

### 12.3.3.4 Alternative 1C—Dual Conveyance with West Alignment and Intakes W1–W5 (15,000 cfs; Operational Scenario A)

Section 3.5.4 in Chapter 3, *Description of Alternatives*, provides details of Alternative 1C, and Figure 3-6 depicts the alternative.

#### Natural Communities

##### Tidal Perennial Aquatic

Construction, operation, maintenance and management associated with the conservation components of Alternative 1C would have no long-term adverse effects on the habitats associated with the tidal perennial aquatic natural community. Initial development and construction of CM1, CM2, CM4, CM5, and CM6 would result in both permanent and temporary removal or modification of this community (see Table 12-1C-1). Full implementation of Alternative 1C would also include the following conservation actions over the term of the BDCP to benefit the tidal perennial aquatic natural community (BDCP Chapter 3, Section 3.3, *Biological Goals and Objectives*).

- Restore and protect 65,000 acres of tidal natural communities and transitional uplands to accommodate sea level rise (Objective L1.3, associated with CM4).
- Within the restored and protected tidal natural communities and transitional uplands, restore or create tidal perennial aquatic natural community as necessary when creating tidal emergent wetland (Objective TPANC1.1, associated with CM4).
- Control invasive aquatic vegetation that adversely affects native fish habitat (Objective TPANC2.1, associated with CM13).

There is a variety of other, less specific conservation goals and objectives in the BDCP that would improve the value of tidal perennial aquatic natural community for terrestrial species. As explained below, with the restoration and enhancement of these amounts of habitat, in addition to AMMs, impacts on tidal aquatic natural community would not be adverse for NEPA purposes and would be less than significant for CEQA purposes.

Note that two time periods are represented in Table 12-1C-1 and the other tables contained in the analysis of Alternative 1C. The near-term (NT) acreage effects listed in the table would occur over the first 10 years of Alternative 1C implementation. The late long-term (LLT) effects contained in these tables represent the cumulative effects of all activities over the entire 50-year term of the Plan. This table and all impact tables in the chapter include reference to only those CMs that would eliminate natural community acreage either through construction or restoration activities, or would result in periodic inundation of the community. Table 3-4 in Chapter 3, *Description of Alternatives*, describes the implementation schedule for all natural community protection and restoration conservation measures.

1 **Table 12-1C-1. Changes in Tidal Perennial Aquatic Natural Community Associated with Alternative**  
2 **1C (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Permanent		Temporary		Periodic <sup>d</sup>	
	NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	25	25	117	117	0	0
CM2	8	8	11	11	9-36	0
CM4	51	58	0	0	0	0
CM5	0	2	0	5	0	39
CM6	Unk.	Unk.	Unk.	Unk.	0	0
<b>TOTAL IMPACTS</b>	<b>84</b>	<b>93</b>	<b>128</b>	<b>133</b>	<b>9-36</b>	<b>39</b>

<sup>a</sup> See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

Unk. = unknown

3

4 **Impact BIO-1: Changes in Tidal Perennial Aquatic Natural Community as a Result of**  
5 **Implementing BDCP Conservation Measures**

6 Construction and land grading activities that would accompany the implementation of CM1, CM2,  
7 CM4, CM5, and CM6 would permanently affect an estimated 93 acres and temporarily remove 133  
8 acres of tidal perennial aquatic natural community in the study area. These modifications represent  
9 less than 1% of the 86,263 acres of the community that is mapped in the study area. The majority of  
10 the permanent and temporary effects would happen during the first 10 years of Alternative 1C  
11 implementation, as water conveyance facilities are constructed and habitat restoration is initiated.  
12 Natural communities restoration would add 8,300 acres of tidal wetlands, including an estimated  
13 3,400 acres of tidal perennial aquatic natural community during the same period, which would  
14 expand the area of that habitat and offset the losses. The 3,400-acre increase is estimated, based on  
15 modeling reported in BDCP Appendix 3.B, Table 5, by comparing existing Plan Area subtidal habitat  
16 to near-term subtidal habitat with the Plan. The BDCP beneficial effects analysis (BDCP Chapter 5,  
17 Section 5.4.1.2) indicates that, while there would be no minimum restoration requirement for the  
18 tidal perennial aquatic natural community, an estimated approximately 27,000 acres of tidal  
19 perennial aquatic natural community would be restored based on tidal restoration modeling. This  
20 estimate is based on Table 5 in BDCP Appendix 3.B, subtracting late long-term without project  
21 acreage from late long-term with project acreage.

22 The individual effects of each relevant conservation measure are addressed below. A summary  
23 statement of the combined impacts and NEPA and CEQA conclusions follows the individual  
24 conservation measure discussions.

- 1       ● *CM1 Water Facilities and Operation*: Construction of the Alternative 1C water conveyance  
2 facilities would permanently remove 25 acres and temporarily remove 117 acres of tidal  
3 perennial aquatic community. Most of the permanent loss would be where Intakes W1–5  
4 encroach on the Sacramento River’s west bank from just north of Clarksburg to just north of  
5 Courtland (see Terrestrial Biology Mapbook, a support document to the EIS/EIR, for a detailed  
6 view of proposed facilities overlain on natural community mapping)). The footings and the  
7 screens at the intake sites would be placed into the river margin and would displace moderately  
8 deep to shallow, flowing open water with a mud substrate and very little aquatic vegetation. A  
9 small area of this community would also be lost to canal construction just east of Elk Slough,  
10 across the river from Hood. The temporary effects on tidal perennial aquatic habitats would  
11 occur at numerous locations, including in the Sacramento River at Intakes W1–5, and at  
12 temporary siphon, barge unloading and tunnel work areas along the western tunnel and canal  
13 alignment. Elk Slough would be temporarily affected by a tunnel work area south of Clarksburg,  
14 and a large siphon work area where the canal would cross under the slough on the west side of  
15 Merritt Island. Temporary siphon work areas would affect tidal perennial aquatic habitats on  
16 Miner Slough at the north end of Ryer Island, on Rock Slough at its head with Contra Costa Canal,  
17 and on Italian Slough immediately adjacent to the west side of Clifton Court Forebay. Barge  
18 unloading facilities would create temporary effects on the Sacramento River just upstream of its  
19 junction with Cache Slough, and on Fishermans Cut just west of Franks Tract. A control structure  
20 work area would temporarily affect the California Aqueduct just south of Clifton Court Forebay.  
21 The details of these locations can be seen in the Terrestrial Biology Mapbook. These losses  
22 would take place during the near-term construction period.
- 23       ● *CM2 Yolo Bypass Fisheries Enhancement*: Implementation of CM2 would involve a number of  
24 construction activities within the Yolo and Sacramento Bypasses, including Fremont Weir and  
25 stilling basin improvements, Putah Creek realignment activities, Tule Canal/Toe Drain and  
26 Lisbon Weir modification and Sacramento Weir improvements. Some of these activities could  
27 involve excavation and grading in tidal perennial aquatic areas to improve passage of fish  
28 through the bypasses. Based on hypothetical construction footprints, a total of 8 acres could be  
29 permanently lost and another 11 acres could be temporarily removed. This activity would occur  
30 primarily in the near-term timeframe.
- 31       ● *CM4 Tidal Natural Communities Restoration*: Based on the use of hypothetical restoration  
32 footprints, implementation of CM4 would affect 18 acres of tidal perennial aquatic community.  
33 CM4 involves conversion of existing natural communities to a variety of tidal wetlands,  
34 including tidal perennial aquatic, tidal brackish emergent, and tidal freshwater emergent  
35 wetlands. Specific locations for these conversions are not known. The 18 acres could remain  
36 tidal perennial aquatic with a modified tidal prism, or they could eventually be converted to one  
37 of the other tidal wetland types. For purposes of this analysis, a conservative approach has been  
38 taken and the effect has been discussed simultaneously with the habitat losses associated with  
39 other conservation measures. An estimated 65,000 acres of tidal wetlands and transitional  
40 upland would be restored during tidal habitat restoration, consistent with BDCP Objective L1.3.  
41 Of these acres, an estimated 27,000 acres of tidal perennial aquatic habitat would be restored,  
42 based on modeling conducted by ESA PWA (refer to Table 5 in BDCP Appendix 3.B, *BDCP Tidal  
43 Habitat Evolution Assessment*). This restoration would be consistent with BDCP Objective  
44 TPANC1.1. Approximately 3,400 acres of the restoration would happen during the first 10 years  
45 of Alternative 1C implementation, which would coincide with the timeframe of water  
46 conveyance facilities construction. The remaining restoration would be spread over the  
47 following 30 years. Tidal natural communities restoration is expected to be focused in the ROAs

1 identified in Figure 12-1. Some of the restoration would occur in the lower Yolo Bypass, but  
2 restoration would also be spread among the Suisun Marsh, South Delta, Cosumnes/Mokelumne  
3 and West Delta ROAs.

- 4 ● *CM5 Seasonally Inundated Floodplain Restoration*: Floodplain restoration levee construction  
5 would permanently remove 2 acres and temporarily remove 5 acres of tidal perennial aquatic  
6 habitat. The construction-related losses would be considered a permanent removal of the tidal  
7 perennial aquatic habitats directly affected. This activity is scheduled to start following  
8 construction of water conveyance facilities, which is expected to take 10 years. Specific locations  
9 for the floodplain restoration have not been identified, but it is expected that much of the  
10 activity would occur in the south Delta along the major rivers. Floodplain restoration along the  
11 San Joaquin River would improve connectivity for a variety of species that rely on tidal  
12 perennial aquatic habitat. The regional and Plan Area landscape linkages along the San Joaquin  
13 River are included in Figure 12-2.
- 14 ● *CM6 Channel Margin Enhancement*: Channel margin habitat enhancement could result in filling  
15 of small amounts of tidal perennial aquatic habitat along 20 miles of river and sloughs. The  
16 extent of this loss cannot be quantified at this time, but the majority of the enhancement activity  
17 would occur on tidal perennial aquatic habitat margins, including levees and channel banks. The  
18 improvements would occur within the study area on sections of the Sacramento, San Joaquin  
19 and Mokelumne Rivers, and along Steamboat and Sutter Sloughs.

20 The following paragraphs summarize the combined effects discussed above and describe other  
21 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA impact conclusions are  
22 also included.

### 23 ***Near-Term Timeframe***

24 During the near-term timeframe (the first 10 years of BDCP implementation), Alternative 1C would  
25 affect the tidal perennial aquatic community through CM1 construction losses (25 acres permanent  
26 and 117 acres temporary) and the CM2 construction losses (8 acres permanent and 11 acres  
27 temporary). The habitat would be lost primarily along the Sacramento River at the western intake  
28 sites, at slough crossings along the western canal and tunnel alignment, or in the northern Yolo  
29 Bypass. Approximately 51 acres of the inundation and construction-related effects from CM4 would  
30 occur during the near-term throughout the ROAs mapped in Figure 12-1.

31 The construction losses of this special-status natural community would represent an adverse effect  
32 if they were not offset by avoidance and minimization measures and restoration actions associated  
33 with BDCP conservation components. Loss of tidal perennial aquatic natural community would be  
34 considered both a loss in acreage of a sensitive natural community and a loss of waters of the United  
35 States as defined by Section 404 of the CWA. However, the creation of approximately 3,400 acres of  
36 high-value tidal perennial aquatic natural community as part of CM4 during the first 10 years of  
37 Alternative 1C implementation would offset this near-term loss, avoiding any adverse effect. Typical  
38 project-level mitigation ratios (1:1 for restoration) would indicate 212 acres of restoration would be  
39 needed to offset (i.e., mitigate) the 212 acres of effect (the total permanent and temporary near-term  
40 effects listed in Table 12-1C-1) associated with near-term activities, including water conveyance  
41 facilities construction.

42 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
43 *Construction Best Management Practices and Monitoring*, *AMM6 Disposal and Reuse of Spoils*,  
44 *Reusable Tunnel Material*, and *Dredged Material*, *AMM7 Barge Operation Plan*, and *AMM10*

1 *Restoration of Temporarily Affected Natural Communities.* All of these AMMs include elements that  
2 avoid or minimize the risk of affecting habitats at work areas and storage sites. The AMMs are  
3 described in detail in BDCP Appendix 3.C.

#### 4 ***Late Long-Term Timeframe***

5 Implementation of Alternative 1C as a whole would result in relatively minor (less than 1%)  
6 conversions or losses of tidal perennial aquatic community in the study area. These losses or  
7 conversions (93 acres of permanent and 133 acres of temporary loss) would be largely associated  
8 with construction of the water conveyance facilities (CM1), construction of Yolo Bypass fish  
9 improvements (CM2), and inundation during tidal marsh restoration (CM4). Inundation conversions  
10 would occur through the course of the Plan's restoration activities at various tidal restoration sites  
11 throughout the study area. By the end of the Plan timeframe, a total of more than 27,000 acres of  
12 high-value tidal perennial aquatic natural community would be restored (estimated from Table 5 in  
13 BDCP Appendix 3.B, *BDCP Tidal Habitat Evolution Assessment*). The restoration would occur over a  
14 wide region of the study area, including within the Suisun Marsh, Cosumnes/Mokelumne, Cache  
15 Slough, and South Delta ROAs (see Figure 12-1).

16 ***NEPA Effects:*** The creation of approximately 3,400 acres of high-value tidal perennial aquatic  
17 natural community as part of CM4 during the first 10 years of Alternative 1C implementation would  
18 offset near-term losses associated with construction activities for CM1, CM2, CM4 and CM6, avoiding  
19 any adverse effect. Alternative 1A, which includes restoration of an estimated 27,000 acres of this  
20 natural community over the course of the Plan, would not result in a net long-term reduction in the  
21 acreage of a sensitive natural community; the effect would be beneficial.

#### 22 ***CEQA Conclusion:***

#### 23 ***Near-Term Timeframe***

24 Alternative 1C would result in the loss or conversion of approximately 212 acres of tidal perennial  
25 aquatic natural community due to construction of the water conveyance facilities (CM1) and fish  
26 passage improvements (CM2), and inundation during tidal marsh restoration (CM4). The  
27 construction losses would be primarily along the Sacramento River at western intake sites, at slough  
28 and river crossings during canal and tunnel construction, and within the northern section of the  
29 Yolo Bypass, while inundation conversions would be at various tidal restoration sites throughout  
30 the study area. The losses and conversions would be spread across the 10-year near-term  
31 timeframe. These losses and conversions would be offset by planned restoration of an estimated  
32 3,400 acres of high-value tidal perennial aquatic natural community scheduled for the first 10 years  
33 of Alternative 1C implementation (CM4). AMM1, AMM2, AMM6, AMM7, and AMM10 would also be  
34 implemented to minimize impacts. Because of these offsetting near-term restoration activities and  
35 AMMs, impacts would be less-than-significant. Typical project-level mitigation ratios (1:1 for  
36 restoration) would indicate that 212 acres of restoration would be needed to offset (i.e., mitigate)  
37 the 212 acres of loss or conversions. The restoration would be initiated at the beginning of  
38 Alternative 1C implementation to minimize any time lag in the availability of this habitat to special-  
39 status species, and would result in a net gain in acreage of this sensitive natural community.

#### 40 ***Late Long-Term Timeframe***

41 At the end of the Plan period, 236 acres of the natural community would be lost or converted and an  
42 estimated 27,000 acres of this community would be restored. There would be no net permanent

1 reduction in the acreage of this sensitive natural community within the study area. Therefore,  
2 Alternative 1C would not have a substantial adverse effect on this natural community; the impact  
3 would be beneficial.

#### 4 **Impact BIO-2: Increased Frequency, Magnitude and Duration of Periodic Inundation of Tidal** 5 **Perennial Aquatic Natural Community**

6 Two Alternative 1C conservation measures would modify the water depths and flooding regimes of  
7 both natural and man-made waterways in the study area. CM2, which is designed to improve fish  
8 passage and shallow flooded habitat for Delta fishes in the Yolo Bypass, would increase periodic  
9 inundation of tidal perennial aquatic natural community on small acreages, while CM5 would expose  
10 this community to additional flooding as channel margins are modified and levees are set back to  
11 improve fish habitat along some of the major rivers and waterways throughout the study area.

12 • *CM2 Yolo Bypass Fisheries Enhancement*: Operation of the Yolo Bypass under Alternative 1C  
13 would result in an increase in the frequency, magnitude and duration of inundation-related  
14 changes in water depth and velocity of 9–36 acres of tidal perennial aquatic natural community.  
15 The methods used to estimate these inundation acreages are described in BDCP Appendix 5.J,  
16 *Effects on Natural Communities, Wildlife, and Plants*. The area more frequently affected by  
17 inundation would vary with the flow volume that would pass through the newly constructed  
18 notch in the Fremont Weir. The 9-acre increase in inundation would be associated with a notch  
19 flow of 1,000 cfs, and the 36-acre increase would result from a notch flow of 4,000 cfs. Plan-  
20 related increases in flow through Fremont Weir would be expected in 30% of the years. Most of  
21 the tidal perennial aquatic community occurs in the southern section of the bypass on Liberty  
22 Island, and, to a lesser extent, along the eastern edge of the bypass, including the Tule Canal/Toe  
23 Drain. The anticipated change in management of flows in the Yolo Bypass includes more  
24 frequent releases in flows into the bypass from the Fremont and Sacramento Weirs, and in some  
25 years, later releases into the bypass in spring months (April and May). The modification of  
26 periodic inundation events would be expected to be beneficial to the ecological function of tidal  
27 perennial aquatic habitat in the bypass as it relates to BDCP covered aquatic species. The Yolo  
28 Bypass waterway is the key element in the Yolo Bypass landscape linkage mapped in Figure 12-  
29 2 and described in detail in BDCP Chapter 3, Table 3.2-3. The change in periodic inundation in  
30 the bypass would not substantially modify its value for special-status or common terrestrial  
31 species. Water depths and water flow rates would increase over Existing Conditions and the No  
32 Action condition in approximately 30% of the years, but it would not fragment the habitat or  
33 make it less accessible to special-status or common terrestrial species. The modifications would  
34 not result in a loss of this community. The plant species associated with this community are  
35 adapted to inundation. The extended inundation would be designed to expand foraging and  
36 spawning habitat for Delta fishes. The effects of these changes in the inundation regime on  
37 terrestrial species that rely on tidal perennial aquatic habitats are discussed in detail later in this  
38 chapter, under the individual species assessments.

39 • *CM5 Seasonally Inundated Floodplain Restoration*: Floodplain restoration would result in a  
40 seasonal increase in the frequency and duration of flooding of 39 acres of tidal perennial aquatic  
41 habitat. Specific locations for this restoration activity have not been identified, but they would  
42 likely be focused in the south Delta area, along the major rivers and Delta channels. The more  
43 frequent exposure of these wetlands to stream flooding events would be beneficial to the  
44 ecological function of tidal perennial aquatic habitats, especially as they relate to BDCP target

1 aquatic species. The plant species associated with these tidal perennial aquatic areas are  
2 adapted to inundation and would not be substantially modified.

3 In summary, 48–75 acres of tidal perennial aquatic community in the study area would be subjected  
4 to more frequent increases in water depth and velocity from flood flows as a result of implementing  
5 two Alternative 1C conservation measures (CM2 and CM5). Tidal perennial aquatic community is  
6 already, by definition, permanently inundated aquatic habitat of value to terrestrial and aquatic  
7 species in the study area; therefore, periodic changes in water depth and velocity would not result in  
8 a net permanent reduction in the acreage of this community in the study area.

9 **NEPA Effects:** Increasing periodic inundation of tidal perennial aquatic natural community would  
10 not have an adverse effect on the community.

11 **CEQA Conclusion:** An estimated 48–75 acres of tidal perennial aquatic community in the study area  
12 would be subjected to more frequent increases in water depth and velocity from inundation as a  
13 result of implementing CM2 and CM5 under Alternative 1C. Tidal perennial aquatic community is  
14 already, by definition, permanently inundated aquatic habitat of value to terrestrial and aquatic  
15 species in the study area. The periodic inundation would not result in a net permanent reduction in  
16 the acreage of this community in the study area. Therefore, there would no substantial adverse  
17 effect on the community. The impact would be less than significant.

### 18 **Impact BIO-3: Modification of Tidal Perennial Aquatic Natural Community from Ongoing** 19 **Operation, Maintenance and Management Activities**

20 Once the physical facilities associated with Alternative 1C are constructed and the stream flow  
21 regime associated with changed water management is in effect, there would be new ongoing and  
22 periodic actions associated with operation, maintenance and management of the BDCP facilities and  
23 conservation lands that could affect tidal perennial aquatic natural community in the study area. The  
24 ongoing actions include the diversion of Sacramento River flows in the north Delta, and reduced  
25 diversions from south Delta channels. These actions are associated with CM1 (see the impact  
26 discussion above for effects associated with CM2). The periodic actions would involve access road  
27 and conveyance facility repair, vegetation management at the various water conveyance facilities  
28 and habitat restoration sites (CM13), levee and canal repair and replacement of levee armoring,  
29 channel dredging, and habitat enhancement in accordance with natural community management  
30 plans. The potential effects of these actions are described below.

- 31 • *Modified river flows upstream of and within the study area and reduced diversions from south*  
32 *Delta channels.* Changes in releases from reservoirs upstream of the study area, increased  
33 diversion of Sacramento River flows in the north Delta, and reduced diversions from south Delta  
34 channels (associated with Operational Scenario A) would not result in the permanent reduction  
35 in acreage of a sensitive natural community in the study area. Flow levels in the upstream rivers  
36 would not change such that the acreage of tidal perennial aquatic community would be reduced  
37 on a permanent basis. Some minor increases and some decreases would be expected to occur  
38 during some seasons and in some water-year types, but there would be no permanent loss.  
39 Similarly, increased diversions of Sacramento River flows in the north Delta would not result in  
40 a permanent reduction in tidal perennial aquatic community downstream of these diversions.  
41 Tidal influence on water levels in the Sacramento River and Delta waterways would continue to  
42 be dominant. Reduced diversions from the south Delta channels would not create a reduction in  
43 this natural community.

1 The periodic changes in flows in the Sacramento River, Feather River, and American River  
2 associated with Alternative 1C operations would affect salinity, water temperature, dissolved  
3 oxygen levels, turbidity, contaminant levels, and dilution capacity in these rivers and Delta  
4 waterways. These changes are discussed in detail in Chapter 8, *Water Quality*. Potentially  
5 substantial increases in electrical conductivity (salinity) are predicted for the Delta and Suisun  
6 Marsh as a result of increased export of Sacramento River water. These salinity changes are not  
7 expected to result in a permanent reduction in the acreage or value of tidal perennial aquatic  
8 natural community for terrestrial species in the study area.

- 9 ● *Access road, water conveyance facility and levee repair.* Periodic repair of access roads, water  
10 conveyance facilities and levees associated with the BDCP actions have the potential to require  
11 removal of adjacent vegetation and could entail earth and rock work in tidal perennial aquatic  
12 habitats. This activity could lead to increased soil erosion, turbidity and runoff entering tidal  
13 perennial aquatic habitats. These activities would be subject to normal erosion, turbidity and  
14 runoff control management practices, including those developed as part of *AMM2 Construction*  
15 *Best Management Practices and Monitoring* and *AMM4 Erosion and Sediment Control Plan*. Any  
16 vegetation removal or earthwork adjacent to or within aquatic habitats would require use of  
17 sediment and turbidity barriers, soil stabilization and revegetation of disturbed surfaces. Proper  
18 implementation of these measures would avoid permanent adverse effects on this community.
- 19 ● *Vegetation management.* Vegetation management in the form of physical removal and chemical  
20 treatment would be a periodic activity associated with the long-term maintenance of water  
21 conveyance facilities and restoration sites. Vegetation management is also the principal activity  
22 associated with *CM13 Invasive Aquatic Vegetation Control* and is consistent with BDCP Objective  
23 TPANC2.1. Use of herbicides to control nuisance vegetation could pose a long-term hazard to  
24 tidal perennial aquatic natural community at or adjacent to treated areas. The hazard could be  
25 created by uncontrolled drift of herbicides, uncontrolled runoff of contaminated stormwater  
26 onto the natural community, or direct discharge of herbicides to tidal perennial aquatic areas  
27 being treated for invasive species removal. Environmental commitments and *AMM5 Spill*  
28 *Prevention, Containment and Countermeasure Plan* have been made part of the BDCP to reduce  
29 hazards to humans and the environment from use of various chemicals during maintenance  
30 activities, including the use of herbicides. These commitments are described in Appendix 3B,  
31 including the commitment to prepare and implement spill prevention, containment, and  
32 countermeasure plans and stormwater pollution prevention plans. Best management practices,  
33 including control of drift and runoff from treated areas, and use of herbicides approved for use  
34 in aquatic environments would also reduce the risk of affecting natural communities adjacent to  
35 water conveyance features and levees associated with restoration activities.

36 Herbicides to remove aquatic invasive species as part of CM13 would be used to restore the  
37 normal ecological function of tidal aquatic habitats in planned restoration areas. The treatment  
38 activities would be conducted in concert with the California Department of Boating and  
39 Waterways' invasive species removal program. Eliminating large stands of water hyacinth and  
40 Brazilian waterweed would improve habitat conditions for some aquatic species by removing  
41 cover for nonnative predators, improving water flow and removing barriers to movement (see  
42 Chapter 11, *Fish and Aquatic Resources*). These habitat changes should also benefit terrestrial  
43 species that use tidal perennial aquatic natural community for movement corridors and for  
44 foraging. Vegetation management effects on individual species are discussed in the species  
45 sections on following pages.

- 1 • *Channel dredging.* Long-term operation of the Alternative 1C intakes on the Sacramento River  
2 would include periodic dredging of sediments that might accumulate in front of intake screens.  
3 The dredging would occur in tidal perennial aquatic natural community and would result in  
4 short-term increases in turbidity and disturbance of the substrate. These conditions would not  
5 eliminate the community, but would diminish its value for special-status and common species  
6 that rely on it for movement corridor or foraging area. The individual species effects are  
7 discussed later in this chapter.
- 8 • *Habitat enhancement.* The BDCP includes a long-term management element for the natural  
9 communities within the Plan Area (CM11). For tidal perennial aquatic natural community, a  
10 management plan would be prepared that specifies actions to improve the value of the habitats  
11 for covered species. Actions would include control of invasive nonnative plant and animal  
12 species, restrictions on vector control and application of herbicides, and maintenance of  
13 infrastructure that would allow for movement through the community. The enhancement efforts  
14 would improve the long-term value of this community for both special-status and common  
15 species.

16 The various operations and maintenance activities described above could alter acreage of tidal  
17 perennial aquatic natural community in the study area through changes in flow patterns and  
18 changes in water quality. Activities could also introduce sediment and herbicides that would reduce  
19 the value of this community to common and sensitive plant and wildlife species. Other periodic  
20 activities associated with the Plan, including management, protection and enhancement actions  
21 associated with *CM3 Natural Communities Protection and Restoration* and *CM11 Natural*  
22 *Communities Enhancement and Management*, would be undertaken to enhance the value of the  
23 community. While some of these activities could result in small reductions in acreage, these  
24 reductions would be greatly offset by restoration activities planned as part of *CM4 Tidal Natural*  
25 *Communities Restoration*. The management actions associated with levee repair, periodic dredging  
26 and control of invasive plant species would also result in a long-term benefit to the species  
27 associated with tidal perennial aquatic habitats by improving water movement.

28 **NEPA Effects:** Ongoing operation, maintenance and management activities associated with  
29 Alternative 1C would not result in a net permanent reduction in this sensitive natural community  
30 within the study area. Therefore, there would be no adverse effect to the community.

31 **CEQA Conclusion:** The operation and maintenance activities associated with Alternative 1C would  
32 have the potential to create minor losses in total acreage of tidal perennial aquatic natural  
33 community in the study area, and could create temporary increases in turbidity and sedimentation.  
34 The activities could also introduce herbicides periodically to control nonnative, invasive plants.  
35 Implementation of environmental commitments and AMM2, AMM4, and AMM5 would minimize  
36 these impacts, and other operations and maintenance activities, including management, protection  
37 and enhancement actions associated with *CM3 Natural Communities Protection and Restoration* and  
38 *CM11 Natural Communities Enhancement and Management*, would create positive effects, including  
39 improved water movement in these habitats. Long-term restoration activities associated with *CM4*  
40 *Tidal Natural Communities Restoration* would greatly expand this natural community in the study  
41 area. Ongoing operation, maintenance and management activities would not result in a net  
42 permanent reduction in the acreage or value of this sensitive natural community within the study  
43 area. Therefore, there would be a less-than-significant impact.

1 **Tidal Brackish Emergent Wetland**

2 Construction, operation, maintenance and management associated with the conservation  
3 components of Alternative 1C would have no adverse effect on the habitats associated with the tidal  
4 brackish emergent wetland natural community. Habitat restoration and construction associated  
5 with CM1, CM2, CM5 and CM6 would not remove tidal brackish emergent wetland; levee breaching  
6 and minor construction associated with CM4 may temporarily remove small amounts of this natural  
7 community (see Table 12-1C-2). Full implementation of Alternative 1C would include the following  
8 conservation actions over the term of the BDCP to benefit the tidal brackish emergent wetland  
9 natural community.

- 10 ● Restore and protect 65,000 acres of tidal natural communities and transitional uplands to  
11 accommodate sea level rise (Objective L1.3 associated with CM4).
- 12 ● Within the restored and protected tidal natural communities and transitional uplands, include  
13 sufficient transitional uplands along the fringes of restored brackish and freshwater tidal  
14 emergent wetlands to accommodate up to 3 feet of sea level rise where possible and allow for  
15 the future upslope establishment of tidal emergent wetland communities (Objective L1.7,  
16 associated with CM4).
- 17 ● Within the restored and protected tidal natural communities and transitional uplands, restore  
18 or create at least 6,000 acres of tidal brackish emergent wetland in Conservation Zone 11  
19 (Objective TBEWNC1.1 associated with CM4).
- 20 ● Restore connectivity to isolated patches of tidal brackish emergent marsh where isolation has  
21 reduced effective use of these marshes by the species that depend on them (Objective  
22 TBEWNC1.3 associated with CM4).
- 23 ● Create topographic heterogeneity in restored tidal brackish emergent wetland to provide  
24 variation in inundation characteristics and vegetative composition (Objective TBEWNC1.4  
25 associated with CM4).
- 26 ● Limit perennial pepperweed to no more than 10% cover in tidal brackish emergent wetland  
27 natural community within the reserve system (Objective TBEWNC2.1 associated with CM11).

28 There is a variety of other, less specific conservation goals and objectives in BDCP Chapter 3, Section  
29 3.3, *Biological Goals and Objectives*, that would improve the value of tidal brackish emergent wetland  
30 natural community for terrestrial species. As explained below, with the restoration and  
31 enhancement of these amounts of habitat, in addition to implementation of AMMs, impacts on this  
32 natural community would not be adverse for NEPA purposes and would be less than significant for  
33 CEQA purposes.

1 **Table 12-1C-2. Changes in Tidal Brackish Emergent Wetland Natural Community Associated with**  
2 **Alternative 1C (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Permanent		Temporary		Periodic <sup>d</sup>	
	NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	0	0	0	0	0	0
CM2	0	0	0	0	0	0
CM4	Unk.	Unk.	Unk.	Unk.	0	0
CM5	0	0	0	0	0	0
CM6	0	0	0	0	0	0
<b>TOTAL IMPACTS</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

<sup>a</sup> See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only.

NT = near-term

LLT = late long-term

Unk. = unknown

3

4 **Impact BIO-4: Changes in Tidal Brackish Emergent Wetland Natural Community as a Result of**  
5 **Implementing BDCP Conservation Measures**

6 Construction of the Alternative 1C water conveyance facilities (CM1) would not affect tidal brackish  
7 emergent wetland natural community.

8 Restoration of tidal marsh habitats associated with CM4 would require site preparation, earthwork,  
9 and other site activities that could remove tidal brackish emergent wetland. Levee modifications,  
10 grading or contouring, filling to compensate for land subsidence, and creation of new channels could  
11 also result in the removal of tidal brackish emergent wetland. All of this construction and land  
12 modification activity that could affect tidal brackish emergent wetland would occur in Suisun Marsh  
13 (CZ 11). The acreage of loss has not been calculated because the specific locations for site  
14 preparation and earthwork have not been identified, but the loss would likely be small (less than 1  
15 acre). These activities would occur in small increments during the course of the CM4 restoration  
16 program. The protection and restoration elements of CM4 would greatly exceed any of the short-  
17 term losses described above. At least 6,000 acres of tidal brackish emergent wetland would be  
18 restored in the Plan Area (BDCP Objective TBEWNC1.1, associated with CM4), with 2,000 acres of  
19 restoration occurring in the near-term timeframe. In addition, the habitat and ecosystem functions  
20 of BDCP restored tidal brackish emergent wetland would be maintained and enhanced (CM11). The  
21 BDCP beneficial effects evaluation of Alternative 4 (BDCP Chapter 5, Section 5.4.3.2) states that at  
22 least 6,000 acres of tidal brackish emergent wetland community would be restored in CZ 11, and  
23 that tidal natural communities restoration would decrease habitat fragmentation by providing  
24 additional connectivity between isolated patches of tidal brackish emergent wetland. These same  
25 conservation benefits would occur under Alternative 1C.

1 The restoration activities associated with CM4 in Suisun Marsh would result in other effects that  
2 could alter the habitat value of tidal brackish emergent wetland. Disturbances associated with levee  
3 breaching and grading or contouring would increase opportunities for the introduction or spread of  
4 invasive species. Implementation of CM11 would limit this risk through invasive species control and  
5 wetland management and enhancement activities to support native species. Tidal flooding of dry  
6 areas could also increase the bioavailability of methylmercury in Suisun Marsh. Site-specific  
7 conditions would dictate the significance of this hazard to tidal brackish marsh vegetation and  
8 associated wildlife. According to the Suisun Marsh Plan EIR/EIS (Bureau of Reclamation et al. 2010,  
9 pg. 5.2-18), marsh creation may generate less methylmercury than is currently being generated by  
10 managed wetlands. However, this has not been confirmed through comprehensive studies. Because  
11 of the difficulty in assessing this risk at a programmatic level, it will need to be considered at a  
12 project level. Site-specific restoration plans that address the creation and mobilization of mercury,  
13 and monitoring and adaptive management as described in *CM12 Methylmercury Management*, would  
14 be available to address the uncertainty of methylmercury levels in restored tidal marsh. Water  
15 temperature fluctuations in newly created marsh and the potential for increased nitrogen  
16 deposition associated with construction vehicles are also issues of concern that are difficult to  
17 quantify at the current stage of restoration design. None of these effects is expected to limit the  
18 extent or value of tidal brackish emergent wetland in the study area.

19 **NEPA Effects:** The increase of tidal brackish emergent wetland associated with CM4 would be a  
20 beneficial effect on the natural community.

21 **CEQA Conclusion:** Tidal brackish emergent wetland natural community could experience small  
22 losses in acreage in Suisun Marsh (CZ 11) as a result of the large-scale tidal marsh restoration  
23 planned as part of CM4. These losses (not expected to exceed 1 acre) would be associated with levee  
24 modification, site preparation and other earthwork needed to expose diked lands to tidal influence.  
25 Because at least 6,000 acres of tidal brackish emergent wetland would be restored in the study area  
26 as part of CM4, including 2,000 acres restored in the near-term timeframe, there would be a large  
27 increase in tidal brackish emergent wetland both in the near-term and over the life of the Plan.  
28 Indirect effects associated with the expansion of tidal brackish emergent wetland natural  
29 community, including the potential spread of invasive species, the generation of methylmercury,  
30 increases in marsh water temperatures, and increased nitrogen deposition are not expected to have  
31 a significant impact on this natural community in the study area. Therefore, this impact would be  
32 beneficial.

### 33 **Impact BIO-5: Modification of Tidal Brackish Emergent Wetland Natural Community from** 34 **Ongoing Operation, Maintenance and Management Activities**

35 Once the physical facilities associated with CM4 of Alternative 1C are constructed and the water  
36 management practices associated with marsh restoration are in effect, there would be new ongoing  
37 and periodic actions that could affect tidal brackish emergent wetland natural community in the  
38 study area. The ongoing actions would include water releases and diversions, access road and levee  
39 repair, replacement of levee armoring, channel dredging, and habitat enhancement in accordance  
40 with natural community management plans. The potential effects of these actions are described  
41 below.

- 42 • *Modified river flows upstream of and within the study area and reduced diversions from south*  
43 *Delta channels.* Changes in releases from reservoirs upstream of the study area, increased  
44 diversion of Sacramento River flows in the north Delta, and reduced diversion from south Delta

1 channels (associated with Operational Scenario A) would not result in the permanent reduction  
2 in acreage of tidal brackish emergent wetland natural community in the study area. Flow levels  
3 in the upstream rivers would not directly affect this natural community because it does not exist  
4 upstream of the Delta. Increased diversions of Sacramento River flows in the north Delta would  
5 not result in a permanent reduction in tidal brackish emergent wetland downstream of these  
6 diversions. Salinity levels in Suisun Marsh channels would be expected to increase with reduced  
7 Sacramento River outflows (see Chapter 8, *Water Quality*), but this change would not be  
8 sufficient to change the acreage of brackish marsh. This natural community persists in an  
9 environment that experiences natural fluctuations in salinity due to tidal ebb and flow. Reduced  
10 diversions from the south Delta channels would not create a reduction in this natural  
11 community.

12 The increased diversion of Sacramento River flows in the north Delta would result in reductions  
13 in sediment load (annual mass) flowing into the central and west Delta, and Suisun Marsh. The  
14 reduction is estimated to be approximately 9% of the river's current sediment load for  
15 Alternative 4, which would have a north Delta diversion capacity of 9,000 cfs under Operational  
16 Scenario H (see BDCP Appendix 5.C, Attachment 5C.D, Section 5C.D.3.3 for a detailed analysis of  
17 this issue). Alternative 1C, which would have a 15,000 cfs diversion capacity (Operational  
18 Scenario A), would be expected to reduce the sediment load by approximately 15%, assuming  
19 that most of the sediment would be removed during high river flow periods when north Delta  
20 pumping would normally be running at or near intake capacity. This would contribute to a  
21 decline in sediment reaching the Delta and Suisun Marsh that has been occurring over the past  
22 50-plus years due to a gradual depletion of sediment from the upstream rivers. The depletion  
23 has been caused by a variety of factors, including depletion of hydraulic mining sediment in  
24 upstream areas, armoring of river channels and a cutoff of sediment due to dam construction on  
25 the Sacramento River and its major tributaries (Wright and Schoellhamer 2004; Barnard et al.  
26 2013).

- 27 ● Reduced sediment load flowing into the Delta and Suisun Marsh could have an adverse effect on  
28 tidal marsh, including tidal brackish emergent wetland. Sediment trapped by the marsh  
29 vegetation allows the emergent plants to maintain an appropriate water depth as water levels  
30 gradually rise from the effects of global warming (see Chapter 29, *Climate Change*). The BDCP  
31 proponents have incorporated an environmental commitment (see Appendix 3B, Section  
32 3B.1.19, *Disposal and Reuse of Spoils, Reusable Tunnel Material and Dredged Material*) into the  
33 project that would lessen this potential effect. The Sacramento River water diverted at north  
34 Delta intakes would pass through sedimentation basins before being pumped to water  
35 conveyance structures. The commitment states that sediment collected in these basins would be  
36 periodically removed and reused, to the greatest extent feasible, in the Plan Area for a number of  
37 purposes, including marsh restoration, levee maintenance, subsidence reversal, flood response,  
38 and borrow area fill. The portion of the sediment re-introduced to the Delta and estuary for  
39 marsh restoration would remain available for marsh accretion. With this commitment to reuse  
40 in the Plan Area, the removal of sediment at the north Delta intakes would not result in a net  
41 reduction in the acreage and value of this special-status marsh community. The effect would not  
42 be adverse (NEPA) and would be less than significant (CEQA). *Access road and levee repair.*  
43 Periodic repair of access roads and levees associated with the BDCP actions has the potential to  
44 require removal of adjacent vegetation and could entail earth and rock work in tidal brackish  
45 emergent wetland habitats. This activity could lead to increased soil erosion, turbidity and  
46 runoff entering these habitats. The activities would be subject to normal erosion, turbidity and  
47 runoff control management practices, including those developed as part of *AMM2 Construction*

1 *Best Management Practices and Monitoring* and *AMM4 Erosion and Sediment Control Plan*. Any  
2 vegetation removal or earthwork adjacent to or within aquatic habitats would require use of  
3 sediment and turbidity barriers, soil stabilization and revegetation of disturbed surfaces. Proper  
4 implementation of these measures would avoid permanent adverse effects on this community.

- 5 • *Vegetation management*. Vegetation management in the form of physical removal and chemical  
6 treatment (CM11) would be a periodic activity associated with the long-term maintenance of  
7 restoration sites. Use of herbicides to control nuisance vegetation could pose a long-term hazard  
8 to tidal brackish emergent wetland natural community at or adjacent to treated areas. The  
9 hazard could be created by uncontrolled drift of herbicides, uncontrolled runoff of contaminated  
10 stormwater onto the natural community, or direct discharge of herbicides to wetland areas  
11 being treated for invasive species removal. Environmental commitments and *AMM5 Spill*  
12 *Prevention, Containment and Countermeasure Plan* have been made part of the BDCP to reduce  
13 hazards to humans and the environment from use of various chemicals during maintenance  
14 activities, including the use of herbicides. These commitments are described in Appendix 3B,  
15 including the commitment to prepare and implement spill prevention, containment, and  
16 countermeasure plans and stormwater pollution prevention plans. Best management practices,  
17 including control of drift and runoff from treated areas, and use of herbicides approved for use  
18 in aquatic environments would also reduce the risk of affecting natural communities adjacent to  
19 levees associated with tidal wetland restoration activities.

20 Herbicides to remove aquatic invasive species as part of CM13 would be used to restore the  
21 normal ecological function of tidal aquatic habitats in planned restoration areas. The treatment  
22 activities would be conducted in concert with the California Department of Boating and  
23 Waterways' invasive species removal program. Eliminating large stands of water hyacinth and  
24 Brazilian waterweed would improve habitat conditions for some aquatic species by removing  
25 cover for nonnative predators, improving water flow and removing barriers to movement (see  
26 Chapter 11, *Fish and Aquatic Resources*). These habitat changes should also benefit terrestrial  
27 species that use tidal brackish emergent wetland natural community for movement corridors  
28 and for foraging. Vegetation management effects on individual species are discussed in the  
29 species sections on following pages.

- 30 • *Channel dredging*. Long-term maintenance of tidal channels that support wetland expansion in  
31 Suisun Marsh would include periodic dredging of sediments. The dredging would take place  
32 adjacent to tidal brackish emergent wetland natural community and would result in short-term  
33 increases in turbidity and disturbance of the substrate. These conditions would not eliminate  
34 the community, but would diminish its value in the short term for special-status and common  
35 species that rely on it for cover, movement corridor or foraging area. The individual species  
36 effects are discussed elsewhere in this chapter.
- 37 • *Habitat enhancement*. The BDCP includes a long-term management element for the natural  
38 communities within the Plan Area (CM11). For tidal brackish emergent wetland natural  
39 community, a management plan would be prepared that specifies actions to improve the value  
40 of the habitats for covered species. Actions would include control of invasive nonnative plant  
41 and animal species, fire management, restrictions on vector control and application of  
42 herbicides, and maintenance of infrastructure that would allow for movement through the  
43 community. The enhancement efforts would improve the long-term value of this community for  
44 both special-status and common species.

1 The various operations and maintenance activities described above could alter acreage and value of  
2 tidal brackish emergent wetland natural community in the study area through water operations,  
3 levee and road maintenance, channel dredging and vegetation management in or adjacent to this  
4 community. Activities could also introduce sediment and herbicides that would reduce the value of  
5 this community to common and sensitive plant and wildlife species. Other periodic activities  
6 associated with the Plan, including management, protection and enhancement actions associated  
7 with *CM3 Natural Communities Protection and Restoration* and *CM11 Natural Communities*  
8 *Enhancement and Management*, would be undertaken to enhance the value of the community. While  
9 some of these activities could result in small changes in acreage, these changes would be greatly  
10 offset by restoration activities planned as part of *CM4 Tidal Natural Communities Restoration*. The  
11 management actions associated with levee repair, periodic dredging and control of invasive plant  
12 species would also result in a long-term benefit to the species associated with tidal brackish  
13 emergent wetland habitats by improving water movement.

14 **NEPA Effects:** Ongoing operation, maintenance and management activities would not result in a net  
15 permanent reduction in this sensitive natural community within the study area. Therefore, there  
16 would be no adverse effect on the tidal brackish emergent wetland natural community.

17 **CEQA Conclusion:** The operation and maintenance activities associated with Alternative 1C would  
18 have the potential to create minor changes (not exceeding 1 acre) in total acreage of tidal brackish  
19 emergent wetland natural community in the study area, and could create temporary increases in  
20 turbidity and sedimentation. The activities could also introduce herbicides periodically to control  
21 nonnative, invasive plants. Implementation of environmental commitments and AMM2, AMM4, and  
22 AMM5 would minimize these impacts, and other operations and maintenance activities, including  
23 management, protection and enhancement actions associated with *CM3 Natural Communities*  
24 *Protection and Restoration* and *CM11 Natural Communities Enhancement and Management*, would  
25 create positive effects, including improved water movement in these habitats. Long-term restoration  
26 activities associated with *CM4 Tidal Natural Communities Restoration* would greatly expand tidal  
27 brackish emergent wetland natural community in the study area. Ongoing operation, maintenance  
28 and management activities would not result in a net permanent reduction in this sensitive natural  
29 community within the study area. Therefore, there would be a less-than-significant impact.

### 30 **Tidal Freshwater Emergent Wetland**

31 Construction, operation, maintenance and management associated with the conservation  
32 components of Alternative 1C would have no long-term adverse effects on the habitats associated  
33 with the tidal freshwater emergent wetland natural community. Initial development and  
34 construction of CM1, CM2, CM4, CM5, and CM6 would result in both permanent and temporary  
35 removal of small acreages of this community (see Table 12-1C-3). Full implementation of Alternative  
36 1C would also include the following conservation actions over the term of the BDCP to benefit the  
37 tidal freshwater emergent wetland natural community.

- 38 ● Restore and protect 65,000 acres of tidal natural communities and transitional uplands to  
39 accommodate sea level rise (Objective L1.3 associated with CM4).
- 40 ● Within the 65,000 acres of tidal natural communities and transitional uplands, include sufficient  
41 transitional uplands along the fringes of restored brackish and freshwater tidal emergent  
42 wetlands to accommodate up to 3 feet of sea level rise where possible and allow for the future  
43 upslope establishment of tidal emergent wetland communities (Objective L1.7, associated with  
44 CM4).

- 1 • Within the 65,000 acres of tidal natural communities, restore or create at least 24,000 acres of  
2 tidal freshwater emergent wetland in Conservation Zones 1, 2, 4, 5, 6 and/or 7 (Objective  
3 TFEWNC1.1, associated with CM4).
- 4 • Restore tidal freshwater emergent wetlands in areas that increase connectivity among  
5 conservation lands (Objective TFEWNC1.2, associated with CM4).
- 6 • Restore and sustain a diversity of marsh vegetation that reflects historical species compositions  
7 and high structural complexity (Objective TFEWNC2.1, associated with CM4).
- 8 • Create topographic heterogeneity in restored tidal freshwater emergent wetland to provide  
9 variation in inundation characteristics and vegetative composition (Objective TFEWNC2.2,  
10 associated with CM4).
- 11 • Protect and manage 50 acres of occupied or recently occupied tricolored blackbird nesting  
12 habitat located within 5 miles of high-value foraging habitat in Conservation Zones 1, 2, 8 or 11.  
13 Nesting habitat will be managed to provide young, lush stands of bulrush/cattail emergent  
14 vegetation (Objective TRBL1.1).

15 There is a variety of other, less specific conservation goals and objectives in BDCP Chapter 3, Section  
16 3.3 that would improve the value of tidal freshwater emergent wetland natural community for  
17 terrestrial species. As explained below, with the restoration and enhancement of these amounts of  
18 habitat, in addition to implementation of AMMs, impacts on this natural community

19 **Table 12-1C-3. Changes in Tidal Freshwater Emergent Wetland Natural Community Associated**  
20 **with Alternative 1C (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Permanent		Temporary		Periodic <sup>d</sup>	
	NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	0	0	1	1	0	0
CM2	6	6	0	0	24-58	0
CM4	1	1	0	0	0	0
CM5	0	1	0	1	0	3
CM6	Unk.	Unk.	Unk.	Unk.	0	0
<b>TOTAL IMPACTS</b>	<b>7</b>	<b>8</b>	<b>1</b>	<b>2</b>	<b>24-58</b>	<b>3</b>

<sup>a</sup> See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

Unk. = unknown

1 **Impact BIO-6: Changes in Tidal Freshwater Emergent Wetland Natural Community as a Result**  
2 **of Implementing BDCP Conservation Measures**

3 Construction and land grading activities that would accompany the implementation of CM1, CM2,  
4 CM4, CM5, and CM6 would permanently eliminate an estimated 8 acres and temporarily remove 2  
5 acres of tidal freshwater emergent wetland natural community in the study area. These  
6 modifications represent less than 1% of the 8,856 acres of the community that is mapped in the  
7 study area. The majority of the permanent and temporary losses would happen during the first 10  
8 years of Alternative 1C implementation, as water conveyance facilities are constructed and habitat  
9 restoration is initiated. Natural communities restoration would add at least 24,000 acres of tidal  
10 freshwater emergent wetland natural community during the course of Plan restoration activities,  
11 which would expand the area of that habitat and offset the losses. The BDCP beneficial effects  
12 evaluation of Alternative 4 (BDCP Chapter 5, Section 5.4.4.2) states that the implementation of *CM4*  
13 *Tidal Natural Communities Restoration* would restore at least 24,000 acres of tidal freshwater  
14 emergent wetland community in Cache Slough (Conservation Zones 1, 2, and 3), the  
15 Cosumnes/Mokelumne (Conservation Zone 4), West Delta (Conservation Zone 5 and 6), and South  
16 Delta (Conservation Zone 7) ROAs. The BDCP evaluation also states that the objectives in the Plan  
17 would promote vegetation diversity and structural complexity (as incorporated into the restoration  
18 design) in restored tidal freshwater marsh. The same conservation actions would occur under  
19 Alternative 1C.

20 The individual effects of each relevant conservation measure are addressed below. A summary  
21 statement of the combined impacts and NEPA and CEQA conclusions follows the individual  
22 conservation measure discussions.

- 23 • *CM1 Water Facilities and Operation*: Construction of the Alternative 1C water conveyance  
24 facilities would temporarily remove 1 acre of tidal freshwater emergent wetland community.  
25 The temporary loss would be located on Brushy Creek immediately adjacent to Byron Highway,  
26 west of Clifton Court Forebay. A temporary railroad work area would be located at this point.  
27 Refer to the Terrestrial Biology Mapbook to see the details of this location. This loss would take  
28 place during the near-term construction period.

29 There is the potential for increased nitrogen deposition associated with construction vehicles  
30 during the construction phase of CM1. BDCP Appendix 5.J, Attachment 5J.A, *Construction-Related*  
31 *Nitrogen Deposition on BDCP Natural Communities*, addresses this issue in detail. It has been  
32 concluded that this potential deposition would pose a low risk of changing tidal freshwater  
33 emergent wetland natural community because the construction would occur primarily  
34 downwind of the natural community and the construction would contribute a negligible amount  
35 of nitrogen to regional projected emissions. No adverse effect is expected.

- 36 • *CM2 Yolo Bypass Fisheries Enhancement*: Implementation of CM2 would involve a number of  
37 construction or channel modification activities within the Yolo and Sacramento Bypasses,  
38 including improvements in flow through the west side channel of the bypass, Putah Creek  
39 realignment activities, Lisbon Weir modification and Sacramento Weir improvements. All of  
40 these activities could involve excavation and grading in tidal freshwater emergent wetland areas  
41 to improve passage of fish through the bypasses. Based on hypothetical construction footprints,  
42 a total of 6 acres could be permanently lost to these activities. The loss is expected to occur  
43 during the first 10 years of Alternative 1C implementation.

- 1 ● *CM4 Tidal Natural Communities Restoration*: Based on hypothetical footprints of this restoration  
2 activity, initial land grading and levee modification could permanently remove 1 acre of tidal  
3 freshwater emergent wetland natural community. This loss would occur during the near-term  
4 timeframe in one of the ROAs identified for tidal wetland restoration. At the same time, an  
5 estimated 24,000 acres of tidal freshwater emergent wetland community would be restored  
6 during tidal habitat restoration (consistent with Objective TFEWNC1.1, associated with CM4).  
7 Approximately 8,850 acres of the restoration would happen during the first 10 years of  
8 Alternative 1C implementation, which would coincide with the timeframe of water conveyance  
9 facilities construction. The remaining restoration would be spread over the following 30 years.  
10 Tidal wetland communities restoration is expected to be focused in the ROAs identified in Figure  
11 12-1. Restoration would be located and designed to improve habitat connectivity (Objective  
12 TFEWNC1.2), improve marsh species diversity (Objective TFEWNC2.1), and provide variation in  
13 inundation characteristics (Objective TFEWNC2.2). Some of the restoration would happen in the  
14 lower Yolo Bypass, but restoration would also be spread among the Suisun Marsh, South Delta,  
15 Cosumnes/Mokelumne and West Delta ROAs.
- 16 ● The restoration activities associated with CM4 in the Plan Area ROAs would result in other  
17 effects that could alter the habitat value of tidal freshwater emergent wetland. Disturbances  
18 associated with levee breaching and grading or contouring would increase opportunities for the  
19 introduction or spread of invasive species. Implementation of CM11 would limit this risk  
20 through invasive species control and wetland management and enhancement activities to  
21 support native species. Flooding of dry areas for tidal freshwater marsh creation could also  
22 increase the bioavailability of methylmercury, especially in the Cache Slough,  
23 Cosumnes/Mokelumne and Suisun Marsh ROAs. Site-specific conditions would dictate the  
24 significance of this hazard to marsh vegetation and associated wildlife. Because of the difficulty  
25 in assessing this risk at a programmatic level, it will need to be considered at a project level.  
26 Site-specific restoration plans that address the creation and mobilization of mercury, and  
27 monitoring and adaptive management as described in *CM12 Methylmercury Management*, would  
28 be available to address the uncertainty of methylmercury levels in restored tidal marsh. Water  
29 temperature fluctuations in newly created marsh is also an issue of concern that is difficult to  
30 quantify at the current stage of restoration design. None of these effects is expected to limit the  
31 extent or value of tidal freshwater emergent wetland in the study area.  
32 *CM5 Seasonally Inundated Floodplain Restoration*: Floodplain restoration levee construction would permanently remove 1  
33 acre and temporarily remove 1 acre of tidal freshwater emergent wetland habitat. The  
34 construction-related losses would be considered a permanent removal of the habitats directly  
35 affected. The majority of seasonally inundated floodplain restoration is expected to be  
36 implemented along the lower San Joaquin River in the south and central Delta areas. Floodplain  
37 restoration along the San Joaquin River would improve connectivity for a variety of species that  
38 rely on freshwater marsh and riparian habitats. The regional and Plan Area landscape linkages  
39 along the San Joaquin River are included in Figure 12-2. This activity is scheduled to start  
40 following construction of water conveyance facilities, which is expected to take 10 years.
- 41 ● *CM6 Channel Margin Enhancement*: Channel margin habitat enhancement could result in filling  
42 of small amounts of tidal freshwater emergent wetland habitat along 20 miles of river and  
43 sloughs. The extent of this loss cannot be quantified at this time, but the majority of the  
44 enhancement activity would take place on narrow strips of habitat, including levees and channel  
45 banks. The improvements would occur within the study area on sections of the Sacramento, San  
46 Joaquin and Mokelumne Rivers, and along Steamboat and Sutter Sloughs.

1 The following paragraphs summarize the combined effects discussed above and describe other  
2 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA impact conclusions are  
3 also included.

#### 4 ***Near-Term Timeframe***

5 During the near-term timeframe (the first 10 years of BDCP implementation), Alternative 1C would  
6 affect the tidal freshwater emergent wetland natural community through CM1 construction losses (1  
7 acre temporary), CM2 construction losses (6 acres permanent), and CM4 construction losses (1 acre  
8 permanent). The tidal freshwater emergent wetland natural community would be lost on Brushy  
9 Creek, just west of Clifton Court Forebay and at various locations within the Yolo Bypass and the  
10 tidal restoration ROAs.

11 The construction losses of this special-status natural community would represent an adverse effect  
12 if they were not offset by avoidance and minimization measures and restoration actions associated  
13 with BDCP conservation components. Loss of tidal freshwater emergent wetland natural community  
14 would be considered both a loss in acreage of a sensitive natural community and a loss of wetland as  
15 defined by Section 404 of the CWA. However, the creation of 8,850 acres of tidal freshwater  
16 emergent wetland natural community as part of CM4 during the first 10 years of Alternative 1C  
17 implementation would more than offset this near-term loss, avoiding any adverse effect. Typical  
18 project-level mitigation ratios (1:1 for restoration) would indicate that 8 acres of restoration would  
19 be needed to offset (i.e., mitigate) the 8 acres of loss (the total permanent and temporary near-term  
20 effects listed in Table 12-1C-3).

21 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
22 *Construction Best Management Practices and Monitoring*, *AMM6 Disposal and Reuse of Spoils*,  
23 *Reusable Tunnel Material and Dredged Material*, *AMM7 Barge Operations Plan*, and *AMM10*  
24 *Restoration of Temporarily Affected Natural Communities*. All of these AMMs include elements that  
25 avoid or minimize the risk of affecting habitats at work areas and storage sites. The AMMs are  
26 described in detail in BDCP Appendix 3.C.

#### 27 ***Late Long-Term Timeframe***

28 Implementation of Alternative 1C as a whole would result in relatively minor (less than 1%) losses  
29 of tidal freshwater emergent wetland community in the study area. These losses (8 acres of  
30 permanent and 2 acres of temporary loss) would be largely associated with construction of the  
31 water conveyance facilities (CM1), construction of Yolo Bypass fish improvements (CM2), and levee  
32 modification and land grading for tidal marsh restoration (CM4) and floodplain restoration (CM5).  
33 The CM4 and CM5 losses would occur during the course of the CM4 and CM5 conservation actions at  
34 various tidal and floodplain restoration sites throughout the study area.

35 ***NEPA Effects:*** The creation of 8,850 acres of tidal freshwater emergent wetland natural community  
36 as part of CM4 during the first 10 years of Alternative 1C implementation would more than offset  
37 this near-term loss of constructing CM1, CM2, CM4 and CM5, avoiding any adverse effect. By the end  
38 of the Plan timeframe, a total of 24,000 acres of this natural community would be restored over a  
39 wide region of the study area, including within the Suisun Marsh, Cosumnes/Mokelumne, Cache  
40 Slough, and South Delta ROAs (see Figure 12-1). Therefore, Alternative 1C would not result in a net  
41 long-term reduction in the acreage of a sensitive natural community; the effect would be beneficial.

1 **CEQA Conclusion:**

2 **Near-Term Timeframe**

3 Alternative 1C would result in the near-term loss of approximately 8 acres of tidal freshwater  
4 emergent wetland natural community due to construction of the water conveyance facilities (CM1)  
5 and fish passage improvements (CM2), and tidal marsh restoration (CM4). The construction losses  
6 would be adjacent to Clifton Court Forebay, in the Yolo Bypass and at various locations undergoing  
7 tidal restoration (see Figure 12-1 for a map of ROAs) The losses would be spread across a 10-year  
8 near-term timeframe and would be offset by planned restoration of 8,850 acres of tidal freshwater  
9 emergent wetland natural community scheduled for the first 10 years of Alternative 1C  
10 implementation (CM4). AMM1, AMM2, AMM6, AMM7, and AMM10 would also be implemented to  
11 minimize impacts. Because of these offsetting near-term restoration activities and AMMs, impacts  
12 would be less than significant. Typical project-level mitigation ratios (1:1 for restoration) would  
13 indicate that 8 acres of restoration would be needed to offset (i.e., mitigate) the 8 acres of loss. The  
14 restoration would be initiated at the beginning of Alternative 1C implementation to minimize any  
15 time lag in the availability of this habitat to special-status species, and would result in a net gain in  
16 acreage of this sensitive natural community.

17 **Late Long-Term Timeframe**

18 At the end of the Plan period, 10 acres of tidal freshwater emergent wetland natural community  
19 would be lost to conservation activities, and 24,000 acres of this community would be restored.  
20 There would be no net permanent reduction in the acreage of this sensitive natural community  
21 within the study area. Therefore, Alternative 1C would not have a substantial adverse effect on this  
22 natural community; the impact would be beneficial.

23 **Impact BIO-7: Increased Frequency, Magnitude and Duration of Periodic Inundation of Tidal**  
24 **Freshwater Emergent Wetland Natural Community**

25 Two Alternative 1C conservation measures would modify the inundation/flooding regimes of both  
26 natural and man-made waterways in the study area. CM2, which is designed to improve fish passage  
27 and shallow flooded habitat for Delta fishes in the Yolo Bypass, would increase periodic inundation  
28 of tidal freshwater emergent wetland natural community on small acreages, while CM5 would  
29 expose this community to additional inundation as channel margins are modified and levees are set  
30 back to improve fish habitat along some of the major rivers and waterways throughout the study  
31 area.

- 32 • *CM2 Yolo Bypass Fisheries Enhancement:* Operation of the Yolo Bypass under Alternative 1C  
33 would result in an increase in the frequency, magnitude and duration of inundation of 24–58  
34 acres of tidal freshwater emergent wetland natural community. The methods used to estimate  
35 these inundation acreages are described in BDCP Appendix 5.J, *Effects on Natural Communities,*  
36 *Wildlife, and Plants.* The area more frequently inundated would vary with the flow volume that  
37 would pass through the newly constructed notch in the Fremont Weir. The 24-acre increase in  
38 inundation would be associated with a notch flow of 1,000 cubic feet per second (cfs), and the  
39 58-acre increase would result from a notch flow of 4,000 cfs. Plan-related increases in flow  
40 through Fremont Weir would be expected in 30% of the years. Most of this community occurs in  
41 the southern section of the bypass on Liberty Island, on the fringes of tidal perennial aquatic  
42 habitats. Smaller areas are scattered among the cropland within the bypass, south of Interstate  
43 80. The anticipated change in management of flows in the Yolo Bypass includes more frequent

1 releases in flows into the bypass from the Fremont and Sacramento Weirs, and in some years,  
2 later releases into the bypass in spring months (April and May). The modification of periodic  
3 inundation events would not adversely affect the ecological function of tidal freshwater  
4 emergent wetland habitats and would not substantially modify its value for special-status or  
5 common terrestrial species. The plants in this natural community are adapted to periodic  
6 inundation events within the Yolo Bypass. The effects of this inundation on wildlife and plant  
7 species are described in detail elsewhere in this chapter.

- 8 • *CM5 Seasonally Inundated Floodplain Restoration*: Floodplain restoration would result in an  
9 seasonal increase in the frequency and duration of inundation of 3 acres of tidal freshwater  
10 emergent wetland habitats. Specific locations for this restoration activity have not been  
11 identified, but they would likely be focused along the major rivers and Delta channels in the  
12 south Delta. The reconnection of these wetlands to stream flooding events would be beneficial to  
13 the wetlands' ecological function, especially as they relate to the BDCP's target terrestrial and  
14 aquatic species. Foraging activity and refuge sites would be expanded into areas currently  
15 unavailable or infrequently available to some aquatic species.

16 In summary, 27–61 acres of tidal freshwater emergent wetland natural community in the study area  
17 would be subjected to more frequent inundation as a result of implementing two Alternative 1C  
18 conservation measures (CM2 and CM5). Tidal freshwater emergent wetland natural community is a  
19 habitat of great value to both terrestrial and aquatic species in the study area.

20 **NEPA Effects:** Periodic inundation would not result in a net permanent reduction in the acreage or  
21 value of tidal freshwater emergent wetland natural community in the study area. Therefore, there  
22 would be no adverse effect.

23 **CEQA Conclusion:** An estimated 27–61 acres of tidal freshwater emergent wetland natural  
24 community in the study area would be subjected to more frequent inundation as a result of  
25 implementing CM2 and CM5 under Alternative 1C. This community is of great value to aquatic and  
26 terrestrial species in the study area. The periodic inundation would not result in a net permanent  
27 reduction in the acreage of this community in the study area. Therefore, there would be a less-than-  
28 significant impact on the community.

### 29 **Impact BIO-8: Modification of Tidal Freshwater Emergent Wetland Natural Community from** 30 **Ongoing Operation, Maintenance and Management Activities**

31 Once the physical facilities associated with Alternative 1C are constructed and the stream flow  
32 regime associated with changed water management is in effect, there would be new ongoing and  
33 periodic actions associated with operation, maintenance and management of the BDCP facilities and  
34 conservation lands that could affect tidal freshwater emergent wetland natural community in the  
35 study area. The ongoing actions include the diversion of Sacramento River flows in the north Delta,  
36 and reduced diversions from south Delta channels. These actions are associated with CM1 (see the  
37 impact discussion above for effects associated with CM2). The periodic actions would involve access  
38 road and conveyance facilities repair, vegetation management at the various water conveyance  
39 facilities and habitat restoration sites (CM11), levee and canal repair and replacement of levee  
40 armoring, channel dredging, and habitat enhancement in accordance with natural community  
41 management plans. The potential effects of these actions are described below.

- 42 • *Modified river flows upstream of and within the study area and reduced diversions from south*  
43 *Delta channels*. Reduced diversions from the south Delta channels would not create a reduction

1 in tidal freshwater emergent wetland in the study area. However, the periodic changes in flows  
 2 in the Sacramento River, Feather River, and American River associated with modified reservoir  
 3 operations, and the increased diversion of Sacramento River flows at north Delta intakes  
 4 associated with Alternative 1C (Operational Scenario A) would affect salinity, water  
 5 temperature, dissolved oxygen levels, turbidity, contaminant levels and dilution capacity in  
 6 these rivers and Delta waterways. These changes are discussed in detail in Chapter 8, *Water*  
 7 *Quality*. Potentially substantial increases in electrical conductivity (salinity) are predicted for the  
 8 west Delta and Suisun Marsh as a result of these changed water operations. These salinity  
 9 changes may alter the plant composition of tidal freshwater emergent wetland along the lower  
 10 Sacramento and San Joaquin Rivers and west Delta islands. The severity and extent of these  
 11 salinity changes would be complicated by anticipated sea level rise and the effects of  
 12 downstream tidal restoration over the life of the Plan. There is the potential that some tidal  
 13 freshwater marsh may become brackish. These potential changes are not expected to result in a  
 14 substantial reduction in the acreage and value of tidal freshwater emergent wetland natural  
 15 community in the study area.

16 The increased diversion of Sacramento River flows in the north Delta would result in reductions  
 17 in sediment load (annual mass) flowing into the central and west Delta, and Suisun Marsh. The  
 18 reduction is estimated to be approximately 9% of the river's current sediment load for  
 19 Alternative 4, which would have a north Delta diversion capacity of 9,000 cfs under Operational  
 20 Scenario H (see BDCP Appendix 5.C, Attachment 5C.D, Section 5C.D.3.3 for a detailed analysis of  
 21 this issue). Alternative 1C, which would have a 15,000 cfs diversion capacity (Operational  
 22 Scenario A), would be expected to reduce the sediment load by approximately 15%, assuming  
 23 that most of the sediment would be removed during high river flow periods when north Delta  
 24 pumping would normally be running at or near intake capacity. This would contribute to a  
 25 decline in sediment reaching the Delta and Suisun Marsh that has been occurring over the past  
 26 50-plus years due to a gradual depletion of sediment from the upstream rivers. The depletion  
 27 has been caused by a variety of factors, including depletion of hydraulic mining sediment in  
 28 upstream areas, armoring of river channels and a cutoff of sediment due to dam construction on  
 29 the Sacramento River and its major tributaries (Wright and Schoellhamer 2004; Barnard et al.  
 30 2013).

31 Reduced sediment load flowing into the Delta and Suisun Marsh could have an adverse effect on  
 32 tidal marsh, including tidal freshwater emergent wetland. Sediment trapped by the marsh  
 33 vegetation allows the emergent plants to maintain an appropriate water depth as water levels  
 34 gradually rise from the effects of global warming (see Chapter 29, *Climate Change*). The BDCP  
 35 proponents have incorporated an environmental commitment (see Appendix 3B, Section  
 36 3B.1.19, *Disposal and Reuse of Spoils, Reusable Tunnel Material and Dredged Material*) into the  
 37 project that would lessen this potential effect. The Sacramento River water diverted at north  
 38 Delta intakes would pass through sedimentation basins before being pumped to water  
 39 conveyance structures. The commitment states that sediment collected in these basins would be  
 40 periodically removed and reused, to the greatest extent feasible, in the Plan Area for a number of  
 41 purposes, including marsh restoration, levee maintenance, subsidence reversal, flood response,  
 42 and borrow area fill. The portion of the sediment re-introduced to the Delta and estuary for  
 43 marsh restoration would remain available for marsh accretion. With this commitment to reuse  
 44 in the Plan Area, the removal of sediment at the north Delta intakes would not result in a net  
 45 reduction in the acreage and value of this special-status marsh community. The effect would not  
 46 be adverse (NEPA) and would be less than significant (CEQA).

- 1       ● *Access road, water conveyance facility and levee repair.* Periodic repair of access roads, water  
2       conveyance facilities and levees associated with the BDCP actions have the potential to require  
3       removal of adjacent vegetation and could entail earth and rock work in or adjacent to tidal  
4       freshwater emergent wetland habitats. This activity could lead to increased soil erosion,  
5       turbidity and runoff entering tidal aquatic habitats. These activities would be subject to normal  
6       erosion, turbidity and runoff control management practices, including those developed as part  
7       of *AMM2 Construction Best Management Practices and Monitoring* and *AMM4 Erosion and*  
8       *Sediment Control Plan*. Any vegetation removal or earthwork adjacent to or within emergent  
9       wetland habitats would require use of sediment and turbidity barriers, soil stabilization and  
10      revegetation of disturbed surfaces. Proper implementation of these measures would avoid  
11      permanent adverse effects on this community.
  
- 12      ● *Vegetation management.* Vegetation management, in the form of physical removal and chemical  
13      treatment, would be a periodic activity associated with the long-term maintenance of water  
14      conveyance facilities and restoration sites (CM11). Use of herbicides to control nuisance  
15      vegetation could pose a long-term hazard to tidal freshwater emergent wetland natural  
16      community at or adjacent to treated areas. The hazard could be created by uncontrolled drift of  
17      herbicides, uncontrolled runoff of contaminated stormwater onto the natural community, or  
18      direct discharge of herbicides to tidal aquatic areas being treated for invasive species removal.  
19      Environmental commitments and *AMM5 Spill Prevention, Containment and Countermeasure Plan*  
20      have been made part of the BDCP to reduce hazards to humans and the environment from use of  
21      various chemicals during maintenance activities, including the use of herbicides. These  
22      commitments are described in Appendix 3B, including the commitment to prepare and  
23      implement spill prevention, containment, and countermeasure plans and stormwater pollution  
24      prevention plans. Best management practices, including control of drift and runoff from treated  
25      areas, and use of herbicides approved for use in aquatic environments would also reduce the  
26      risk of affecting natural communities adjacent to water conveyance features and levees  
27      associated with restoration activities.
  
- 28      ● *Channel dredging.* Long-term operation of the Alternative 1C intakes on the Sacramento River  
29      would include periodic dredging of sediments that might accumulate in front of intake screens.  
30      The dredging would be done in waterways adjacent to tidal freshwater emergent wetlands and  
31      would result in short-term increases in turbidity and disturbance of the substrate. These  
32      conditions would not eliminate the community, but would diminish its value for special-status  
33      and common species that rely on it for cover or foraging area. The individual species effects are  
34      discussed later in this chapter.
  
- 35      ● *Habitat enhancement.* The BDCP includes a long-term management element for the natural  
36      communities within the Plan Area (CM11). For tidal freshwater emergent wetland community, a  
37      management plan would be prepared that specifies actions to improve the value of the habitats  
38      for covered species. Actions would include control of invasive nonnative plant and animal  
39      species, fire management, restrictions on vector control and application of herbicides, and  
40      maintenance of infrastructure that would allow for movement through the community. The  
41      enhancement efforts would improve the long-term value of this community for both special-  
42      status and common species.

43      The various operations and maintenance activities described above could alter acreage of tidal  
44      freshwater emergent wetland natural community in the study area through changes in flow patterns  
45      and resultant changes in water quality. Activities could also introduce sediment and herbicides that  
46      would reduce the value of this community to common and sensitive plant and wildlife species. Other

1 periodic activities associated with the Plan, including management, protection and enhancement  
2 actions associated with *CM3 Natural Communities Protection and Restoration* and *CM11 Natural*  
3 *Communities Enhancement and Management*, would be undertaken to enhance the value of the  
4 community. While some of these activities could result in small changes in acreage, these changes  
5 would be greatly offset by restoration activities planned as part of *CM4 Tidal Natural Communities*  
6 *Restoration*. The management actions associated with levee repair, periodic dredging and control of  
7 invasive plant species would also result in a long-term benefit to the species associated with tidal  
8 freshwater emergent wetland habitats by improving water movement.

9 **NEPA Effects:** Ongoing operation, maintenance and management activities would not result in a net  
10 permanent reduction in the tidal freshwater emergent wetland natural community within the study  
11 area. Therefore, there would be no adverse effect on this natural community.

12 **CEQA Conclusion:** The operation and maintenance activities associated with Alternative 1C,  
13 including changed water operations in the upstream rivers, would have the potential to create  
14 minor changes in total acreage of tidal freshwater emergent wetland natural community in the study  
15 area, and could create temporary increases in turbidity and sedimentation. The activities could also  
16 introduce herbicides periodically to control nonnative, invasive plants. Implementation of  
17 environmental commitments and AMM2, AMM4, and AMM5 would minimize these impacts, and  
18 other operations and maintenance activities, including management, protection and enhancement  
19 actions associated with *CM3 Natural Communities Protection and Restoration* and *CM11 Natural*  
20 *Communities Enhancement and Management*, would create positive effects, including improved  
21 water movement in these habitats. Long-term restoration activities associated with *CM4 Tidal*  
22 *Natural Communities Restoration* would greatly expand this natural community in the study area.  
23 Ongoing operation, maintenance and management activities would not result in a net permanent  
24 reduction in this sensitive natural community within the study area. Therefore, there would be a  
25 less-than-significant impact on the tidal freshwater emergent wetland natural community.

## 26 **Valley/Foothill Riparian**

27 Construction, operation, maintenance and management associated with the conservation  
28 components of Alternative 1C would have no long-term adverse effects on the habitats associated  
29 with the valley/foothill riparian natural community. Initial development and construction of CM1,  
30 CM2, CM4, CM5, and CM6 would result in both permanent and temporary removal of this  
31 community(see Table 12-1C-4). Full implementation of Alternative 1C would also include the  
32 following conservation actions over the term of the BDCP to benefit the valley/foothill riparian  
33 natural community.

- 34 ● Restore or create 5,000 acres of valley/foothill riparian natural community, with at least 3,000  
35 acres occurring on restored seasonally inundated floodplain (Objective VFRNC1.1, associated  
36 with CM7).
- 37 ● Protect 750 acres of existing valley/foothill riparian natural community in Conservation Zone 7  
38 by year 10 (Objective VFRNC1.2, associated with CM3).
- 39 ● Maintain 1,000 acres of early- to mid-successional vegetation with a well-developed understory  
40 of dense shrubs on restored seasonally inundated floodplain (Objective VFRNC2.2, associated  
41 with CM5 and CM7).
- 42 ● Maintain 500 acres of mature riparian forest in Conservation Zones 4 or 7 (Objective VFRNC2.3,  
43 associated with CM3 and CM7).

- 1 • Maintain 500 acres of mature riparian forest (VFRNC2.3) intermixed with a portion of the early-  
2 to late-successional riparian vegetation (VFRNC2.2,) in large blocks with a minimum patch size  
3 of 50 acres and minimum width of 330 feet (Objective VFRNC2.4, associated with CM3 and  
4 CM7).
- 5 • Maintain or increase abundance and distribution of valley/foothill riparian natural community  
6 vegetation alliances that are rare or uncommon as recognized by California Department of Fish  
7 and Game (2010), such as button willow thickets alliance and blue elderberry stands alliance  
8 (Objective VFRNC3.1).

9 There is a variety of other, less specific conservation goals and objectives in BDCP Chapter 3, Section  
10 3.3 that would improve the value of valley/foothill riparian natural community for terrestrial  
11 species. As explained below, with the restoration and enhancement of these amounts of habitat, in  
12 addition to implementation of AMMs, impacts on this natural community would not be adverse for  
13 NEPA purposes and would be less than significant for CEQA purposes.

14 **Table 12-1C-4. Changes in Valley/Foothill Riparian Natural Community Associated with Alternative**  
15 **1C (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Permanent		Temporary		Periodic <sup>d</sup>	
	NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	40	40	86	86	0	0
CM2	89	89	88	88	51-92	0
CM4	298	552	0	0	0	0
CM5	0	43	0	35	0	266
CM6	Unk.	Unk.	Unk.	Unk.	0	0
<b>TOTAL IMPACTS</b>	<b>427</b>	<b>724</b>	<b>174</b>	<b>209</b>	<b>51-92</b>	<b>266</b>

<sup>a</sup> See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

Unk. = unknown

16  
17 **Impact BIO-9: Changes in Valley/Foothill Riparian Natural Community as a Result of**  
18 **Implementing BDCP Conservation Measures**

19 Construction, land grading and habitat restoration activities that would accompany the  
20 implementation of CM1, CM2, CM4, CM5, and CM6 would permanently eliminate an estimated 724  
21 acres and temporarily remove 209 acres of valley/foothill riparian natural community in the study  
22 area. These modifications represent approximately 5% of the 17,966 acres of the community that is  
23 mapped in the study area. The majority of the permanent and temporary losses would occur during

1 the first 10 years of Alternative 1C implementation, as water conveyance facilities are constructed  
2 and habitat restoration is initiated. Valley/foothill riparian protection (750 acres) and restoration  
3 (800 acres) would be initiated during the same period, which would begin to offset the losses. By the  
4 end of the Plan period, 5,000 acres of this natural community would be restored. The BDCP  
5 beneficial effects analysis (BDCP Chapter 5, Section 5.4.5.2) indicates that implementation of  
6 Alternative 4 would restore or create 5,000 acres of riparian forest and scrub in Conservation Zones  
7 1, 2, 4, 5, 6, and 7, with at least 3,000 acres occurring on restored seasonally inundated floodplain.  
8 Alternative 4 would also protect 750 acres of existing valley/foothill riparian natural community in  
9 Conservation Zone 7. These same conservation actions would occur with implementation of  
10 Alternative 1C.

11 The individual effects of each relevant conservation measure are addressed below. A summary  
12 statement of the combined impacts and NEPA and CEQA conclusions follows the individual  
13 conservation measure discussions.

- 14 ● *CM1 Water Facilities and Operation:* Construction of the Alternative 1C water conveyance  
15 facilities would permanently remove 40 acres and temporarily remove 86 acres of  
16 valley/foothill riparian natural community. The habitat would be removed at multiple locations  
17 from the north Delta to the west Delta and in the vicinity of Discovery Bay. Almost all of the  
18 losses would occur on the narrow borders of waterways that are crossed by water conveyance  
19 facilities. In the north Delta, most of the permanent loss would be where Intakes W1–5 encroach  
20 on the Sacramento River’s west bank from just north of Clarksburg to just north of Courtland.  
21 The riparian areas here are very small patches, some dominated by valley oak and willows, and  
22 others by nonnative trees and mixed brambles (see Terrestrial Biology Mapbook). Other small  
23 patches or narrow bands of riparian vegetation dominated by valley oak and willow would be  
24 permanently removed by canal construction and borrow areas in the vicinity of Elk Slough south  
25 of Clarksburg. A long band of mixed brambles and willows would be lost adjacent to the  
26 Sacramento River Deep Water Ship Channel, north of Miner Slough. The temporary losses of  
27 valley/foothill riparian natural community would be associated with temporary canal and  
28 siphon work areas where the canal would cross Elk Slough on the west side of Merritt Island,  
29 Duck Slough west of Courtland, Miner Slough on the northwest corner of Ryer Island, and  
30 Kellogg Creek southwest of Discovery Bay. The vegetation in these areas ranges from small  
31 stands of valley oak and willow to narrow bands of alder and mixed brambles. Small temporary  
32 losses associated with transmission line construction would occur along the entire  
33 canal/pipeline route. These losses would take place during the near-term construction period.
- 34 ● *CM2 Yolo Bypass Fisheries Enhancement:* Implementation of CM2 involves a number of  
35 construction activities within the Yolo and Sacramento Bypasses, including Fremont Weir and  
36 stilling basin improvements, Putah Creek realignment activities, Lisbon Weir modification and  
37 Sacramento Weir improvements. All of these activities could involve excavation and grading in  
38 valley/foothill riparian areas to improve passage of fish through the bypasses. Based on  
39 hypothetical construction footprints, a total of 89 acres could be permanently lost and another  
40 88 acres could be temporarily removed. Most of the riparian losses would occur at the north end  
41 of Yolo Bypass where major fish passage improvements are planned. This vegetation is a mix of  
42 valley oak, cottonwood, sycamore and willow trees. The riparian areas here are primarily small,  
43 disconnected patches with moderate to low value as wildlife movement corridors. Most of these  
44 patches lack structural complexity. Excavation to improve water movement in the Toe Drain and  
45 in the Sacramento Weir would remove similar linear strips of vegetation. These losses would  
46 occur primarily in the near-term timeframe.

- 1       ● *CM4 Tidal Natural Communities Restoration*: Based on the use of hypothetical restoration  
2       footprints, implementation of CM4 would permanently inundate or remove 552 acres of  
3       valley/foothill riparian community. The losses would be spread among most of the ROAs  
4       established for tidal restoration (see Figure 12-1). No losses would occur from Suisun Marsh  
5       restoration. These ROAs support a mix of riparian vegetation types, including valley oak stands,  
6       extensive willow and cottonwood stringers along waterways, and areas of scrub vegetation  
7       dominated by blackberry. These areas are considered of low to moderate habitat value (BDCP  
8       Chapter 5, Section 5.4.5). The actual loss of riparian habitat to marsh restoration would be  
9       expected to be smaller than predicted by use of the theoretical footprint. As marsh restoration  
10      projects were identified and planned, sites could be selected that avoid riparian areas as much  
11      as possible.
- 12      ● *CM5 Seasonally Inundated Floodplain Restoration*: Floodplain restoration levee construction  
13      would permanently remove 43 acres and temporarily remove 35 acres of valley/foothill  
14      riparian natural community. The construction-related losses would be considered a permanent  
15      removal of the habitats directly affected. These losses would be expected to occur along the San  
16      Joaquin River and other major waterways in CZ 7 (see Figure 12-1). This activity is scheduled to  
17      start following construction of water conveyance facilities, which is expected to take 10 years.
- 18      ● *CM6 Channel Margin Enhancement*: Channel margin habitat enhancement could result in  
19      removal of small amounts of valley/foothill riparian habitat along 20 miles of river and sloughs.  
20      The extent of this loss cannot be quantified at this time, but the majority of the enhancement  
21      activity would occur along waterway margins where riparian habitat stringers exist, including  
22      levees and channel banks. The improvements would occur within the study area on sections of  
23      the Sacramento, San Joaquin and Mokelumne Rivers, and along Steamboat and Sutter Sloughs.
- 24      ● *CM7 Riparian Natural Community Restoration*: The valley/foothill riparian natural community  
25      would be restored primarily in association with the tidal (CM4) and floodplain (CM5)  
26      restoration and channel margin enhancements. Following community-specific goals and  
27      objectives in the Plan, a total of 5,000 acres of this community would be restored (Objective  
28      VFRNC1.1) and 750 acres would be protected over the life of the Plan. Approximately 800 acres  
29      would be restored and the entire 750 acres would be protected (Objective VFRNC1.2) during the  
30      first 10 years of Plan implementation. Riparian restoration and protection would be focused in  
31      CZs 4 and 7 (Objective VFRNC2.3), with a goal of adding a 500-acre portion of the restoration in  
32      one or the other of these zones. A variety of successional stages would also be sought to benefit  
33      the variety of sensitive plant and animal species that rely on this natural community in the study  
34      area (Objective VFRNC2.4).

35      The following paragraphs summarize the combined effects discussed above and describe other  
36      BDCP conservation actions that offset or avoid these effects. NEPA and CEQA impact conclusions are  
37      also included.

### 38      ***Near-Term Timeframe***

39      During the near-term timeframe (the first 10 years of BDCP implementation), Alternative 1C would  
40      affect the valley/foothill riparian natural community through CM1 construction losses (40 acres  
41      permanent and 86 acres temporary) and the CM2 construction losses (89 acres permanent and 88  
42      acres temporary). The natural community would be lost primarily along the western bank of the  
43      Sacramento River at intake sites, along the western canal route in the northern and western Delta  
44      areas, and in the northern Yolo Bypass. Approximately 298 acres of the inundation and

1 construction-related loss from CM4 would occur during the near-term throughout the ROAs mapped  
2 in Figure 12-1.

3 The construction losses of this special-status natural community would represent an adverse effect  
4 if they were not offset by avoidance and minimization measures and protection/restoration actions  
5 associated with BDCP conservation components. Loss of valley/foothill riparian natural community  
6 would be considered a loss in acreage of a sensitive natural community, and could be considered a  
7 loss of wetlands as defined by Section 404 of the CWA. As indicated above, most of the losses would  
8 be in small patches or narrow strips along waterways, with limited structural complexity. However,  
9 the restoration of 800 acres and protection (including significant enhancement) of 750 acres of  
10 valley/foothill riparian natural community as part of CM7 and CM3 during the first 10 years of  
11 Alternative 1C implementation would minimize this near-term loss, avoiding an adverse effect. At  
12 least 400 acres of the protection is planned for the first 5 years of Alternative 1C implementation.  
13 The restoration areas would be large areas providing connectivity with existing riparian habitats  
14 and would include a variety of trees and shrubs to produce structural complexity. Typical project-  
15 level mitigation ratios (1:1 for restoration and 1:1 for protection) would indicate that 601 acres of  
16 protection and 601 acres of restoration would be needed to offset (i.e., mitigate) the 601 acres of  
17 loss (the combination of permanent and temporary losses in the near-term listed in Table 12-1C-4).  
18 The combination of the two approaches (protection and restoration) is designed to avoid a temporal  
19 lag in the value of riparian habitat available to sensitive species.

20 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
21 *Construction Best Management Practices and Monitoring*, *AMM6 Disposal and Reuse of Spoils*,  
22 *Reusable Tunnel Material*, and *Dredged Material*, *AMM7 Barge Operation Plan*, and *AMM10*  
23 *Restoration of Temporarily Affected Natural Communities*, and *AMM18 Swainson's Hawk and White-*  
24 *Tailed Kite*. All of these AMMs include elements that avoid or minimize the risk of affecting habitats  
25 at work areas and storage sites. The AMMs are described in detail in BDCP Appendix 3.C.

### 26 **Late Long-Term Timeframe**

27 Implementation of Alternative 1C as a whole would result in approximately 5% losses of  
28 valley/foothill riparian community in the study area. These losses (724 acres of permanent and 209  
29 acres of temporary loss) would be associated with construction of the water conveyance facilities  
30 (CM1), construction of Yolo Bypass fish improvements (CM2), and inundation during tidal marsh  
31 restoration (CM4). Inundation losses would occur during the course of the Plan's restoration  
32 activities at various tidal restoration sites throughout the study area. By the end of the Plan  
33 timeframe, a total of 5,000 acres of this natural community would be restored and 750 acres would  
34 be protected (CM7 and CM3, respectively). The restoration would occur primarily in CZs 4 and 7, in  
35 the Cosumnes/ Mokelumne and South Delta ROAs (see Figure 12-1).

36 **NEPA Effects:** The restoration of 800 acres and protection (including significant enhancement) of  
37 750 acres of valley/foothill riparian natural community as part of CM7 and CM3 during the first 10  
38 years of Alternative 1C implementation would minimize the near-term loss of this community,  
39 avoiding any adverse effect. Because of the Plan's commitment to restoration of 5,000 acres and  
40 protection of 750 acres of valley/foothill riparian natural community during the course of the Plan,  
41 Alternative 1C would not result in a net long-term reduction in the acreage of a sensitive natural  
42 community; the effect would be beneficial.

1 **CEQA Conclusion:**

2 **Near-Term Timeframe**

3 Alternative 1C would result in the near-term loss of approximately 601 acres of valley/foothill  
4 riparian natural community due to construction of the water conveyance facilities (CM1) and fish  
5 passage improvements (CM2), and inundation during tidal marsh restoration (CM4). The natural  
6 community would be lost primarily along the western bank of the Sacramento River at intake sites,  
7 along the western canal route in the northern and western Delta areas, and within the northern  
8 section of the Yolo Bypass, while inundation losses would occur at various tidal restoration sites  
9 throughout the study area. The construction losses would be spread across a 10-year near-term  
10 timeframe. These losses would be minimized by planned restoration of 800 acres (CM7) and  
11 protection (including significant enhancement) of 750 acres (CM3) of valley/foothill riparian natural  
12 community scheduled for the first 10 years of Alternative 1C implementation. At least 400 acres of  
13 the protection is planned for the first 5 years of Alternative 1C implementation. AMM1, AMM2,  
14 AMM6, AMM7, AMM10 and AMM18 would also be implemented to minimize impacts. Because of  
15 these near-term restoration and protection activities and AMMs, impacts would be less than  
16 significant. Typical project-level mitigation ratios (1:1 for protection and 1:1 for restoration) would  
17 indicate that 601 acres of protection and 601 acres of restoration would be needed to offset (i.e.,  
18 mitigate) the 601 acres of loss. The combination of the two approaches (protection and restoration)  
19 is designed to avoid a temporal lag in the value of riparian habitat available to sensitive species. The  
20 restoration would be initiated at the beginning of implementation to minimize any time lag in the  
21 availability of this habitat to special-status species, and would result in a net gain in acreage of this  
22 sensitive natural community.

23 **Late Long-Term Timeframe**

24 At the end of the Plan period, 933 acres of valley/foothill riparian natural community would be  
25 permanently or temporarily removed by conservation actions, 5,000 acres would be restored and  
26 750 acres would be protected. There would be no net permanent reduction in the acreage of this  
27 sensitive natural community within the study area. Therefore, Alternative 1C would not have a  
28 substantial adverse effect on this natural community; the impact on the valley/foothill riparian  
29 natural community would be beneficial.

30 **Impact BIO-10: Increased Frequency and Duration of Periodic Inundation of Valley/Foothill**  
31 **Riparian Natural Community**

32 Two Alternative 1C conservation measures would modify the inundation/flooding regimes of both  
33 natural and man-made waterways in the study area. CM2, which is designed to improve fish passage  
34 and shallow flooded habitat for Delta fishes in the Yolo Bypass, would increase periodic inundation  
35 of valley/foothill riparian natural community at scattered locations, while CM5 would expose this  
36 community to additional flooding as channel margins are modified and levees are set back to  
37 improve fish habitat along some of the major rivers and waterways of the study area.

- 38 • *CM2 Yolo Bypass Fisheries Enhancement:* Operation of the Yolo Bypass under Alternative 1C  
39 would result in an increase in the frequency and duration of inundation of 51–92 acres of  
40 valley/foothill riparian natural community. The area more frequently inundated would vary  
41 with the flows that would be passed through the newly constructed notch in the Fremont Weir.  
42 The 51 acres would be created by a notch flow of 8,000 cfs and the 92 acres would be created by  
43 a notch flow of 4,000 cfs. The methods used to estimate these inundation acreages are described

1 in BDCP Appendix 5.J, *Effects on Natural Communities, Wildlife and Plants*. These increased flow  
2 conditions would be expected to occur in no more than 30% of all years (see BDCP Chapter 5,  
3 Section 5.4.1.2). The valley/foothill riparian community occurs throughout the bypass, including  
4 a large acreage just below Fremont Weir in the north end of the bypass. There are other riparian  
5 habitat areas on Liberty Island, and, to a lesser extent, along the eastern and western edges of  
6 the bypass, including along the Tule Canal/Toe Drain, the west side channels and the  
7 Sacramento Bypass. The anticipated change in management of flows in the Yolo Bypass includes  
8 more frequent releases in flows into the bypass from the Fremont and Sacramento Weirs, and in  
9 some years, later releases into the bypass in spring months (April and May). The modification of  
10 periodic inundation events would not adversely affect riparian habitats, as they have persisted  
11 under similar high flows and extended inundation periods in the Yolo Bypass. The effects of this  
12 inundation on wildlife and plant species are described in detail in later sections of this chapter.

- 13 ● *CM5 Seasonally Inundated Floodplain Restoration*: Floodplain restoration would result in an  
14 increase in the frequency and duration of inundation of 266 acres of valley/foothill riparian  
15 habitats. Specific locations for this restoration activity have not been identified, but they would  
16 likely be focused in the south Delta area, along the major rivers and Delta channels in CZ 7 (see  
17 Figure 12-1). The reconnection of riparian vegetation to periodic stream flooding events would  
18 be beneficial to the ecological function of this natural community, especially in the germination  
19 and establishment of native riparian plants as flood scour increases.

20 In summary, from 317 to 368 acres of valley/foothill riparian community in the study area would be  
21 subjected to more frequent inundation as a result of implementing two Alternative 1C conservation  
22 measures (CM2 and CM5). The valley/foothill riparian community is conditioned to and benefits  
23 from periodic inundation; therefore, periodic inundation would not result in a net permanent  
24 reduction in the acreage of this community in the study area. The increased inundation would create  
25 a beneficial effect on the community as it relates to germination and establishment of native riparian  
26 plants.

27 **NEPA Effects:** Increasing periodic inundation of valley/foothill riparian natural community in the  
28 Yolo Bypass and along south Delta waterways would have a beneficial effect on the community.

29 **CEQA Conclusion:** An estimated 317 to 368 acres of valley/foothill riparian community in the study  
30 area would be subjected to more frequent inundation as a result of implementing CM2 and CM5  
31 under Alternative 1C. The valley/foothill riparian community is conditioned to and benefits from  
32 periodic inundation; therefore, periodic inundation would not result in a net permanent reduction in  
33 the acreage of this community in the study area. Increasing periodic inundation of valley/foothill  
34 riparian natural community in the Yolo Bypass and along south Delta waterways would have a  
35 beneficial impact on the community.

### 36 **Impact BIO-11: Modification of Valley/Foothill Riparian Natural Community from Ongoing** 37 **Operation, Maintenance and Management Activities**

38 Once the physical facilities associated with Alternative 1C are constructed and the stream flow  
39 regime associated with changed water management is in effect, there would be new ongoing and  
40 periodic actions associated with operation, maintenance and management of the BDCP facilities and  
41 conservation lands that could affect valley/foothill riparian natural community in the study area.  
42 The ongoing actions include modified operation of upstream reservoirs, the diversion of Sacramento  
43 River flows in the north Delta, reduced diversions from south Delta channels, and recreational use of  
44 reserve areas. These actions are associated with CM1 and CM11 (see Impact BIO-10 for effects

1 associated with CM2). The periodic actions would involve access road and conveyance facility  
2 repair, vegetation management at the various water conveyance facilities and habitat restoration  
3 sites (CM11), levee and canal repair and replacement of levee armoring, channel dredging, and  
4 habitat enhancement in accordance with natural community management plans. The potential  
5 effects of these actions are described below.

- 6 • *Modified releases and water levels in upstream reservoirs.* Modified releases and water levels at  
7 Shasta Lake, Lake Oroville, Whiskeytown Lake, Lewiston Lake, and Folsom Lake would not affect  
8 valley/foothill riparian natural community. The anticipated water levels over time with  
9 Alternative 1C, as compared with no action, would be slightly lower in the October to May  
10 timeframe. The small changes in frequency of higher water levels in these lakes would not  
11 substantially reduce the small patches of riparian vegetation that occupy the upper fringes of  
12 the reservoir pools. Changes in releases that would influence downstream river flows are  
13 discussed below.
- 14 • *Modified river flows upstream of and within the study area and reduced diversions from south*  
15 *Delta channels.* Changes in releases from reservoirs upstream of the study area and their  
16 resultant changes in flows in the Sacramento, American and Feather Rivers (associated with  
17 Operational Scenario A) would not be expected to result in the permanent reduction in acreage  
18 of valley/foothill riparian natural community along these waterways. There is no evidence that  
19 flow levels in the upstream rivers would change such that the acreage of this community would  
20 be reduced on a permanent basis. Riparian habitats along the rivers of the Sacramento Valley  
21 have historically been exposed to significant variations in river stage. Based on modeling  
22 conducted for the BDCP (see Appendix 11C, *CALSIM II Model Results Utilized in the Fish Analysis*),  
23 flow levels in these upstream rivers could be reduced by as much as 19% in the July to  
24 November time frame when compared to No Action, while flow levels in the February to May  
25 time frame could increase as much as 48% with implementation of Alternative 1C. Similarly,  
26 increased diversions of Sacramento River flows in the north Delta would not be expected to  
27 result in a permanent reduction in valley/foothill riparian community downstream of these  
28 diversions, even though river flows are modeled to be reduced by 11–27% compared with No  
29 Action, depending on month and water-year type (see Section 11C.4 in Appendix 11C). Reduced  
30 diversions from the south Delta channels would not create a reduction in this natural  
31 community.

32 The periodic changes in flows in the Sacramento River, Feather River, and American River  
33 associated with modified reservoir operations, and the increased diversion of Sacramento River  
34 flows at north Delta intakes associated with Alternative 1C would affect salinity, water  
35 temperature, dissolved oxygen levels, turbidity, contaminant levels and dilution capacity in  
36 these rivers and Delta waterways. These changes are discussed in detail in Chapter 8, *Water*  
37 *Quality*. Potentially substantial increases in electrical conductivity (salinity) are predicted for the  
38 west Delta and Suisun Marsh as a result of these changed water operations. These salinity  
39 changes may alter the plant composition of riparian habitats along the lower Sacramento and  
40 San Joaquin Rivers and west Delta islands. The severity and extent of these salinity changes  
41 would be complicated by anticipated sea level rise and the effects of downstream tidal  
42 restoration over the life of the Plan. There is the potential that some valley/foothill riparian  
43 natural community may be degraded immediately adjacent to river channels. The riparian  
44 communities in the west Delta are dominated by willows, cottonwood and mixed brambles.  
45 These potential changes are not expected to result in a significant reduction in the acreage and  
46 value of valley/foothill riparian natural community in the study area.

- 1       ● *Access road, water conveyance facility and levee repair.* Periodic repair of access roads, water  
2       conveyance facilities and levees associated with the BDCP actions have the potential to require  
3       removal of adjacent vegetation and could entail earth and rock work in valley/foothill riparian  
4       habitats. This activity could lead to increased soil erosion, turbidity and runoff entering these  
5       habitats. These activities would be subject to normal erosion, turbidity and runoff control  
6       management practices, including those developed as part of *AMM2 Construction Best*  
7       *Management Practices and Monitoring* and *AMM4 Erosion and Sediment Control Plan*. Any  
8       vegetation removal or earthwork adjacent to or within riparian habitats would require use of  
9       sediment barriers, soil stabilization and revegetation of disturbed surfaces (*AMM10 Restoration*  
10      *of Temporarily Affected Natural Communities*). Proper implementation of these measures would  
11      avoid permanent adverse effects on this community.
- 12      ● *Vegetation management.* Vegetation management, in the form of physical removal and chemical  
13      treatment, would be a periodic activity associated with the long-term maintenance of water  
14      conveyance facilities and restoration sites. Vegetation management is also the principal activity  
15      associated with *CM11 Natural Communities Enhancement and Management*. Use of herbicides to  
16      control nuisance vegetation could pose a long-term hazard to valley/foothill riparian natural  
17      community at or adjacent to treated areas. The hazard could be created by uncontrolled drift of  
18      herbicides, uncontrolled runoff of contaminated stormwater onto the natural community, or  
19      direct discharge of herbicides to riparian areas being treated for invasive species removal.  
20      Environmental commitments and *AMM5 Spill Prevention, Containment and Countermeasure Plan*  
21      have been made part of the BDCP to reduce hazards to humans and the environment from use of  
22      various chemicals during maintenance activities, including the use of herbicides. These  
23      commitments are described in Appendix 3B, including the commitment to prepare and  
24      implement spill prevention, containment, and countermeasure plans and stormwater pollution  
25      prevention plans. Best management practices, including control of drift and runoff from treated  
26      areas, and use of herbicides approved for use in terrestrial environments would also reduce the  
27      risk of affecting natural communities adjacent to water conveyance features and levees  
28      associated with restoration activities.
- 29      ● *Channel dredging.* Long-term operation of the Alternative 1C intakes on the Sacramento River  
30      would include periodic dredging of sediments that might accumulate in front of intake screens.  
31      The dredging could occur adjacent to valley/foothill riparian natural community. This activity  
32      should not adversely affect riparian plants as long as dredging equipment is kept out of riparian  
33      areas and dredge spoil is disposed of outside of riparian corridors.
- 34      ● *Habitat enhancement.* The BDCP includes a long-term management element for the natural  
35      communities within the Plan Area (CM11). For the valley/foothill riparian natural community, a  
36      management plan would be prepared that specifies actions to improve the value of the habitats  
37      for covered species. Actions would include control of invasive nonnative plant and animal  
38      species, fire management, restrictions on vector control and application of herbicides, and  
39      maintenance of infrastructure that would allow for movement through the community. The  
40      enhancement efforts would improve the long-term value of this community for both special-  
41      status and common species.
- 42      ● *Recreation.* The BDCP would allow for certain types of recreation in and adjacent to  
43      valley/foothill riparian natural community in the reserve system. The activities could include  
44      wildlife and plant viewing and hiking. *CM11 Natural Communities Enhancement and*  
45      *Management* (BDCP Chapter 3, Section 3.4.11) describes this program and identifies applicable  
46      restrictions on recreation that might adversely affect riparian habitat. The BDCP also includes an

1 avoidance and minimization measure (AMM37) that further dictates limits on recreation  
2 activities that might affect this natural community. Priority would be given to use of existing  
3 trails and roads, with some potential for new trails. Limited tree removal and limb trimming  
4 could also be involved.

5 The various operations and maintenance activities described above could alter acreage of valley/  
6 foothill riparian natural community in the study area through changes in flow patterns and resultant  
7 changes in water quality. Activities could also introduce sediment and herbicides that would reduce  
8 the value of this community to common and sensitive plant and wildlife species. Recreation  
9 activities could encroach on riparian areas and require occasional tree removal. Other periodic  
10 activities associated with the Plan, including management, protection and enhancement actions  
11 associated with *CM3 Natural Communities Protection and Restoration* and *CM11 Natural*  
12 *Communities Enhancement and Management*, would be undertaken to enhance the value of the  
13 community. While some of these activities could result in small changes in acreage, these changes  
14 would be greatly offset by restoration and protection activities planned as part of *CM7 Riparian*  
15 *Natural Community Restoration* and *CM3 Natural Communities Protection and Restoration*, or  
16 minimized by implementation of AMM2, AMM4, AMM5, AMM10, and AMM37. The management  
17 actions associated with levee repair, periodic dredging and control of invasive plant species would  
18 also result in a long-term benefit to the species associated with riparian habitats by improving water  
19 movement in adjacent waterways and by eliminating competitive, invasive species of plants.

20 **NEPA Effects:** Ongoing operation, maintenance and management activities associated with  
21 implementation of Alternative 1C would not result in a net permanent reduction in valley/foothill  
22 riparian natural community within the study area. Therefore, there would be no adverse effect on  
23 this community.

24 **CEQA Conclusion:** The operation and maintenance activities associated with Alternative 1C would  
25 have the potential to create minor changes in total acreage of valley/foothill riparian natural  
26 community in the study area, and could create temporary increases in turbidity and sedimentation.  
27 The activities could also introduce herbicides periodically to control nonnative, invasive plants.  
28 Implementation of environmental commitments and AMM2, AMM4, AMM5, AMM10 and AMM37  
29 would minimize these impacts, and other operations and maintenance activities, including  
30 management, protection and enhancement actions associated with *CM3 Natural Communities*  
31 *Protection and Restoration* and *CM11 Natural Communities Enhancement and Management*, would  
32 create positive effects, including reduced competition from invasive, nonnative plants in these  
33 habitats. Long-term restoration and protection activities associated with *CM7 Riparian Natural*  
34 *Community Restoration* and *CM3 Natural Communities Protection and Restoration* would expand this  
35 natural community in the study area. Ongoing operation, maintenance and management activities  
36 would not result in a net permanent reduction in this sensitive natural community within the study  
37 area. Therefore, there would be a less-than-significant impact on the valley/foothill riparian natural  
38 community.

### 39 **Nontidal Perennial Aquatic**

40 Construction, operation, maintenance and management associated with the conservation  
41 components of Alternative 1C would have no long-term adverse effects on the habitats associated  
42 with the nontidal perennial aquatic natural community. Initial development and construction of  
43 CM1, CM2, CM4, CM5, and CM6 would result in both permanent and temporary removal of this  
44 community. (see Table 12-1C-5). Full implementation of Alternative 1C would also include the

1 following conservation actions over the term of the BDCP to benefit the nontidal perennial aquatic  
2 natural community.

- 3 • Create at least 1,200 acres of nontidal marsh consisting of a mosaic of nontidal perennial aquatic  
4 and nontidal freshwater perennial emergent wetland natural communities (Objective  
5 NFEW/NPANC1.1, associated with CM10).

6 There is a variety of other, less specific conservation goals and objectives in BDCP Chapter 3, Section  
7 3.3 that would improve the value of nontidal perennial aquatic natural community for terrestrial  
8 species. As explained below, with the restoration and enhancement of these amounts of habitat, in  
9 addition to implementation of AMMs, impacts on this natural community would not be adverse for  
10 NEPA purposes and would be less than significant for CEQA purposes.

11 **Table 12-1C-5. Changes in Nontidal Perennial Aquatic Natural Community Associated with**  
12 **Alternative 1C (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Permanent		Temporary		Periodic <sup>d</sup>	
	NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	22	22	21	21	0	0
CM2	24	24	12	12	50-77	0
CM4	34	189	0	0	0	0
CM5	0	28	0	16	0	25
CM6	Unk.	Unk.	Unk.	Unk.	0	0
<b>TOTAL IMPACTS</b>	<b>80</b>	<b>263</b>	<b>33</b>	<b>49</b>	<b>50-77</b>	<b>25</b>

<sup>a</sup> See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

Unk. = unknown

13  
14 **Impact BIO-12: Changes in Nontidal Perennial Aquatic Natural Community as a Result of**  
15 **Implementing BDCP Conservation Measures**

16 Construction and land grading activities that would accompany the implementation of CM1, CM2,  
17 CM4, CM5, and CM6 under Alternative 1C would permanently eliminate an estimated 263 acres and  
18 temporarily remove 49 acres of nontidal perennial aquatic natural community in the study area.  
19 These modifications represent approximately 6% of the 5,567 acres of the community that is  
20 mapped in the study area. Approximately 36% (113 acres) of the permanent and temporary losses  
21 would happen during the first 10 years of Alternative 1C implementation, as water conveyance  
22 facilities are constructed and habitat restoration is initiated. Natural communities restoration would  
23 add 400 acres of nontidal marsh (CM10) during the same period, which would expand the area of

1 that habitat and offset the losses. The nontidal marsh restoration would include a mosaic of nontidal  
2 perennial aquatic and nontidal freshwater perennial emergent wetland natural communities, as  
3 specified in Objective NFEW/NPANC1.1. The BDCP beneficial effects analysis (BDCP Chapter 5,  
4 Section 5.4.6.2) indicates that implementation of Alternative 4 would result in the restoration of  
5 1,200 acres of nontidal marsh, and that the restoration would occur in blocks that would be  
6 contiguous with the Plan's larger reserve system. The nontidal marsh would be restored in the  
7 vicinity of giant garter snake subpopulations identified in the recovery plan for this species (U.S.  
8 Fish and Wildlife Service 1998). The same conservation actions would be undertaken with  
9 Alternative 1C.

10 The individual effects of each relevant conservation measure are addressed below. A summary  
11 statement of the combined impacts and NEPA and CEQA conclusions follows the individual  
12 conservation measure discussions.

- 13 • *CM1 Water Facilities and Operation:* Construction of the Alternative 1C water conveyance  
14 facilities would permanently remove 22 acres and temporarily remove 21 acres of nontidal  
15 perennial aquatic community. The permanent losses would be created by construction of the  
16 west canal where it crosses a number of north, west and south Delta waterways, including  
17 Winchester Lake just west of the Sacramento River, Medora Lake just north of Miner Slough and  
18 east of the deep water ship channel, the end of Duck Slough at Miner Slough, a small canal just  
19 south of Clifton Court Forebay, and the northern ends of the California Aqueduct and Delta  
20 Mendota Canal. Temporary losses would be created by siphon construction at Duck Slough just  
21 north of North Courtland Road and at Miner Slough just east of the deep water ship channel, and  
22 by control structure construction in the Delta Mendota Canal, (see Terrestrial Biology  
23 Mapbook). These losses would take place during the near-term construction period.
- 24 • *CM2 Yolo Bypass Fisheries Enhancement:* Implementation of CM2 would involve a number of  
25 construction activities within the Yolo and Sacramento Bypasses, including Fremont Weir and  
26 stilling basin improvements, west side channels modifications, Putah Creek realignment  
27 activities, and Sacramento Weir and Tule Canal improvements. All of these activities could  
28 involve excavation and grading in nontidal perennial aquatic areas to improve passage of fish  
29 through the bypasses. Based on hypothetical construction footprints, a total of 24 acres could be  
30 permanently lost and another 12 acres could be temporarily removed. This activity would occur  
31 primarily in the near-term timeframe.
- 32 • *CM4 Tidal Natural Communities Restoration:* Based on the use of hypothetical restoration  
33 footprints, implementation of CM4 would permanently change to tidally influenced inundation  
34 or remove 189 acres of nontidal perennial aquatic community. These losses would be expected  
35 to occur primarily in the Cache Slough and Cosumnes/Mokelumne ROAs (see Figure 12-1). An  
36 estimated 1,200 acres of nontidal marsh would be restored. Approximately 400 acres of the  
37 restoration (CM10) would happen during the first 10 years of Alternative 1C implementation,  
38 which would coincide with the timeframe of water conveyance facilities construction and early  
39 restoration activities. The remaining restoration would be spread over the following 30 years.  
40 Nontidal natural communities restoration is expected to be focused in CZs 2,4 and/or 5 in Figure  
41 12-1.
- 42 • *CM5 Seasonally Inundated Floodplain Restoration:* Based on theoretical footprints, floodplain  
43 restoration levee construction would permanently remove 28 acres and temporarily remove 16  
44 acres of nontidal perennial aquatic habitat. The construction-related losses would be considered  
45 a permanent removal of the nontidal perennial aquatic habitats. It is expected that floodplain

1 restoration would be focused on the south part of the Plan Area, in CZ 7. Floodplain restoration  
2 along the southern Delta rivers would improve connectivity for a variety of species that rely on  
3 aquatic and riparian habitats. The regional and Plan Area landscape linkages along the San  
4 Joaquin River, Middle River and Old River are included in Figure 12-2. This activity is scheduled  
5 to start following construction of water conveyance facilities, which is expected to take 10 years.

- 6 • *CM6 Channel Margin Enhancement*: Channel margin habitat enhancement could result in filling  
7 of small amounts of nontidal perennial aquatic habitat along 20 miles of river and sloughs. The  
8 extent of this loss cannot be quantified at this time, but the majority of the enhancement activity  
9 would be on the edges of tidal perennial aquatic habitat, including levees and channel banks.  
10 Nontidal marsh adjacent to these tidal areas could be affected. Channel margin would be  
11 enhanced within the study area on sections of the Sacramento, San Joaquin and Mokelumne  
12 Rivers, and along Steamboat and Sutter Sloughs.

13 The following paragraphs summarize the combined effects discussed above and describe other  
14 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA impact conclusions are  
15 also included.

### 16 ***Near-Term Timeframe***

17 During the near-term timeframe (the first 10 years of BDCP implementation), Alternative 1C would  
18 affect the nontidal perennial aquatic community through CM1 construction losses (22 acres  
19 permanent and 21 acres temporary) and the CM2 construction losses (24 acres permanent and 12  
20 acres temporary). The natural community would be lost at scattered locations along the west canal  
21 construction corridor in the north, west and south Delta and along the west side channels and  
22 channels associated with the Sacramento and Lisbon Weirs in the Yolo Bypass. Approximately 34  
23 acres of the inundation and construction-related losses from CM4 would occur during the near-term  
24 throughout several of the ROAs mapped in Figure 12-1.

25 The construction losses of this special-status natural community would represent an adverse effect  
26 if they were not offset by avoidance and minimization measures and restoration actions associated  
27 with BDCP conservation components. Loss of nontidal perennial aquatic natural community would  
28 be considered both a loss in acreage of a sensitive natural community and a loss of waters of the  
29 United States as defined by Section 404 of the CWA. However, creating 400 acres of nontidal marsh  
30 as part of CM10 during the first 10 years of Alternative 1C implementation would offset this near-  
31 term loss, avoiding any adverse effect. Typical project-level mitigation ratios (1:1 for restoration and  
32 1:1 for protection) would indicate 113 acres of restoration and 113 acres of protection would be  
33 needed to offset (i.e., mitigate) the 113 acres of loss. While the Plan does not include protection of  
34 nontidal perennial aquatic habitat, it includes in excess of the typical 1:1 restoration acreage (which  
35 includes protection in perpetuity), and therefore compensates for the lack of protection.

36 The Plan also includes commitments to implement *AMM1 Worker Training Awareness*, *AMM2*  
37 *Construction Best Management Practices and Monitoring*, *AMM6 Disposal and Reuse of Spoils*,  
38 *Reusable Tunnel Material, and Dredged Material*, *AMM7 Barge Operation Plan*, and *AMM10*  
39 *Restoration of Temporarily Affected Natural Communities*. All of these AMMs include elements that  
40 avoid or minimize the risk of affecting habitats at work areas and storage sites. The AMMs are  
41 described in detail in BDCP Appendix 3.C.

1 **Late Long-Term Timeframe**

2 Implementation of Alternative 1C as a whole would result in relatively minor (5%) losses of nontidal  
3 perennial aquatic community in the study area. These losses (272 acres of permanent and 46 acres  
4 of temporary loss) would be largely associated with construction of the water conveyance facilities  
5 (CM1), construction of Yolo Bypass fish improvements (CM2), change to tidally influenced  
6 inundation during tidal marsh restoration (CM4), and floodplain restoration (CM5). The changes to  
7 tidally influenced inundation would occur during the course of the CM4 restoration activities at  
8 various tidal restoration sites throughout the study area. By the end of the Plan timeframe, a total of  
9 1,200 acres of nontidal marsh would be restored over a wide region of the study area, including  
10 within the Cosumnes/Mokelumne, Cache Slough, and South Delta ROAs (see Figure 12-1).

11 **NEPA Effects:** During the first 10 years of implementing Alternative 1C, creating 400 acres of  
12 nontidal marsh as part of CM10 would offset the construction-related and inundation losses of 113  
13 acres of nontidal perennial aquatic natural community. There would be no adverse effect. During the  
14 full duration of Plan implementation, Alternative 1C would not result in a net reduction in the  
15 acreage of a sensitive natural community; there would be an expansion of nontidal marsh and the  
16 effect would be beneficial.

17 **CEQA Conclusion:**

18 **Near-Term Timeframe**

19 Alternative 1C would result in the loss of approximately 113 acres of nontidal perennial aquatic  
20 natural community due to construction of the water conveyance facilities (CM1) and fish passage  
21 improvements (CM2), and change to tidally influenced inundation during tidal marsh restoration  
22 (CM4). The natural community would be lost at scattered locations along the western canal  
23 construction corridor in the north, west and south Delta and along the west side channels and  
24 channels associated with the Sacramento and Lisbon Weirs in the Yolo Bypass. The losses would be  
25 spread across a 10-year near-term timeframe. These losses would be offset by planned restoration  
26 of 400 acres of nontidal perennial aquatic natural community scheduled for the first 10 years of  
27 Alternative 1C implementation (CM10). Also, AMM1, AMM2, AMM6, AMM7, and AMM10 would be  
28 implemented to minimize impacts. Because of these offsetting near-term restoration activities and  
29 AMMs, impacts would be less than significant. Typical project-level mitigation ratios (1:1 for  
30 restoration and 1:1 for protection) would indicate that 113 acres of restoration and 113 acres of  
31 protection would be needed to offset (i.e., mitigate) the 113 acres of loss. While the Plan does not  
32 include protection in the near-term, it includes well in excess of the typical 1:1 restoration acreage  
33 (which includes protection in perpetuity), and therefore compensates for the lack of protection. The  
34 restoration and protection would be initiated at the beginning of Alternative 1C implementation to  
35 minimize any time lag in the availability of this habitat to special-status species, and would result in  
36 a net gain in acreage of this sensitive natural community.

37 **Late Long-Term Timeframe**

38 At the end of the Plan period, 312 acres of the natural community would be removed and 1,200  
39 acres of nontidal marsh would be restored. The nontidal marsh would consist of a mosaic of nontidal  
40 perennial aquatic and nontidal freshwater perennial emergent wetland natural communities. There  
41 would be no net permanent reduction in the acreage of this sensitive natural community within the  
42 study area. Therefore, Alternative 1C would not have a substantial adverse effect on this natural  
43 community; the impact on the nontidal perennial aquatic natural community would be beneficial.

1 **Impact BIO-13: Increased Frequency, Magnitude and Duration of Periodic Inundation of**  
2 **Nontidal Perennial Aquatic Natural Community**

3 Two Alternative 1C conservation measures would modify the inundation/flooding regimes of both  
4 natural and man-made waterways in the study area. CM2, which is designed to improve fish passage  
5 and shallow flooded habitat for Delta fishes in the Yolo Bypass, would increase periodic inundation  
6 of nontidal perennial aquatic natural community on small acreages, while CM5 would expose this  
7 community to additional flooding as channel margins are modified and levees are set back to  
8 improve fish habitat along some of the major rivers and waterways throughout the study area.

- 9 • *CM2 Yolo Bypass Fisheries Enhancement*: Operation of the Yolo Bypass under Alternative 1C  
10 would result in an increase in the frequency, magnitude and duration of inundation of 50–77  
11 acres of nontidal perennial aquatic natural community. The methods used to estimate these  
12 inundation acreages are described in BDCP Appendix 5.J, *Effects on Natural Communities,*  
13 *Wildlife, and Plants*. The area more frequently affected by inundation would vary with the flow  
14 volume that would pass through the newly constructed notch in the Fremont Weir. The 50-acre  
15 increase in inundation would be associated with a notch flow of 3,000 cubic feet per second  
16 (cfs), and the 77-acre increase would result from a notch flow of 6,000 cfs. Plan-related  
17 increases in flow through Fremont Weir would be expected in 30% of the years. This community  
18 occurs in small stringers and patches throughout the bypass, including along the Tule Canal/Toe  
19 Drain, the western channels north of Interstate 80, and below the Fremont and Sacramento  
20 Weirs. The anticipated change in management of flows in the Yolo Bypass includes more  
21 frequent releases in flows into the bypass from the Fremont and Sacramento Weirs, and in some  
22 years, later releases into the bypass in spring months (April and May). The modification of  
23 periodic inundation events would not adversely affect the ecological function of this natural  
24 community and would not substantially modify its value for special-status or common wildlife  
25 species. Nontidal perennial aquatic habitats in the Yolo Bypass have developed under a long-  
26 term regime of periodic inundation events. The extended inundation would be designed to  
27 expand foraging and spawning habitat for Delta fishes. The effects of this inundation on wildlife  
28 and plant species are described in detail in later sections of this chapter.
- 29 • *CM5 Seasonally Inundated Floodplain Restoration*: Floodplain restoration would result in an  
30 increase in the frequency and duration of inundation of an estimated 25 acres of nontidal  
31 perennial aquatic habitat. Specific locations for this restoration activity have not been identified,  
32 but they would likely be focused in the south Delta area, along the major rivers and Delta  
33 channels. The reconnection of these wetlands to stream flooding events would be beneficial to  
34 the ecological function of nontidal perennial aquatic habitats, especially as they relate to BDCP  
35 target aquatic species. The periodic flooding may also encourage the germination of nontidal  
36 marsh vegetation.

37 In summary, 75–102 acres of nontidal perennial aquatic community in the study area would be  
38 subjected to more frequent inundation as a result of implementing two Alternative 1C conservation  
39 measures (CM2 and CM5). Nontidal perennial aquatic community in the Yolo Bypass has developed  
40 under a long-term regime of periodic inundation events and inundation along expanded river  
41 floodplains would be infrequent.

42 **NEPA Effects:** The increased inundation of nontidal perennial aquatic natural community in the Yolo  
43 Bypass and along south Delta waterways would not reduce the acreage of this natural community  
44 and could encourage germination of aquatic vegetation. This increased inundation would not be  
45 adverse.

1 **CEQA Conclusion:** An estimated 75–102 acres of nontidal perennial aquatic community in the study  
2 area would be subjected to more frequent inundation as a result of implementing CM2 and CM5  
3 under Alternative 1C. Nontidal perennial aquatic community would not be significantly impacted  
4 because its habitats in the Yolo Bypass have developed under a long-term regime of periodic  
5 inundation events and inundation along expanded river floodplains would be infrequent. The  
6 periodic inundation would not result in a net permanent reduction in the acreage of this community  
7 in the study area. Therefore, there would be no substantial adverse effect on the community. The  
8 impact would be less than significant.

9 **Impact BIO-14: Modification of Nontidal Perennial Aquatic Natural Community from Ongoing**  
10 **Operation, Maintenance and Management Activities**

11 Once the physical facilities associated with Alternative 1C are constructed and the stream flow  
12 regime associated with changed water management is in effect, there would be new ongoing and  
13 periodic actions associated with operation, maintenance and management of the BDCP facilities and  
14 conservation lands that could affect nontidal perennial aquatic natural community in the study area.  
15 The ongoing actions include modified operation of upstream reservoirs, the diversion of Sacramento  
16 River flows in the north Delta, and reduced diversions from south Delta channels. These actions  
17 would be associated with CM1 (see Impact BIO-13 for effects associated with CM2). The periodic  
18 actions would involve access road and conveyance facility repair, vegetation management at the  
19 various water conveyance facilities and habitat restoration sites (CM11), levee and canal repair and  
20 replacement of levee armoring, channel dredging, and habitat enhancement in accordance with  
21 natural community management plans. The potential effects of these actions are described below.

- 22 ● *Modified releases and water levels in upstream reservoirs.* Modified releases and water levels at  
23 Shasta Lake, Lake Oroville, Whiskeytown Lake, Lewiston Lake, and Folsom Lake would affect  
24 nontidal perennial aquatic natural community, in the form of the reservoir pools. The  
25 Alternative 1C operations scheme (Operational Scenario A) would alter the surface elevations of  
26 these reservoir pools as described in Chapter 6, *Surface Water*. These fluctuations would occur  
27 within historic ranges and would not adversely affect the natural community. Changes in  
28 releases that would influence downstream river flows are discussed below.
- 29 ● *Modified river flows upstream of and within the study area and reduced diversions from south*  
30 *Delta channels.* Changes in releases from reservoirs upstream of the study area, increased  
31 diversion of Sacramento River flows in the north Delta, and reduced diversions from south Delta  
32 channels (associated with Operational Scenario A) would not result in the permanent reduction  
33 in acreage of the nontidal perennial aquatic natural community in the study area. Flow levels in  
34 the upstream rivers would not change such that the acreage of nontidal perennial aquatic  
35 community would be reduced on a permanent basis. Some minor increases and some decreases  
36 would be expected to occur along the major rivers during some seasons and in some water-year  
37 types, but there would be no permanent loss. Similarly, increased diversions of Sacramento  
38 River flows in the north Delta would not result in a permanent reduction in nontidal perennial  
39 aquatic community downstream of these diversions. Nontidal wetlands below the diversions are  
40 not directly connected to the rivers, as this reach of the river is tidally influenced. Reduced  
41 diversions from the south Delta channels would not create a reduction in this natural  
42 community.
- 43 ● *Access road, water conveyance facility and levee repair.* Periodic repair of access roads, water  
44 conveyance facilities and levees associated with the BDCP actions have the potential to require  
45 removal of adjacent vegetation and could entail earth and rock work in nontidal perennial

1 aquatic habitats. This activity could lead to increased soil erosion, turbidity and runoff entering  
2 nontidal perennial aquatic habitats. These activities would be subject to normal erosion,  
3 turbidity and runoff control management practices, including those developed as part of *AMM2*  
4 *Construction Best Management Practices and Monitoring* and *AMM4 Erosion and Sediment*  
5 *Control Plan*. Any vegetation removal or earthwork adjacent to or within aquatic habitats would  
6 require use of sediment and turbidity barriers, soil stabilization and revegetation of disturbed  
7 surfaces. Proper implementation of these measures would avoid permanent adverse effects on  
8 this community.

- 9 • *Vegetation management*. Vegetation management, in the form of physical removal and chemical  
10 treatment, would be a periodic activity associated with the long-term maintenance of water  
11 conveyance facilities and restoration sites. Vegetation management is also the principal activity  
12 associated with *CM11 Natural Communities Enhancement and Management*. Use of herbicides to  
13 control nuisance vegetation could pose a long-term hazard to nontidal perennial aquatic natural  
14 community at or adjacent to treated areas. The hazard could be created by uncontrolled drift of  
15 herbicides, uncontrolled runoff of contaminated stormwater onto the natural community, or  
16 direct discharge of herbicides to nontidal perennial aquatic areas being treated for invasive  
17 species removal. Environmental commitments and *AMM5 Spill Prevention, Containment and*  
18 *Countermeasure Plan* have been made part of the BDCP to reduce hazards to humans and the  
19 environment from use of various chemicals during maintenance activities, including the use of  
20 herbicides. These commitments are described in Appendix 3B, including the commitment to  
21 prepare and implement spill prevention, containment, and countermeasure plans and  
22 stormwater pollution prevention plans. Best management practices, including control of drift  
23 and runoff from treated areas, and use of herbicides approved for use in aquatic environments  
24 would also reduce the risk of affecting natural communities adjacent to water conveyance  
25 features and levees associated with restoration activities.

26 Herbicides to remove aquatic invasive species as part of CM13 would be used to restore the  
27 normal ecological function of tidal and nontidal aquatic habitats in planned restoration areas.  
28 The treatment activities would be conducted in concert with the California Department of  
29 Boating and Waterways' invasive species removal program. Eliminating large stands of water  
30 hyacinth and Brazilian waterweed would improve habitat conditions for some aquatic species  
31 by removing cover for nonnative predators, improving water flow and removing barriers to  
32 movement (see Chapter 11, *Fish and Aquatic Resources*). These habitat changes should also  
33 benefit terrestrial species that use tidal and nontidal perennial aquatic natural community for  
34 movement corridors and for foraging. Vegetation management effects on individual species are  
35 discussed in the species sections on following pages.

- 36 • *Habitat enhancement*. The BDCP includes a long-term management element for the natural  
37 communities within the Plan Area (CM11). For nontidal perennial aquatic natural community, a  
38 management plan would be prepared that specifies actions to improve the value of the habitats  
39 for covered species. Actions would include control of invasive nonnative plant and animal  
40 species, fire management, restrictions on vector control and application of herbicides, and  
41 maintenance of infrastructure that would allow for movement through the community. The  
42 enhancement efforts would improve the long-term value of this community for both special-  
43 status and common species.

44 The various operations and maintenance activities described above could alter acreage of nontidal  
45 perennial aquatic natural community in the study area through changes in flow patterns and  
46 changes in periodic inundation of this community. Activities could also introduce sediment and

1 herbicides that would reduce the value of this community to common and sensitive plant and  
2 wildlife species. Other periodic activities associated with the Plan, including management,  
3 protection and enhancement actions associated with *CM3 Natural Communities Protection and*  
4 *Restoration* and *CM11 Natural Communities Enhancement and Management*, would be undertaken to  
5 enhance the value of the community. While some of these activities could result in small changes in  
6 acreage, these changes would be greatly offset by restoration activities planned as part of *CM4 Tidal*  
7 *Natural Communities Restoration* and protection actions associated with *CM3 Natural Communities*  
8 *Protection and Restoration*. The management actions associated with levee repair and control of  
9 invasive plant species would also result in a long-term benefit to the species associated with  
10 nontidal perennial aquatic habitats by improving water movement.

11 **NEPA Effects:** Ongoing operation, maintenance and management activities would not result in a net  
12 permanent reduction in the nontidal perennial aquatic natural community within the study area.  
13 Therefore, there would be no adverse effect on this natural community.

14 **CEQA Conclusion:** The operation and maintenance activities associated with Alternative 1C would  
15 have the potential to create minor changes in total acreage of nontidal perennial aquatic natural  
16 community in the study area, and could create temporary increases in turbidity and sedimentation.  
17 The activities could also introduce herbicides periodically to control nonnative, invasive plants.  
18 Implementation of environmental commitments and AMM2, AMM4, and AMM5 would minimize  
19 these impacts, and other operations and maintenance activities, including management, protection  
20 and enhancement actions associated with *CM3 Natural Communities Protection and Restoration* and  
21 *CM11 Natural Communities Enhancement and Management*, would create positive effects, including  
22 improved water movement in these habitats. Long-term restoration activities associated with *CM10*  
23 *Nontidal Marsh Restoration* and protection actions associated with *CM3 Natural Communities*  
24 *Protection and Restoration* would expand this natural community in the study area. Ongoing  
25 operation, maintenance and management activities would not result in a net permanent reduction in  
26 this sensitive natural community within the study area. Therefore, there would be a less-than-  
27 significant impact.

### 28 **Nontidal Freshwater Perennial Emergent Wetland**

29 Construction, operation, maintenance and management associated with the conservation  
30 components of Alternative 1C would have no long-term adverse effects on the habitats associated  
31 with the nontidal freshwater perennial emergent wetland natural community. Initial development  
32 and construction of CM1, CM2, CM4, CM5, and CM6 would result in both permanent and temporary  
33 removal of this community (see Table 12-1C-6). Full implementation of Alternative 1C would also  
34 include the following conservation actions over the term of the BDCP to benefit the nontidal  
35 freshwater perennial emergent wetland natural community.

- 36 ● Create at least 1,200 acres of nontidal marsh consisting of a mosaic of nontidal perennial aquatic  
37 and nontidal freshwater perennial emergent wetland natural communities (Objective  
38 NFEW/NPANC1.1, associated with CM10).
- 39 ● Protect and manage 50 acres of occupied or recently occupied tricolored blackbird nesting  
40 habitat located within 5 miles of high-value foraging habitat in Conservation Zones 1, 2, 8 or 11.  
41 Nesting habitat will be managed to provide young, lush stands of bulrush/cattail emergent  
42 vegetation (Objective TRBL1.1).

1 There is a variety of other, less specific conservation goals and objectives in BDCP Chapter 3, Section  
 2 3.3 that would improve the value of nontidal freshwater perennial emergent wetland natural  
 3 community for terrestrial species. As explained below, with the restoration and enhancement of  
 4 these amounts of habitat, in addition to implementation of AMMs, impacts on this natural  
 5 community would not be adverse for NEPA purposes and would be less than significant for CEQA  
 6 purposes.

7 **Table 12-1C-6. Changes in Nontidal Freshwater Perennial Emergent Wetland Natural Community**  
 8 **Associated with Alternative 1C (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Permanent		Temporary		Periodic <sup>d</sup>	
	NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	0	0	5	5	0	0
CM2	25	25	1	1	6-8	0
CM4	40	99	0	0	0	0
CM5	0	0	0	0	0	8
CM6	Unk.	Unk.	Unk.	Unk.	0	0
<b>TOTAL IMPACTS</b>	<b>65</b>	<b>124</b>	<b>6</b>	<b>6</b>	<b>6-8</b>	<b>8</b>

<sup>a</sup> See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

Unk. = unknown

9

10 **Impact BIO-15: Changes in Nontidal Freshwater Perennial Emergent Wetland Natural**  
 11 **Community as a Result of Implementing BDCP Conservation Measures**

12 Construction and land grading activities that would accompany the implementation of CM1, CM2,  
 13 CM4, and CM6 would permanently eliminate an estimated 124 acres and temporarily remove 6  
 14 acres of nontidal freshwater perennial emergent wetland natural community in the study area.  
 15 These modifications represent approximately 9% of the 1,509 acres of the community that is  
 16 mapped in the study area. Approximately 55% (71 acres) of the permanent and temporary losses  
 17 would occur during the first 10 years of Alternative 1C implementation, as water conveyance  
 18 facilities are constructed and habitat restoration is initiated. Natural communities restoration would  
 19 add 400 acres (CM10) and natural communities protection would protect 25 acres (CM3) of nontidal  
 20 marsh during the same period, which would expand the area of that habitat and offset the losses.  
 21 The nontidal marsh restoration would include a mosaic of nontidal perennial aquatic and nontidal  
 22 freshwater perennial emergent wetland natural communities, as specified in BDCP Objective  
 23 NFEW/NPANC1.1 (BDCP Chapter 3, Table 3.3-2). The nontidal marsh protection would be designed  
 24 to support tricolored blackbird populations in the study area. The BDCP beneficial effects analysis

1 (BDCP Chapter 5, Section 5.4.6.2) indicates that implementation of Alternative 4 would result in the  
2 restoration of 1,200 acres of nontidal marsh. The restoration would occur in blocks that are  
3 contiguous with the alternative's larger reserve system. The nontidal marsh would be restored in  
4 the vicinity of giant garter snake subpopulations identified in the recovery plan for this species (U.S.  
5 Fish and Wildlife Service 1998). The same conservation activities would be undertaken in  
6 implementing Alternative 1C.

7 The individual effects of each relevant conservation measure are addressed below. A summary  
8 statement of the combined impacts and NEPA and CEQA conclusions follows the individual  
9 conservation measure discussions.

- 10 • *CM1 Water Facilities and Operation:* Construction of the Alternative 1C water conveyance  
11 facilities would temporarily remove 5 acres of tidal freshwater perennial emergent wetland  
12 community. The temporary losses would be the result of canal siphon construction across Rock  
13 Slough near its junction with the Contra Costa Canal, and transmission corridor construction  
14 along the tunnel alignment in the west and south Delta. (see Terrestrial Biology Mapbook).  
15 These wetlands are extremely small and remote water bodies. These losses would take place  
16 during the near-term construction period.
- 17 • *CM2 Yolo Bypass Fisheries Enhancement:* Implementation of CM2 involves a number of  
18 construction activities within the Yolo and Sacramento Bypasses, including Fremont Weir and  
19 stilling basin improvements, west side channels and Tule Canal modifications, Putah Creek  
20 realignment activities, Lisbon Weir modification and Sacramento Weir improvements. Some of  
21 these activities could involve excavation and grading in nontidal freshwater perennial emergent  
22 wetland areas to improve passage of fish through the bypasses. Based on hypothetical  
23 construction footprints, a total of 25 acres could be permanently lost and 1 acre could be  
24 temporarily removed. These losses would most likely occur in the Tule Canal and west side  
25 channels at the north end of the bypass. The habitat there includes narrow bands within these  
26 side channels of the bypass and is isolated from other marsh or open water habitats. The narrow  
27 bands are bordered by riparian habitats, primarily willows and cottonwoods. This activity  
28 would occur in the near-term timeframe.
- 29 • *CM4 Tidal Natural Communities Restoration:* Based on the use of hypothetical restoration  
30 footprints, implementation of CM4 would permanently inundate or remove 99 acres of nontidal  
31 freshwater perennial emergent wetland community. These losses would be expected to occur  
32 primarily in the Cache Slough ROA (see Figure 12-1). An estimated 1,200 acres of nontidal  
33 marsh would be restored (CM10) and 50 acres would be protected (CM3) during tidal habitat  
34 restoration. Approximately 400 acres of the restoration and 35 acres of the protection would  
35 occur during the first 10 years of Alternative 1C implementation, which would coincide with the  
36 timeframe of water conveyance facilities construction and early tidal marsh restoration. The  
37 remaining restoration would be spread over the following 30 years. Nontidal marsh natural  
38 communities restoration is expected to be focused in the vicinity of giant garter snake  
39 populations in the eastern Delta and near the Yolo Bypass.
- 40 • *CM5 Seasonally Inundated Floodplain Restoration:* Based on theoretical footprints, floodplain  
41 restoration levee construction would not affect nontidal freshwater perennial emergent wetland  
42 natural community.
- 43 • *CM6 Channel Margin Enhancement:* Channel margin habitat enhancement could result in filling  
44 of small amounts of nontidal freshwater perennial emergent wetland habitat along 20 miles of  
45 river and sloughs. The extent of this loss cannot be quantified at this time, but the majority of the

1 enhancement activity would occur on the edges of tidal perennial aquatic habitat, including  
2 levees and channel banks. Nontidal marsh adjacent to these tidal areas could be affected. The  
3 improvements would occur within the study area on sections of the Sacramento, San Joaquin  
4 and Mokelumne Rivers, and along Steamboat and Sutter Sloughs.

- 5 • *CM10 Nontidal Marsh Restoration*: CM10 would entail restoration of 1,200 acres of nontidal  
6 marsh in CZs 2, 4 and/or 5. The restoration would create a mosaic of nontidal perennial aquatic  
7 and nontidal freshwater perennial emergent natural communities. This marsh restoration  
8 would occur in 25-acre or larger patches in or near giant garter snake occupied habitat and  
9 would be accompanied by adjacent grassland restoration or protection.

10 The following paragraphs summarize the combined effects discussed above and describe other  
11 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA impact conclusions are  
12 also included.

### 13 ***Near-Term Timeframe***

14 During the near-term timeframe (the first 10 years of BDCP implementation), Alternative 1C would  
15 affect the nontidal freshwater perennial emergent wetland community through CM1 construction  
16 losses (5 acres temporary) and the CM2 construction losses (25 acres permanent and 1 acre  
17 temporary). These losses would occur along the western canal and tunnel route at various locations,  
18 and in the Yolo Bypass. Approximately 40 acres of the inundation and construction-related losses  
19 from CM4 would occur in the near-term. These losses would occur primarily in the Cache Slough  
20 ROA mapped in Figure 12-1.

21 The construction losses of this special-status natural community would represent an adverse effect  
22 if they were not offset by avoidance and minimization measures and restoration actions associated  
23 with BDCP conservation components. Loss of nontidal freshwater perennial emergent wetland  
24 natural community would be considered both a loss in acreage of a sensitive natural community and  
25 a loss of wetland as defined by Section 404 of the CWA. However, the combination of creating 400  
26 acres and protecting 25 acres of nontidal perennial marsh as part of CM3 and CM10 during the first  
27 10 years of Alternative 1C implementation would offset this near-term loss, avoiding any adverse  
28 effect. Typical project-level mitigation ratios (1:1 for restoration and 1:1 for protection) would  
29 indicate 71 acres of restoration and 71 acres of protection would be needed to offset (i.e., mitigate)  
30 the 71 acres of loss. While the Plan includes just 25 acres of protection in the near-term, it includes  
31 in excess of the typical 1:1 restoration acreage (which includes protection in perpetuity), and  
32 therefore compensates for the shortfall in protection.

33 The Plan also includes commitments to implement *AMM1 Worker Training Awareness*, *AMM2*  
34 *Construction Best Management Practices and Monitoring*, *AMM6 Disposal and Reuse of Spoils*,  
35 *Reusable Tunnel Material*, and *Dredged Material*, *AMM7 Barge Operation Plan* and *AMM10*  
36 *Restoration of Temporarily Affected Natural Communities*. All of these AMMs include elements that  
37 avoid or minimize the risk of affecting habitats at work areas and storage sites. The AMMs are  
38 described in detail in BDCP Appendix 3.C.

### 39 ***Late Long-Term Timeframe***

40 Implementation of Alternative 1C as a whole would result in 9% losses of nontidal freshwater  
41 perennial emergent wetland community in the study area. These losses (124 acres of permanent  
42 and 6 acres of temporary loss) would be associated with construction of the water conveyance  
43 facilities (CM1), construction of Yolo Bypass fish improvements (CM2), and inundation during tidal

1 marsh restoration (CM4). Inundation losses would occur during the course of the CM4 restoration  
2 activities primarily at the Cache Slough ROA. By the end of the Plan timeframe, a total of 1,200 acres  
3 of nontidal marsh would be restored and 50 acres would be protected. The restoration would occur  
4 near giant garter snake occupied habitat in the eastern Delta and near Yolo Bypass, in CZs 2, 4 and 5,  
5 and the protection would occur in CZ 1, 2, 8 or 11 to provide nesting habitat for tri-colored blackbird  
6 (see Figure 12-1).

7 **NEPA Effects:** In the near-term, the combination of creating 400 acres and protecting 25 acres of  
8 nontidal perennial marsh as part of CM3 and CM10 would offset the near-term losses associated  
9 with construction of CM1, CM2 and CM4 facilities, avoiding any adverse effect. With 1,200 acres of  
10 nontidal marsh restoration (BDP Objective NFEW/NPANC1.1) and 50 acres of protection (BDCP  
11 Objective TRBL1.1) included with full implementation of the Plan, Alternative 1C would not result in  
12 a net long-term reduction in the acreage of a sensitive natural community; the effect would be  
13 beneficial.

14 **CEQA Conclusion:**

15 **Near-Term Timeframe**

16 Alternative 1C would result in the loss of approximately 71 acres (the sum of the permanent and  
17 temporary near-term losses in Table 12-1C-6) of nontidal freshwater perennial emergent wetland  
18 natural community due to construction of the water conveyance facilities (CM1) and fish passage  
19 improvements (CM2), and inundation during tidal marsh restoration (CM4). The construction losses  
20 would occur along the western canal route in the west and south Delta, and in the Yolo Bypass.  
21 Approximately 40 acres of the inundation and construction-related losses from CM4 would occur in  
22 the near-term. These losses would occur primarily in the Cache Slough ROA mapped in Figure 12-1.

23 The losses would be spread across a 10-year near-term timeframe. These losses would be offset by  
24 planned restoration of 400 acres and protection of 25 acres of nontidal marsh scheduled for the first  
25 10 years of Alternative 1C implementation (CM3 and CM10). AMM1, AMM2, AMM6, AMM7, and  
26 AMM10 would also be implemented to minimize impacts. Because of these offsetting near-term  
27 restoration activities and AMMs, impacts would be less than significant. Typical project-level  
28 mitigation ratios (1:1 for restoration and 1:1 for protection) would indicate that 71 acres of  
29 restoration and 71 acres of protection would be needed to offset (i.e., mitigate) the 71 acres of loss.  
30 While the Plan includes just 35 acres of protection in the near-term, it includes in excess of the  
31 typical 1:1 restoration acreage (which includes protection in perpetuity), and therefore  
32 compensates for the shortfall in protection. The restoration and protection would be initiated at the  
33 beginning of Alternative 1C implementation to minimize any time lag in the availability of this  
34 habitat to special-status species, and would result in a net gain in acreage of this sensitive natural  
35 community.

36 **Late Long-Term Timeframe**

37 At the end of the Plan period, 131 acres of the natural community would be removed, 1,200 acres of  
38 nontidal marsh would be restored (BDCP Objective NFEW/NPANC1.1), and 50 acres of nontidal  
39 marsh would be protected (BDCP Objective TRBL1.1). There would be no net permanent reduction  
40 in the acreage of this sensitive natural community within the study area. Therefore, Alternative 1C  
41 would not have a substantial adverse effect on this natural community; the impact would be  
42 beneficial.

1 **Impact BIO-16: Increased Frequency, Magnitude and Duration of Periodic Inundation of**  
2 **Nontidal Freshwater Perennial Emergent Wetland Natural Community**

3 Two Alternative 1C conservation measures would modify the inundation/flooding regimes of both  
4 natural and man-made waterways in the study area. CM2, which is designed to improve fish passage  
5 and shallow flooded habitat for Delta fishes in the Yolo Bypass, would increase periodic inundation  
6 of nontidal freshwater perennial emergent wetland natural community on small acreages, while  
7 CM5 would expose this community to additional flooding as channel margins are modified and  
8 levees are set back to improve fish habitat along some of the major rivers and waterways  
9 throughout the study area.

- 10 ● *CM2 Yolo Bypass Fisheries Enhancement*: Operation of the Yolo Bypass under Alternative 1C  
11 would result in an increase in the frequency and duration of inundation of 6–8 acres of nontidal  
12 freshwater perennial emergent wetland natural community. The methods used to estimate  
13 these inundation acreages are described in BDCP Appendix 5.J, *Effects on Natural Communities,*  
14 *Wildlife, and Plants*. The area more frequently affected by inundation would vary with the flow  
15 volume that would pass through the newly constructed notch in the Fremont Weir. The 6-acre  
16 increase in inundation would be associated with a notch flow of 1,000 cubic feet per second  
17 (cfs), and the 8-acre increase would result from a notch flow of 6,000 cfs. Plan-related increases  
18 in flow through Fremont Weir would be expected in 30% of the years. This community occurs in  
19 small stringers and isolated patches along the Tule Canal and western channel in the north end  
20 of the bypass. These areas are not connected to other adjacent marsh and open water habitats;  
21 they are surrounded by riparian habitat, scoured grassland and agricultural lands. The  
22 anticipated change in management of flows in the Yolo Bypass includes more frequent releases  
23 in flows into the bypass from the Fremont and Sacramento Weirs, and in some years, later  
24 releases into the bypass in spring months (April and May). The modification of periodic  
25 inundation events would not adversely affect the ecological function of this natural community  
26 and would not substantially modify its value for special-status or common wildlife species.  
27 Nontidal freshwater perennial emergent wetland plant species in the Yolo Bypass have  
28 developed under a long-term regime of periodic inundation events. The extended inundation  
29 would be designed to expand foraging and spawning habitat for Delta fishes. The effects of this  
30 increased inundation on terrestrial wildlife and plant species are described in detail in later  
31 sections of this chapter.
- 32 ● *CM5 Seasonally Inundated Floodplain Restoration*: Floodplain restoration would result in an  
33 increase in the frequency and duration of inundation of an estimated 8 acres of nontidal  
34 freshwater perennial emergent wetland habitat. Specific locations for this restoration activity  
35 have not been identified, but they would likely be focused in the south Delta area, along the  
36 major rivers and Delta channels. The reconnection of these wetlands to stream flooding events  
37 would be beneficial to the ecological function of nontidal freshwater perennial emergent  
38 wetland habitats as they relate to BDCP target aquatic species. The added exposure to  
39 inundation could also encourage germination of nontidal marsh plant species. Foraging activity  
40 and refuge sites would be expanded into areas currently unavailable or infrequently available to  
41 some aquatic species.

42 In summary, 14–16 acres of nontidal freshwater emergent perennial emergent wetland community  
43 in the study area would be subjected to more frequent inundation as a result of implementing two  
44 Alternative 1C conservation measures (CM2 and CM5). This community would not be adversely

1 affected because its habitats in the Yolo Bypass have developed under a long-term regime of  
2 periodic inundation events and inundation along expanded river floodplains would be infrequent.

3 **NEPA Effects:** The increased inundation of nontidal freshwater perennial emergent wetland natural  
4 community in the Yolo Bypass and in the southern Delta would not reduce the acreage of this  
5 natural community and could encourage germination of emergent wetland vegetation. The  
6 increased inundation would not be an adverse effect.

7 **CEQA Conclusion:** An estimated 14-16 acres of nontidal freshwater perennial emergent wetland  
8 community in the study area would be subjected to more frequent inundation as a result of  
9 implementing CM2 and CM5 under Alternative 1C. This community would not be significantly  
10 impacted because its habitats in the Yolo Bypass have developed under a long-term regime of  
11 periodic inundation events and inundation along expanded river floodplains would be infrequent.  
12 The periodic inundation would not result in a net permanent reduction in the acreage of this  
13 community in the study area. Therefore, there would be no substantial effect on the community. The  
14 impact would be less than significant.

15 **Impact BIO-17: Modification of Nontidal Freshwater Perennial Emergent Wetland Natural**  
16 **Community from Ongoing Operation, Maintenance and Management Activities**

17 Once the physical facilities associated with Alternative 1C are constructed and the stream flow  
18 regime associated with changed water management is in effect, there would be new ongoing and  
19 periodic actions associated with operation, maintenance and management of the BDCP facilities and  
20 conservation lands that could affect nontidal freshwater perennial emergent wetland natural  
21 community in the study area. The ongoing actions include modified operation of upstream  
22 reservoirs, the diversion of Sacramento River flows in the north Delta, and reduced diversions from  
23 south Delta channels. These actions are associated with CM1 (see the impact discussion above for  
24 effects associated with CM2). The periodic actions would involve access road and conveyance facility  
25 repair, vegetation management at the various water conveyance facilities and habitat restoration  
26 sites (CM11), levee and canal repair and replacement of levee armoring, channel dredging, and  
27 habitat enhancement in accordance with natural community management plans. The potential  
28 effects of these actions are described below.

- 29
- 30 • *Modified releases and water levels in upstream reservoirs.* Modified releases and water levels at  
31 Shasta Lake, Lake Oroville, Whiskeytown Lake, Lewiston Lake, and Folsom Lake would not affect  
32 nontidal freshwater perennial emergent wetland natural community. These reservoirs do not  
33 support significant stands of freshwater emergent wetlands. Changes in releases that would  
34 influence downstream river flows are discussed below.
  - 35 • *Modified river flows upstream of and within the study area and reduced diversions from south*  
36 *Delta channels.* Changes in releases from reservoirs upstream of the study area, increased  
37 diversion of Sacramento River flows in the north Delta, and reduced diversions from south Delta  
38 channels (associated with Operational Scenario A) would not result in the permanent reduction  
39 in acreage of the nontidal freshwater perennial emergent wetland natural community in the  
40 study area. The majority of this wetland type exists outside of the levees of the larger rivers and  
41 would not be affected by flow changes in river or Delta channels. Similarly, increased diversions  
42 of Sacramento River flows in the north Delta would not result in a permanent reduction in  
43 nontidal freshwater perennial emergent wetland community downstream of these diversions.  
Nontidal wetlands below the diversions are not directly connected to the rivers, as this reach of

1 the river is tidally influenced. Reduced diversions from the south Delta channels would not  
2 create a reduction in this natural community.

- 3 • *Access road, water conveyance facility and levee repair.* Periodic repair of access roads, water  
4 conveyance facilities and levees associated with the BDCP actions have the potential to require  
5 removal of adjacent vegetation and could entail earth and rock work in nontidal freshwater  
6 perennial emergent wetland habitats. This activity could lead to increased soil erosion, turbidity  
7 and runoff entering nontidal freshwater perennial habitats. These activities would be subject to  
8 normal erosion, turbidity and runoff control management practices, including those developed  
9 as part of *AMM2 Construction Best Management Practices and Monitoring* and *AMM4 Erosion and*  
10 *Sediment Control Plan*. Any vegetation removal or earthwork adjacent to or within aquatic  
11 habitats would require use of sediment and turbidity barriers, soil stabilization and revegetation  
12 of disturbed surfaces. Proper implementation of these measures would avoid permanent  
13 adverse effects on this community.

- 14 • *Vegetation management.* Vegetation management, in the form of physical removal and chemical  
15 treatment, would be a periodic activity associated with the long-term maintenance of water  
16 conveyance facilities and restoration sites. Vegetation management is also the principal activity  
17 associated with *CM11 Natural Communities Enhancement and Management*. Use of herbicides to  
18 control nuisance vegetation could pose a long-term hazard to nontidal freshwater perennial  
19 emergent wetland natural community at or adjacent to treated areas. The hazard could be  
20 created by uncontrolled drift of herbicides, uncontrolled runoff of contaminated stormwater  
21 onto the natural community, or direct discharge of herbicides to nontidal perennial wetland  
22 areas being treated for invasive species removal. Environmental commitments and *AMM5 Spill*  
23 *Prevention, Containment and Countermeasure Plan* have been made part of the BDCP to reduce  
24 hazards to humans and the environment from use of various chemicals during maintenance  
25 activities, including the use of herbicides. These commitments are described in Appendix 3B,  
26 including the commitment to prepare and implement spill prevention, containment, and  
27 countermeasure plans and stormwater pollution prevention plans. Best management practices,  
28 including control of drift and runoff from treated areas, and use of herbicides approved for use  
29 in aquatic environments would also reduce the risk of affecting natural communities adjacent to  
30 water conveyance features and levees associated with restoration activities.

31 Herbicides to remove aquatic invasive species as part of CM13 would be used to restore the  
32 normal ecological function of tidal and nontidal aquatic habitats in planned restoration areas.  
33 The treatment activities would be conducted in concert with the California Department of  
34 Boating and Waterways' invasive species removal program. Eliminating large stands of water  
35 hyacinth and Brazilian waterweed would improve habitat conditions for some aquatic species  
36 by removing cover for nonnative predators, improving water flow and removing barriers to  
37 movement (see Chapter 11, *Fish and Aquatic Resources*). These habitat changes should also  
38 benefit terrestrial species that use tidal and nontidal freshwater perennial emergent wetland  
39 natural community for movement corridors and for foraging. Vegetation management effects on  
40 individual species are discussed in the species sections on following pages.

- 41 • *Habitat enhancement.* The BDCP includes a long-term management element for the natural  
42 communities within the Plan Area (CM11). For nontidal freshwater perennial emergent wetland  
43 natural community, a management plan would be prepared that specifies actions to improve the  
44 value of the habitats for covered species. Actions would include control of invasive nonnative  
45 plant and animal species, fire management, restrictions on vector control and application of  
46 herbicides, and maintenance of infrastructure that would allow for movement through the

1 community. The enhancement efforts would improve the long-term value of this community for  
2 both special-status and common species.

3 The various operations and maintenance activities described above could alter acreage of nontidal  
4 freshwater perennial emergent wetland natural community in the study area through changes in  
5 flow patterns and changes in periodic inundation of this community. Activities could also introduce  
6 sediment and herbicides that would reduce the value of this community to common and sensitive  
7 plant and wildlife species. Other periodic activities associated with the Plan, including management,  
8 protection and enhancement actions associated with *CM3 Natural Communities Protection and*  
9 *Restoration* and *CM11 Natural Communities Enhancement and Management*, would be undertaken to  
10 enhance the value of the community. While some of these activities could result in small changes in  
11 acreage, these changes would be greatly offset by restoration activities planned as part of *CM10*  
12 *Nontidal Marsh Restoration* and protection actions associated with *CM3 Natural Communities*  
13 *Protection and Restoration*. The management actions associated with levee repair and control of  
14 invasive plant species would also result in a long-term benefit to the species associated with  
15 nontidal freshwater perennial emergent wetland habitats by improving water movement.

16 **NEPA Effects:** Ongoing operation, maintenance and management activities associated with  
17 Alternative 1C would not result in a net permanent reduction in the nontidal freshwater perennial  
18 emergent wetland natural community within the study area. Therefore, there would be no adverse  
19 effect on this natural community.

20 **CEQA Conclusion:** The operation and maintenance activities associated with Alternative 1C would  
21 have the potential to create minor changes in total acreage of nontidal freshwater perennial  
22 emergent wetland natural community in the study area, and could create temporary increases in  
23 turbidity and sedimentation. The activities could also introduce herbicides periodically to control  
24 nonnative, invasive plants. Implementation of environmental commitments and AMM2, AMM4, and  
25 AMM5 would minimize these impacts, and other operations and maintenance activities, including  
26 management, protection and enhancement actions associated with *CM3 Natural Communities*  
27 *Protection and Restoration* and *CM11 Natural Communities Enhancement and Management*, would  
28 create positive effects, including improved water movement in and adjacent to these habitats. Long-  
29 term restoration activities associated with *CM10 Nontidal Marsh Restoration* and protection actions  
30 associated with *CM3 Natural Communities Protection and Restoration* would greatly expand this  
31 natural community in the study area. Ongoing operation, maintenance and management activities  
32 would not result in a net permanent reduction in this sensitive natural community within the study  
33 area. Therefore, there would be a less-than-significant impact.

#### 34 **Alkali Seasonal Wetland Complex**

35 Construction, operation, maintenance and management associated with the conservation  
36 components of Alternative 1C would have near-term and long-term adverse effects on the habitats  
37 associated with the alkali seasonal wetland complex natural community. Initial development and  
38 construction of CM2 and CM4 would result in permanent removal of this community. (see Table 12-  
39 1C-7). Full implementation of Alternative 1C would also include the following conservation actions  
40 over the term of the BDCP to benefit the alkali seasonal wetland natural community.

- 41 • Protect 150 acres of alkali seasonal wetland in Conservation Zones 1, 8 and/or 11 among a  
42 mosaic of protected grasslands and vernal pool complex (Objective ASWNC1.1, associated with  
43 CM3).

- Restore or create alkali seasonal wetlands in Conservation Zones 1, 8, and/or 11 to achieve no net loss of wetted acres (up to 72 acres of alkali seasonal wetland complex restoration) (Objective ASWNC1.2, associated with CM3 and CM9).
- Provide appropriate seasonal flooding characteristics for supporting and sustaining alkali seasonal wetland species (Objective ASWNC2.1, associated with CM3 and CM11).

There is a variety of other, less specific conservation goals and objectives in BDCP Chapter 3, Section 3.3 that would improve the value of alkali seasonal wetland natural community for terrestrial species. As explained below, with the protection, restoration, and enhancement of the amounts of habitat listed in the BDCP objectives, in addition to implementation of AMMs and mitigation, impacts on this natural community would not be adverse for NEPA purposes and would be less than significant for CEQA purposes.

**Table 12-1C-7. Changes in Alkali Seasonal Wetland Complex Natural Community Associated with Alternative 1C (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Permanent		Temporary		Periodic <sup>d</sup>	
	NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	13	13	9	9	0	0
CM2	45	45	0	0	264-744	0
CM4	13	27	0	0	0	0
CM5	0	0	0	0	0	0
CM6	Unk.	Unk.	Unk.	Unk.	0	0
<b>TOTAL IMPACTS</b>	<b>71</b>	<b>85</b>	<b>9</b>	<b>9</b>	<b>264-744</b>	<b>0</b>

<sup>a</sup> See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

Unk. = unknown

### Impact BIO-18: Changes in Alkali Seasonal Wetland Complex Natural Community as a Result of Implementing BDCP Conservation Measures

Construction, land grading and habitat restoration activities that would accompany the implementation of CM1, CM2, CM4, and CM6 under Alternative 1C would permanently eliminate an estimated 85 acres and temporarily eliminate an estimated 9 acres of alkali seasonal wetland complex natural community in the study area. These modifications represent approximately 3% of the 3,723 acres of the community that is mapped in the study area. Most of the losses (80 acres or 85%) would occur during the first 10 years of Alternative 1C implementation, as the water conveyance facility is constructed, Yolo Bypass improvements are initiated, and habitat restoration

1 is initiated. Alkali seasonal wetland complex protection (120 acres) and restoration (an estimated  
2 58 acres, but determined by actual level of effect) would be initiated during the same period; when  
3 combined, these actions would offset most of the losses. The 58 acres of restoration would be 22  
4 acres fewer than the number of acres lost in the near-term. By the end of the Plan period, 150 acres  
5 of this natural community would be protected and up to 72 acres would be restored. The BDCP  
6 beneficial effects analysis for this community (BDCP Chapter 5, Section 5.4.7.2) states that  
7 Alternative 4 would protect 150 acres of alkali seasonal wetland in Conservation Zones 1, 8, or 11, in  
8 a mosaic of protected grasslands and vernal pool complex. This would protect currently unprotected  
9 high-value alkali seasonal wetland complex in the Plan Area. These conservation measures would  
10 also be implemented under Alternative 1C.

11 The individual effects of each relevant conservation measure are addressed below. A summary  
12 statement of the combined impacts and NEPA and CEQA conclusions follows the individual  
13 conservation measure discussions.

- 14 • *CM1 Water Facilities and Operation:* Construction of the Alternative 1C water conveyance  
15 facilities would permanently eliminate 13 acres and temporarily eliminate 9 acres of alkali  
16 seasonal wetland complex natural community. The permanent losses would be caused by  
17 construction of the western canal just south of Rock Slough near Knightsen, and immediately  
18 west of Clifton Court Forebay. Temporary losses would be created by siphon work areas at both  
19 locations, and by railroad work area just west of Clifton Court Forebay (see Terrestrial Biology  
20 Mapbook). All of these losses would occur in the near-term timeframe.

21 The construction activity associated with CM1 also has the potential to lead to increased  
22 nitrogen deposition in alkali seasonal wetland habitats in the vicinity of Clifton Court Forebay. A  
23 significant number of cars, trucks, and land grading equipment involved in construction would  
24 emit small amounts of atmospheric nitrogen from fuel combustion; this material could be  
25 deposited in sensitive alkali seasonal wetland areas that are located west of the major  
26 construction areas at Clifton Court Forebay. Nitrogen deposition can pose a risk of adding a  
27 fertilizer to nitrogen-limited soils and their associated plants. Nonnative invasive species can be  
28 encouraged by the added nitrogen available. BDCP Appendix 5.J, Attachment 5J.A, *Construction-  
29 Related Nitrogen Deposition on BDCP Natural Communities*, addresses this issue in detail. It has  
30 been concluded that this potential deposition would pose a low risk of changing the alkali  
31 seasonal wetland complex in the construction area because the construction would occur  
32 primarily downwind of the natural community and the construction would contribute a  
33 negligible amount of nitrogen to regional projected emissions. No adverse effect is expected.

- 34 • *CM2 Yolo Bypass Fisheries Enhancement:* Implementation of CM2 involves a number of  
35 construction activities within the Yolo and Sacramento Bypasses, including Fremont Weir and  
36 stilling basin improvements, Putah Creek realignment activities, Lisbon Weir modification and  
37 Sacramento Weir improvements. Realignment of Putah Creek could involve excavation and  
38 grading in alkali seasonal wetland complex as a new channel is constructed. Based on  
39 hypothetical construction footprints, a total of 45 acres could be permanently lost. This complex  
40 is located immediately south of the existing Putah Creek channel within the bypass, and is a  
41 relatively large, moderate to high value, contiguous expanse of this community. This loss would  
42 occur in the near-term timeframe.
- 43 • *CM3 Natural Communities Protection and Restoration:* CM3 proposes to protect at least 150 acres  
44 of alkali seasonal wetland complex in CZs 1, 8 and 11 (Objective ASWNC1.1). The protection  
45 would occur in areas containing a mosaic of grassland and vernal pool complex in unfragmented

1 natural landscapes supporting a diversity of native plant and wildlife species. These areas would  
2 be both protected and enhanced to increase the cover of alkali seasonal wetland plants relative  
3 to nonnative species.

- 4 ● *CM4 Tidal Natural Communities Restoration*: Based on the use of hypothetical restoration  
5 footprints, implementation of CM4 would permanently inundate or remove 13 acres of alkali  
6 seasonal wetland complex in the near-term and inundate or remove 27 acres by the end of the  
7 Plan timeframe. The losses would be expected to occur in the Cache Slough and Suisun Marsh  
8 ROAs established for tidal restoration (see Figure 12-1). The largest losses would likely occur in  
9 the Lindsay Slough area and on the northern fringes of Suisun Marsh, north of the Potrero Hills.  
10 These losses would not fragment the alkali seasonal wetland communities adjacent to these  
11 sloughs because the losses would occur on the edges of the existing habitat.
- 12 ● *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*: CM9 includes both vernal  
13 pool complex and alkali seasonal wetland complex restoration goals. The intent of the  
14 conservation measure is to match the acreage of restoration with the actual acreage lost to other  
15 conservation measures (primarily CM2 and CM4). The current estimate for alkali seasonal  
16 wetland complex restoration is 58 acres in the near-term and a total of 72 acres by the end of  
17 the BDCP restoration period, consistent with BDCP Objective ASWNC1.2. Restoration in the  
18 Lindsay Slough area of the Cache Slough ROA and the northern region of the Suisun Marsh ROA  
19 would be consistent with essential habitat connectivity goals mapped in Figure 12-2 and  
20 described in Table 3.2-3 of BDCP Chapter 3.

21 The following paragraphs summarize the combined effects discussed above and describe other  
22 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA impact conclusions are  
23 also included.

#### 24 ***Near-Term Timeframe***

25 During the near-term timeframe (the first 10 years of BDCP implementation), Alternative 1C would  
26 affect the alkali seasonal wetland complex natural community through CM1 construction losses (22  
27 acres) and CM2 construction losses (45 acres). These losses would occur in the Yolo Bypass south of  
28 Putah Creek and on land immediately west of Clifton Court Forebay. Approximately 13 acres of the  
29 inundation and construction-related losses in habitat from CM4 would occur in the near-term. These  
30 losses would occur primarily in the Cache Slough and Suisun Marsh ROAs mapped in Figure 12-1.

31 The construction losses of this special-status natural community would represent an adverse effect  
32 if they were not offset by avoidance and minimization measures and restoration actions associated  
33 with BDCP conservation components. Loss of alkali seasonal wetland complex natural community  
34 would be considered both a loss in acreage of a sensitive natural community and a loss of wetland as  
35 defined by Section 404 of the CWA. The protection of 120 acres of alkali seasonal wetland complex  
36 as part of CM3 and the restoration of an estimated 58 acres of this community as part of CM9 during  
37 the first 10 years of BDCP implementation would partially offset this near-term loss. Typical project-  
38 level mitigation ratios (2:1 for protection and 1:1 for restoration) would indicate 160 acres of  
39 protection and 80 acres of restoration would be needed to offset (i.e., mitigate) the 80 acres of loss.  
40 The restoration acreage would be 22 acres less than the near-term losses and the protection would  
41 be 40 acres less than typically required for this natural community. This deficit in restoration and  
42 protection would result in a near-term decrease in acreage of the natural community and would be  
43 an adverse effect.

1 The Plan also includes commitments to implement *AMM1 Worker Training Awareness*, *AMM2*  
2 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
3 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM6 Disposal and Reuse of Spoils*, *Reusable Tunnel*  
4 *Material and Dredged Material*, and *AMM10 Restoration of Temporarily Affected Natural*  
5 *Communities*. All of these AMMs include elements that avoid or minimize the risk of affecting  
6 habitats at work areas. The AMMs are described in detail in BDCP Appendix 3.C.

### 7 **Late Long-Term Timeframe**

8 Implementation of Alternative 1C as a whole would result in relatively minor (3%) losses of alkali  
9 seasonal wetland natural community in the study area. These losses (94 acres) would be largely  
10 associated with construction of the western canal in the south Delta area (CM1), Yolo Bypass fish  
11 improvements (CM2) and inundation during tidal marsh restoration (CM4). Inundation losses  
12 would occur during the course of the Plan's restoration activities, primarily in the Cache Slough and  
13 Suisun Marsh ROAs.

14 **NEPA Effects:** In the first 10 years of implementing Alternative 1C conservation measures, 120 acres  
15 of alkali seasonal wetland complex would be protected as part of CM3 and up to 58 acres of this  
16 community would be restored as part of CM9. These conservation actions would not totally offset  
17 the effects of Alternative 1C actions. By the end of the Plan timeframe, a total of 150 acres of this  
18 natural community would be protected (CM3) and up to 72 acres would be restored (CM9). The  
19 protection and restoration would occur primarily in CZs 1, 8, and 11, in the Cache Slough, Suisun  
20 Marsh and Clifton Court Forebay areas. The restoration and protection acreages contained in the  
21 BDCP would not be sufficient to provide the typical level of mitigation for this community; therefore,  
22 the effect of Alternative 1C would be adverse.

### 23 **CEQA Conclusion:**

#### 24 **Near-Term Timeframe**

25 Alternative 1C would result in the combined permanent and temporary loss of approximately 80  
26 acres of alkali seasonal wetland complex natural community due to construction of the western  
27 canal and tunnel (CM1), fish passage improvements (CM2) and inundation during tidal marsh  
28 restoration (CM4). The construction losses would occur primarily in the south Delta in CZ 8 and CZ 9  
29 and the area just south of Putah Creek in the Yolo Bypass (CZ 2), while inundation losses would  
30 occur in the Cache Slough and Suisun Marsh ROAs. The losses would be spread across a 10-year  
31 near-term timeframe.

32 The construction losses of this special-status natural community would represent an adverse effect  
33 if they were not offset by avoidance and minimization measures and other actions associated with  
34 BDCP conservation components. Loss of alkali seasonal wetland complex natural community would  
35 be considered both a loss in acreage of a sensitive natural community and a loss of wetland as  
36 defined by Section 404 of the CWA. The protection of 120 acres of alkali seasonal wetland complex  
37 as part of CM3 and the restoration of up to 58 acres of this community as part of CM9 during the first  
38 10 years of BDCP implementation would partially offset this near-term loss. Typical project-level  
39 mitigation ratios (2:1 for protection and 1:1 for restoration) would indicate 160 acres of protection  
40 and 80 acres or restoration would be needed to offset (i.e., mitigate) the 80 acres of loss. AMM1,  
41 AMM2, AMM3, AMM4, AMM6 and AMM10 would also be implemented to minimize impacts. Because  
42 the offsetting protection and restoration activities contained in the BDCP do not provide for the  
43 typical level of mitigation, the near-term impact of Alternative 1C would be significant without

1 additional mitigation. With the implementation of Mitigation Measure BIO-18, *Compensate for Loss*  
2 *of Alkali Seasonal Wetland Complex*, the impact would be less than significant.

### 3 **Late Long-Term Timeframe**

4 At the end of the Plan period, 94 acres of alkali seasonal wetland complex natural community would  
5 be permanently removed by conservation actions, 150 acres would be protected and up to 72 acres  
6 would be restored. The restoration and protection acreages contained in the BDCP would not be  
7 sufficient to provide the typical level of mitigation for this community (188 acres of protection and  
8 94 acres of restoration); therefore, the effect of Alternative 1C would be potentially significant. With  
9 the implementation of Mitigation Measure BIO-18, the impact would be less than significant.

### 10 **Mitigation Measure BIO-18: Compensate for Loss of Alkali Seasonal Wetland Complex**

11 To fully compensate for loss of alkali seasonal wetland complex as a result of implementing  
12 Alternative 1C, DWR shall increase near-term restoration and protection to 80 acres and 160  
13 acres, respectively, and long-term restoration and protection to 94 acres and 188 acres,  
14 respectively.

### 15 **Impact BIO-19: Increased Frequency, Magnitude and Duration of Periodic Inundation of** 16 **Alkali Seasonal Wetland Complex Natural Community**

17 Under Alternative 1C, CM2 would modify the inundation/flooding regime of the Yolo Bypass, a man-  
18 made waterway. CM2, which is designed to improve fish passage and shallow flooded habitat for  
19 Delta fishes in the Yolo Bypass, would increase periodic inundation of alkali seasonal wetland  
20 complex natural community at scattered locations in the central and southern sections of the  
21 bypass.

22 Operation of the Yolo Bypass under Alternative 1C would result in an increase in the frequency and  
23 duration of inundation on an estimated 264–744 acres of alkali seasonal wetland complex natural  
24 community. The methods used to estimate these inundation acreages are described in BDCP  
25 Appendix 5.J, *Effects on Natural Communities, Wildlife, and Plants*. The area more frequently affected  
26 by flooding would vary with the flow volume that would pass through the newly constructed notch  
27 in the Fremont Weir. The 264-acre increase in inundation would be associated with a notch flow of  
28 1,000 cubic feet per second (cfs), and the 744-acre increase would result from a notch flow of 4,000  
29 cfs. Plan-related increases in flow through Fremont Weir would be expected in 30% of the years.  
30 The alkali seasonal wetland complex natural community occurs primarily in the central and  
31 southern reaches of the bypass, south of Putah Creek. The stands in this location are relatively large,  
32 with moderate to high value for associated plant and wildlife species. The anticipated change in  
33 management of flows in the Yolo Bypass includes more frequent releases in flows into the bypass  
34 from the Fremont and Sacramento Weirs, and in some years, later releases into the bypass in spring  
35 months (April and May).

36 **NEPA Effects:** The modification of periodic inundation events in the Yolo Bypass associated with  
37 Alternative 1C would not adversely affect alkali seasonal wetland complex habitats, as they have  
38 persisted under similar high flows and extended flow periods. There is the potential for some  
39 change in plant species composition as a result of longer inundation periods, but the natural  
40 community would persist.

41 **CEQA Conclusion:** An estimated 264–744 acres of alkali seasonal wetland complex natural  
42 community in the Yolo Bypass would be subjected to more frequent inundation as a result of

1 implementing CM2 under Alternative 1C. This natural community is conditioned to periodic  
2 inundation; the slight increase in periodic inundation would not result in a net permanent reduction  
3 in the acreage of this community in the study area, although some change in plant species  
4 composition could occur. Increasing periodic inundation of alkali seasonal wetland complex natural  
5 community in the Yolo Bypass would have a less-than-significant impact on the community. The  
6 effects of this inundation on wildlife and plant species are described in detail in later sections of this  
7 chapter.

### 8 **Impact BIO-20: Modification of Alkali Seasonal Wetland Complex Natural Community from** 9 **Ongoing Operation, Maintenance and Management Activities**

10 Once the physical facilities associated with Alternative 1C are constructed and the stream flow  
11 regime associated with changed water management is in effect, there would be new ongoing and  
12 periodic actions associated with operation, maintenance and management of the BDCP facilities and  
13 conservation lands that could affect alkali seasonal wetland complex natural community in the study  
14 area. The ongoing actions include the diversion of Sacramento River flows in the north Delta,  
15 reduced diversions from south Delta channels, and recreation in and adjacent to Plan reserves.  
16 These actions are associated with CM1 and CM11 (see the impact discussion above for effects  
17 associated with CM2). The periodic actions would involve access road and conveyance facility  
18 repair, vegetation management at the various water conveyance facilities and habitat restoration  
19 sites (CM11), levee repair and replacement of levee armoring, channel dredging, and habitat  
20 enhancement in accordance with natural community management plans. The potential effects of  
21 these actions are described below.

- 22 ● *Modified river flows upstream of and within the study area and reduced diversions from south*  
23 *Delta channels.* Changes in releases from reservoirs upstream of the study area, increased  
24 diversion of Sacramento River flows in the north Delta, and reduced diversions from south Delta  
25 channels (associated with Operational Scenario A) would not affect alkali seasonal wetland  
26 natural community. This natural community does not exist within or adjacent to the active  
27 Sacramento River system channels and Delta waterways that would be affected by modified  
28 flow levels.
- 29 ● *Access road, water conveyance facility and levee repair.* Periodic repair of access roads, water  
30 conveyance facilities and levees associated with the BDCP actions have the potential to require  
31 removal of adjacent vegetation and could entail earth and rock work in or adjacent to alkali  
32 seasonal wetland complex habitats. This activity could lead to increased soil erosion and runoff  
33 entering these habitats. These activities would be subject to normal erosion and runoff control  
34 management practices, including those developed as part of *AMM2 Construction Best*  
35 *Management Practices and Monitoring* and *AMM4 Erosion and Sediment Control Plan*. Any  
36 vegetation removal or earthwork adjacent to or within alkali seasonal wetland complex habitats  
37 would require use of sediment barriers, soil stabilization and revegetation of disturbed surfaces  
38 as required by *AMM10 Restoration of Temporarily Affected Natural Communities*. Proper  
39 implementation of these measures would avoid permanent adverse effects on this community.
- 40 ● *Vegetation management.* Vegetation management, in the form of physical removal and chemical  
41 treatment, would be a periodic activity associated with the long-term maintenance of water  
42 conveyance facilities and restoration sites. Vegetation management is also the principal activity  
43 associated with *CM11 Natural Communities Enhancement and Management*. Use of herbicides to  
44 control nuisance vegetation could pose a long-term hazard to alkali seasonal wetland complex  
45 natural community at or adjacent to treated areas. The hazard could be created by uncontrolled

1 drift of herbicides, uncontrolled runoff of contaminated stormwater onto the natural  
2 community, or direct discharge of herbicides to alkali seasonal wetland complex areas being  
3 treated for invasive species removal. Environmental commitments and *AMM5 Spill Prevention,*  
4 *Containment and Countermeasure Plan* have been made part of the BDCP to reduce hazards to  
5 humans and the environment from use of various chemicals during maintenance activities,  
6 including the use of herbicides. These commitments are described in Appendix 3B, including the  
7 commitment to prepare and implement spill prevention, containment, and countermeasure  
8 plans and stormwater pollution prevention plans. Best management practices, including control  
9 of drift and runoff from treated areas, and use of herbicides approved for use in terrestrial  
10 environments would also reduce the risk of affecting natural communities adjacent to water  
11 conveyance features and levees associated with restoration activities.

- 12 ● *Habitat enhancement.* The BDCP includes a long-term management element for the natural  
13 communities within the Plan Area (CM11). For the alkali seasonal wetland complex natural  
14 community, a management plan would be prepared that specifies actions to improve the value  
15 of the habitats for covered species. Actions would include control of invasive nonnative plant  
16 and animal species, fire management, restrictions on vector control and application of  
17 herbicides, and maintenance of infrastructure that would allow for movement through the  
18 community. The enhancement efforts would improve the long-term value of this community for  
19 both special-status and common species.
- 20 ● *Recreation.* The BDCP would allow for certain types of recreation in and adjacent to alkali  
21 seasonal wetland natural community in the reserve system. The activities could include wildlife  
22 and plant viewing and hiking. *CM11 Natural Communities Enhancement and Management* (BDCP  
23 Chapter 3 Section 3.4.11) describes this program and identifies applicable restrictions on  
24 recreation that might adversely affect alkali seasonal wetland habitat. BDCP also includes an  
25 avoidance and minimization measure (AMM37) that further dictates limits on recreation  
26 activities that might affect this natural community. Most recreation would be docent-led wildlife  
27 and botanical tours, using existing trails and roads in the vicinity of the reserves. No new trails  
28 would be constructed.

29 The various operations and maintenance activities described above could alter acreage of alkali  
30 seasonal wetland complex natural community in the study area. Activities could introduce sediment  
31 and herbicides that would reduce the value of this community to common and sensitive plant and  
32 wildlife species. Other periodic activities associated with the Plan, including management,  
33 protection and enhancement actions associated with *CM3 Natural Communities Protection and*  
34 *Restoration* and *CM11 Natural Communities Enhancement and Management*, would be undertaken to  
35 enhance the value of the community. While some of these activities could result in small changes in  
36 acreage, these changes would be offset by protection and restoration activities planned as part of  
37 *CM3 Natural Communities Protection and Restoration*, and *CM9 Vernal Pool and Alkali Seasonal*  
38 *Wetland Complex Restoration* and by Mitigation Measure BIO-18, *Compensate for Loss of Alkali*  
39 *Seasonal Wetland Complex*, or minimized by implementation of AMM2, AMM4, AMM5, and AMM10.  
40 The management actions associated with control of invasive plant species would also result in a  
41 long-term benefit to the species associated with alkali seasonal wetland complex habitats by  
42 eliminating competitive, invasive species of plants.

43 ***NEPA Effects:*** Ongoing operation, maintenance and management activities associated with  
44 Alternative 1C would not result in a net permanent reduction in this natural community within the  
45 study area. Therefore, there would be no adverse effect to the community.

1 **CEQA Conclusion:** The operation and maintenance activities associated with Alternative 1C would  
2 have the potential to create minor changes in total acreage of alkali seasonal wetland complex  
3 natural community in the study area, and could create temporary increases sedimentation. The  
4 activities could also introduce herbicides periodically to control nonnative, invasive plants.  
5 Implementation of environmental commitments and AMM2, AMM4, AMM5, and AMM10 would  
6 minimize these impacts, and other operations and maintenance activities, including management,  
7 protection and enhancement actions associated with *CM3 Natural Communities Protection and*  
8 *Restoration* and *CM11 Natural Communities Enhancement and Management*, would create positive  
9 effects, including reduced competition from invasive, nonnative plants in these habitats. Long-term  
10 restoration activities associated with *CM9 Vernal Pool and Alkali Seasonal Wetland Complex*  
11 *Restoration*, protection actions associated with *CM3 Natural Communities Protection and Restoration*  
12 and implementation of Mitigation Measure BIO-18, *Compensate for Loss of Alkali Seasonal Wetland*  
13 *Complex*, would ensure that the acreage of this natural community would not decrease in the study  
14 area. Ongoing operation, maintenance and management activities would not result in a net  
15 permanent reduction in this natural community within the study area. Therefore, there would be a  
16 less-than-significant impact on alkali seasonal wetland complex natural community.

17 **Mitigation Measure BIO-18: Compensate for Loss of Alkali Seasonal Wetland Complex**

18 See the discussion of Mitigation Measure BIO-18 under Impact BIO-18.

19 **Vernal Pool Complex**

20 Construction, operation, maintenance and management associated with the conservation  
21 components of Alternative 1C would have a long-term adverse effect on the habitats associated with  
22 the vernal pool complex natural community, requiring mitigation. Development and construction of  
23 CM1 and CM4 would result in permanent removal of 401 acres and temporary removal of 37 acres  
24 of this community(see Table 12-1C-8). Full implementation of Alternative 1C would also include the  
25 following conservation actions over the term of the BDCP to benefit the vernal pool complex natural  
26 community.

- 27
- 28 ● Protect 600 acres of existing vernal pool complex in Conservation Zones 1, 8, and 11, primarily  
in core vernal pool recovery areas (Objective VPNC1.1, associated with CM3).
  - 29 ● Restore vernal pool complex in Conservation Zones 1, 8, and/or 11 to achieve no net loss of  
30 vernal pool acreage (up to 67 acres of vernal pool complex restoration, assuming that all  
31 anticipated impacts [10 wetted acres] occur and that the restored vernal pool complex has 15%  
32 density of vernal pools) (Objective VPNC1.2, associated with CM3 and CM9).

33 There is a variety of other, less specific conservation goals and objectives in BDCP Chapter 3, Section  
34 3.3 that would improve the value of vernal pool complex natural community for terrestrial species.  
35 As explained below, with the protection, restoration and enhancement of the amounts of habitat  
36 listed in the BDCP objectives, in addition to implementation of AMMs and mitigation measures,  
37 impacts on this natural community would not be adverse for NEPA purposes and would be less than  
38 significant for CEQA purposes.

1 **Table 12-1C-8. Changes in Vernal Pool Complex Natural Community Associated with Alternative 1C**  
2 **(acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Permanent		Temporary		Periodic <sup>d</sup>	
	NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	29	29	37	37	0	0
CM2	0	0	0	0	0-4	0
CM4	201	372	0	0	0	0
CM5	0	0	0	0	0	0
CM6	Unk.	Unk.	Unk.	Unk.	0	0
<b>TOTAL IMPACTS</b>	<b>230</b>	<b>401</b>	<b>37</b>	<b>37</b>	<b>0-4</b>	<b>0</b>

<sup>a</sup> See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

Unk. = unknown

3

4 **Impact BIO-21: Changes in Vernal Pool Complex Natural Community as a Result of**  
5 **Implementing BDCP Conservation Measures**

6 Construction, land grading and habitat restoration activities that would accompany the  
7 implementation of Alternative 1C would eliminate an estimated 438 acres of vernal pool complex  
8 natural community (CM1 and CM4) in the study area. This modification represents approximately  
9 4% of the 12,133 acres of the community that is mapped in the study area. An estimated 267 acres  
10 of the loss would occur during the first 10 years of Alternative 1C implementation, as the western  
11 canal is constructed and tidal marsh restoration is initiated. Vernal pool complex protection (400  
12 acres) and restoration (an estimated 40 acres, with actual restoration based on level of effect) would  
13 be initiated during the first 10 years of Alternative 1C implementation, which would partially offset  
14 the losses in the near-term. By the end of the Plan period, 600 acres of this natural community  
15 would be protected and an estimated 67 acres would be restored. Because of the high sensitivity of  
16 this natural community and its shrinking presence in the Plan Area, avoidance and minimization  
17 measures have been built into the BDCP to eliminate much of this potential loss. The BDCP beneficial  
18 effect analysis (BDCP Chapter 5, Section 5.4.8.2) indicates that implementation of Alternative 4  
19 would protect at least 600 acres of vernal pool complex in Conservation Zones 1, 8, and 11 and  
20 additional vernal pool complex would be restored to achieve no net loss of this community. These  
21 conservation measures would also be implemented for Alternative 1C.

22 The individual effects of the relevant conservation measure are addressed below. A summary  
23 statement of the combined impacts and NEPA and CEQA conclusions follows the individual  
24 conservation measure discussions.

- 1       ● *CM1 Water Facilities and Operation*: Construction of the Alternative 1C water conveyance  
2 facilities would permanently eliminate 29 acres and temporarily eliminate 37 acres of vernal  
3 pool complex natural community. All of these losses would be associated with western canal and  
4 related facilities construction at the south and western sides of Clifton Court Forebay.  
5 Permanent losses would be created by the canal footprint and an adjacent spoil/borrow area.  
6 The temporary losses would be created by constructing a siphon under the southern extension  
7 of Italian Slough and an adjacent fueling station/batch plant (see Figure 12-1 and the Terrestrial  
8 Biology Mapbook). All of these effects would occur in the near-term timeframe.

9       Because of the close proximity of construction activity to adjacent vernal pool complex near  
10 Clifton Court Forebay, there is also the potential for indirect loss or damage to vernal pools from  
11 changes in pool hydrology or deposition of construction-related sediment. These potential  
12 indirect effects are discussed in detail in the vernal pool crustaceans impact analysis later in this  
13 chapter.

14       The construction activity associated with CM1 also has the potential to lead to increased  
15 nitrogen deposition in vernal pool complex habitats in the vicinity of Clifton Court Forebay. A  
16 significant number of cars, trucks, and land grading equipment involved in construction would  
17 emit small amounts of atmospheric nitrogen from fuel combustion; this material could be  
18 deposited in sensitive vernal pool areas that are located west of the major construction areas at  
19 Clifton Court Forebay. Nitrogen deposition can pose a risk of adding a fertilizer to nitrogen-  
20 limited soils and their associated plants. Nonnative invasive species can be encouraged by the  
21 added nitrogen available. BDCP Appendix 5.J, Attachment 5J.A, *Construction-Related Nitrogen*  
22 *Deposition on BDCP Natural Communities*, addresses this issue in detail. It has been concluded  
23 that this potential deposition would pose a low risk of changing the vernal pool complex in the  
24 construction areas because the construction would contribute a negligible amount of nitrogen to  
25 regional projected emissions. Also, the construction at Clifton Court Forebay would occur  
26 primarily downwind of the natural community. No adverse effect is expected.

- 27       ● *CM3 Natural Communities Protection and Restoration*: CM3 proposes to protect at least 600 acres  
28 of vernal pool complex in CZs 1, 8, and 11 (BDCP Objective VPNC1.1). The protection would  
29 occur in areas containing a mosaic of grassland and vernal pool complex in unfragmented  
30 natural landscapes supporting a diversity of native plant and wildlife species. These areas would  
31 be both protected and enhanced to increase the cover of vernal pool complex plants relative to  
32 nonnative species.

- 33       ● *CM4 Tidal Natural Communities Restoration*: Based on the use of hypothetical restoration  
34 footprints, implementation of CM4 tidal marsh restoration in CZs 1 and 11 (Cache Slough and  
35 Suisun Marsh ROAs; see Figure 12-1) could permanently inundate or remove 201 acres of vernal  
36 pool complex in the near-term timeframe. By the end of the Plan period, a total of 372 acres  
37 could be affected. The principal areas likely to be affected include the Cache Slough drainage just  
38 west of the Yolo Bypass and the Nurse Slough drainage just east of the Potrero Hills.

- 39       ● *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*: CM9 includes both vernal  
40 pool complex and alkali seasonal wetland complex restoration goals. The current estimate for  
41 vernal pool complex restoration is 40 acres in the near-term and a total of 67 acres by the end of  
42 the BDCP restoration period. This restoration conservation measure includes the “no net loss”  
43 policy normally applied to this natural community (BDCP Objective VPNC1.2).

1 The following paragraphs summarize the combined effects discussed above and describe other  
2 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA impact conclusions are  
3 also included.

#### 4 ***Near-Term Timeframe***

5 During the near-term timeframe (the first 10 years of BDCP implementation), Alternative 1C would  
6 affect 267 acres of vernal pool complex natural community through inundation or construction-  
7 related losses in habitat from CM1 and CM4 activities. The majority of these losses would occur  
8 adjacent to Clifton Court Forebay as the western canal is constructed, and in the Cache Slough or  
9 Suisun Marsh ROAs mapped in Figure 12-1.

10 The construction or inundation loss of this special-status natural community would represent an  
11 adverse effect if it were not offset by avoidance and minimization measures and restoration actions  
12 associated with BDCP conservation components. Loss of vernal pool complex natural community  
13 would be considered both a loss in acreage of a sensitive natural community and a loss of wetland as  
14 defined by Section 404 of the CWA. The protection of 400 acres of vernal pool complex as part of  
15 CM3 and the restoration of an estimated 40 acres of this community (with a commitment to have  
16 restoration keep pace with actual losses) as part of CM9 during the first 10 years of BDCP  
17 implementation would partially offset this near-term loss. Typical project-level mitigation ratios  
18 (2:1 for protection and 1:1 for restoration) would indicate 534 acres of protection and 267 acres of  
19 restoration would be needed to offset (i.e., mitigate) the 267 acres of loss. The BDCP conservation  
20 measures would be 134 acres short of typical protection requirements and 227 acres short of the  
21 typical restoration requirement for full mitigation of the loss of this natural community. Alternative  
22 1C would have an adverse effect on vernal pool complex in the near-term.

23 To avoid these adverse effects, the Plan also includes commitments to implement *AMM1 Worker*  
24 *Training Awareness*, *AMM2 Construction Best Management Practices and Monitoring*, *AMM3*  
25 *Stormwater Pollution Prevention Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM10 Restoration*  
26 *of Temporarily Affected Natural Communities* and *AMM12 Vernal Pool Crustaceans*. All of these AMMs  
27 include elements that avoid or minimize the risk of affecting habitats at work areas. AMM12 limits  
28 the direct removal of vernal pool crustacean habitat to no more than 10 wetted acres and the  
29 indirect effect to no more than 20 wetted acres through the life of the Plan. This is equivalent to  
30 approximately 67 acres of direct removal and 134 acres of indirect removal of vernal pool complex  
31 natural community. The AMMs are described in detail in BDCP Appendix 3.C. With these AMMs in  
32 place, Alternative 1C not adversely affect vernal pool complex natural community in the near-term.

#### 33 ***Late Long-Term Timeframe***

34 The late long-term effect on vernal pool complex natural community would be 401 acres of  
35 permanent and 37 acres of temporary loss. These losses would be associated with the construction  
36 of CM1 facilities in the vicinity of Clifton Court Forebay and the ongoing restoration of tidal wetland  
37 in the Cache Slough and Suisun Marsh ROAs. However, 600 acres would be protected (CM3) and up  
38 to 67 acres would be restored (CM9) through the course of the BDCP implementation. In addition,  
39 the avoidance and minimization measures listed above would reduce the actual loss of this  
40 community to no more than 10 wetted acres of vernal pool crustacean habitat from direct effects  
41 and 20 acres of habitat from indirect effects.

42 ***NEPA Effects:*** The conservation measures associated with Alternative 1C include protection of 400  
43 acres (CM3) and restoration of an estimated 40 acres (CM9) of vernal pool complex in the near-term

1 time frame. The Plan focuses the protection in the core vernal pool areas identified in the USFWS  
2 vernal pool recovery plan (U.S. Fish and Wildlife Service 2005). The core areas exist in CZ 1, CZ 8 and  
3 CZ 11 (see Figure 12-1). In addition, Alternative 1C includes AMM12, which limits the removal of  
4 vernal pool crustacean habitat to no more than 10 wetted acres and the indirect effect to no more  
5 than 20 wetted acres through the life of the Plan. This is equivalent to approximately 67 acres of  
6 direct loss and 134 acres of indirect loss of vernal pool complex natural community. With this and  
7 other AMMs in place, Alternative 1C not adversely affect vernal pool complex natural community in  
8 the near-term. With these conservation measures and AMMs in effect through the entire Plan period,  
9 Alternative 1C would not have an adverse effect on the vernal pool complex natural community in  
10 the long term.

11 ***CEQA Conclusion:***

12 ***Near-Term Timeframe***

13 During the 10-year near-term time frame, Alternative 1C would result in the direct loss of  
14 approximately 267 acres of vernal pool complex natural community due to water conveyance  
15 construction and inundation during tidal marsh restoration (CM1 and CM4). The loss would occur in  
16 the vicinity of Clifton Court Forebay and Cache Slough or Suisun Marsh ROAs. The construction- and  
17 inundation-related loss of this special-status natural community would represent a significant  
18 impact if it were not offset by avoidance and minimization measures and other actions associated  
19 with BDCP conservation components. Loss of vernal pool complex natural community would be  
20 considered both a loss in acreage of a sensitive natural community and a loss of wetland as defined  
21 by Section 404 of the CWA. The protection of 400 acres of vernal pool complex as part of CM3 and  
22 the restoration of an estimated 40 acres of this community (with a commitment to have restoration  
23 keep pace with actual losses) as part of CM9 during the first 10 years of Alternative 1C  
24 implementation would partially offset this near-term loss. Typical project-level mitigation ratios  
25 (2:1 for protection and 1:1 for restoration) would indicate 534 acres of protection and 267 acres of  
26 restoration would be needed to offset (i.e., mitigate) the 267 acres of loss. Without additional  
27 avoidance and minimization measures to reduce the potential impact, the proposed protection and  
28 restoration would not meet the typical mitigation for vernal pool complex losses. However,  
29 Alternative 1C also includes AMM1, AMM2, AMM3, AMM4, AMM10, and AMM12 to minimize  
30 impacts. AMM12 places a strict limit on the acres of wetted vernal pool crustacean habitat that can  
31 be lost to conservation actions (10 acres of direct and 20 acres of indirect loss). Because of the  
32 offsetting protection and restoration activities and implementation of AMMs, impacts would be less  
33 than significant.

34 ***Late Long-Term Timeframe***

35 At the end of the Plan period, 438 acres of vernal pool complex natural community would be  
36 permanently removed by conservation actions, 600 acres would be protected and up to 67 acres  
37 would be restored. The protection and restoration acreages and the implementation of AMM12  
38 would limit the actual impact to acceptable levels. Alternative 1C would have a less-than-significant  
39 impact on vernal pool complex natural community in the late long-term timeframe.

40 **Impact BIO-22: Increased Frequency, Magnitude and Duration of Periodic Inundation of**  
41 **Vernal Pool Complex Natural Community**

42 Under Alternative 1C, CM2 would modify the inundation/flooding regime of the Yolo Bypass, a man-  
43 made waterway. CM2, which is designed to improve fish passage and shallow flooded habitat for

1 Delta fishes in the Yolo Bypass, could increase periodic inundation of a small acreage of vernal pool  
2 complex natural community in the southern section of the bypass, south of Putah Creek.

3 Operation of the Yolo Bypass under Alternative 1C would result in an increase in the frequency,  
4 magnitude and duration of inundation on an estimated 0–4 acres of vernal pool complex natural  
5 community. The methods used to estimate this inundation acreage are described in BDCP Appendix  
6 5.J, *Effects on Natural Communities, Wildlife, and Plants*. The area more frequently affected by  
7 inundation would vary with the flow volume that would pass through the newly constructed notch  
8 in the Fremont Weir. The 4-acre increase in inundation would only occur at the highest modeled  
9 flow regime, 8,000 cfs. Plan-related increases in flow through Fremont Weir would be expected in  
10 30% of the years. The vernal pool complex natural community that would likely be affected occurs  
11 in the southern reaches of the bypass, south of Putah Creek. There are several relatively large,  
12 contiguous areas of vernal pools on the western edge of the bypass in this area. The anticipated  
13 change in management of flows in the Yolo Bypass includes more frequent releases in flows into the  
14 bypass from the Fremont and Sacramento Weirs, and in some years, later releases into the bypass in  
15 spring months (April and May).

16 **NEPA Effects:** The modification of periodic inundation events in the Yolo Bypass associated with  
17 Alternative 1C water operations would not adversely affect vernal pool complex habitats, as they  
18 have persisted under similar high flows and extended flow periods. There is the potential, however,  
19 for some change in plant species composition as a result of longer inundation periods.

20 **CEQA Conclusion:** An estimated 0–4 acres of vernal pool complex natural community in the Yolo  
21 Bypass would be subjected to more frequent inundation as a result of implementing CM2 under  
22 Alternative 1C. This natural community is conditioned to periodic inundation; the slight increase in  
23 periodic inundation would not result in a net permanent reduction in the acreage of this community  
24 in the study area, although some change in plant species composition could occur. Increasing  
25 periodic inundation of vernal pool complex natural community in the Yolo Bypass would have a less-  
26 than-significant impact on the community.

### 27 **Impact BIO-23: Modification of Vernal Pool Complex Natural Community from Ongoing** 28 **Operation, Maintenance and Management Activities**

29 Once the physical facilities associated with Alternative 1C are constructed and the stream flow  
30 regime associated with changed water management is in effect, there would be new ongoing and  
31 periodic actions associated with operation, maintenance and management of the BDCP facilities and  
32 conservation lands that could affect vernal pool complex natural community in the study area. The  
33 ongoing actions include the diversion of Sacramento River flows in the north Delta, reduced  
34 diversions from south Delta channels, and recreation activities in Plan reserves. These actions are  
35 associated with CM1 and CM11 (see the impact discussion above for effects associated with CM2).  
36 The periodic actions would involve access road and conveyance facility repair, vegetation  
37 management at the various water conveyance facilities and habitat restoration sites (CM11), levee  
38 repair and replacement of levee armoring, channel dredging, and habitat enhancement in  
39 accordance with natural community management plans. The potential effects of these actions are  
40 described below.

- 41 • *Modified river flows upstream of and within the study area and reduced diversions from south*  
42 *Delta channels.* Changes in releases from reservoirs upstream of the study area, increased  
43 diversion of Sacramento River flows in the north Delta, and reduced diversions from south Delta  
44 channels (associated with Operational Scenario A) would not affect vernal pool complex natural

1 community. This natural community does not exist within or adjacent to the active Sacramento  
2 River system channels and Delta waterways.

- 3 ● *Access road, water conveyance facility and levee repair.* Periodic repair of access roads, water  
4 conveyance facilities and levees associated with the BDCP actions have the potential to require  
5 removal of adjacent vegetation and could entail earth and rock work adjacent to vernal pool  
6 complex habitats. This activity could lead to increased soil erosion and runoff entering these  
7 habitats. These activities would be subject to normal erosion and runoff control management  
8 practices, including those developed as part of *AMM2 Construction Best Management Practices*  
9 *and Monitoring* and *AMM4 Erosion and Sediment Control Plan*. Any vegetation removal or  
10 earthwork adjacent to vernal pool complex habitats would require use of sediment barriers, soil  
11 stabilization and revegetation of disturbed surfaces (*AMM10 Restoration of Temporarily Affected*  
12 *Natural Communities*). Proper implementation of these measures would avoid permanent  
13 adverse effects on this community.
- 14 ● *Vegetation management.* Vegetation management, in the form of physical removal and chemical  
15 treatment, would be a periodic activity associated with the long-term maintenance of water  
16 conveyance facilities and restoration sites. Vegetation management is also the principal activity  
17 associated with *CM11 Natural Communities Enhancement and Management*. Use of herbicides to  
18 control nuisance vegetation could pose a long-term hazard to vernal pool complex natural  
19 community at or adjacent to treated areas. The hazard could be created by uncontrolled drift of  
20 herbicides, uncontrolled runoff of contaminated stormwater onto the natural community, or  
21 direct discharge of herbicides to vernal pool complex areas being treated for invasive species  
22 removal. Environmental commitments and *AMM5 Spill Prevention, Containment and*  
23 *Countermeasure Plan* have been made part of the BDCP to reduce hazards to humans and the  
24 environment from use of various chemicals during maintenance activities, including the use of  
25 herbicides. These commitments are described in Appendix 3B, including the commitment to  
26 prepare and implement spill prevention, containment, and countermeasure plans and  
27 stormwater pollution prevention plans. Best management practices, including control of drift  
28 and runoff from treated areas, and use of herbicides approved for use in terrestrial or aquatic  
29 environments would also reduce the risk of affecting natural communities adjacent to water  
30 conveyance features and levees associated with restoration activities.
- 31 ● *Habitat enhancement.* The BDCP includes a long-term management element for the natural  
32 communities within the Plan Area (CM11). For the vernal pool complex natural community, a  
33 management plan would be prepared that specifies actions to improve the value of the habitats  
34 for covered species. Actions would include control of invasive nonnative plant and animal  
35 species, fire management, restrictions on vector control and application of herbicides, and  
36 maintenance of infrastructure that would allow for movement through the community. The  
37 enhancement efforts would improve the long-term value of this community for both special-  
38 status and common species.
- 39 ● *Recreation.* The BDCP would allow for certain types of recreation in and adjacent to vernal pool  
40 complexes in the reserve system. The activities could include wildlife and plant viewing and  
41 hiking. *CM11 Natural Communities Enhancement and Management* (BDCP Chapter 3, Section  
42 3.4.11) describes this program and identifies applicable restrictions on recreation that might  
43 adversely affect vernal pool habitat. BDCP also includes an avoidance and minimization measure  
44 (*AMM37*) that further dictates limits on recreation activities that might affect vernal pools.  
45 Recreational trails would be limited to existing trails and roads. New trail construction would be

1 prohibited within the vernal pool complex reserves. It is expected that most activities would be  
2 docent-led tours of reserves, minimizing adverse effects.

3 The various operations and maintenance activities described above could alter acreage of vernal  
4 pool complex natural community in the study area. Activities could introduce sediment and  
5 herbicides that would reduce the value of this community to common and sensitive plant and  
6 wildlife species. Other periodic activities associated with the Plan, including management,  
7 protection and enhancement actions associated *CM3 Natural Communities Protection and*  
8 *Restoration* and *CM11 Natural Communities Enhancement and Management*, would be undertaken to  
9 enhance the value of the community. While some of these activities could result in small changes in  
10 acreage, these changes would be greatly offset by restoration activities planned as part of *CM9*  
11 *Vernal Pool and Alkali Seasonal Wetland Complex Restoration*, or minimized by implementation of  
12 AMM2, AMM4, AMM5, AMM10, AMM12, and AMM37. The management actions associated with  
13 control of invasive plant species would also result in a long-term benefit to the species associated  
14 with vernal pool complex habitats by eliminating competitive, invasive species of plants.

15 **NEPA Effects:** Ongoing operation, maintenance and management activities associated with  
16 Alternative 1C would not result in a net permanent reduction in the vernal pool complex natural  
17 community within the study area. Therefore, there would be no adverse effect to the community.

18 **CEQA Conclusion:** The operation and maintenance activities associated with Alternative 1C would  
19 have the potential to create minor changes in total acreage of vernal pool complex natural  
20 community in the study area, and could create temporary increases in sedimentation, or damage  
21 from recreational activity. The activities could also introduce herbicides periodically to control  
22 nonnative, invasive plants. Implementation of environmental commitments and AMM2, AMM4,  
23 AMM5, AMM10, AMM12 and AMM37 would minimize these impacts, and other operations and  
24 maintenance activities, including management, protection and enhancement actions associated with  
25 *CM3 Natural Communities Protection and Restoration* and *CM11 Natural Communities Enhancement*  
26 *and Management*, would create positive effects, including reduced competition from invasive,  
27 nonnative plants in these habitats. Long-term restoration activities associated with *CM9 Vernal Pool*  
28 *and Alkali Seasonal Wetland Complex Restoration* and protection actions associated with *CM3*  
29 *Natural Communities Protection and Restoration* would ensure that the acreage of this natural  
30 community would not decrease in the study area. Ongoing operation, maintenance and management  
31 activities would not result in a net permanent reduction in this natural community within the study  
32 area. Therefore, there would be a less-than-significant impact.

### 33 **Managed Wetland**

34 The conservation components of Alternative 1C would reduce the acreage of managed wetland  
35 currently found in the study area. Initial development and construction of CM1, CM2, CM4, and CM6  
36 would result in both permanent and temporary removal of this community (see Table 12-1C-9). Full  
37 implementation of Alternative 1C would also include the following conservation action over the  
38 term of the BDCP to benefit the managed wetland natural community.

- 39 ● Protect and enhance 8,100 acres of managed wetland, at least 1,500 acres of which are in the  
40 Grizzly Island Marsh Complex (Objective MWNC1.1, associated with CM3).
- 41 ● Create 320 acres of managed wetlands consisting of greater sandhill crane roosting habitat in  
42 minimum patch sizes of 40 acres within the Greater Sandhill Crane Winter Use Area in

1 Conservation Zones 3, 4, 5, or 6, with consideration of sea level rise and local seasonal flood  
2 events (Objective GSHC1.3, associated with CM10).

- 3 • Create two wetland complexes within the SLNWR refuge boundary. Each complex will consist of  
4 at least three wetlands totaling 90 acres of greater sandhill crane roosting habitat. One of the  
5 wetland complexes may be replaced by 180 acres of cultivated lands that are flooded following  
6 harvest for crane roosting and foraging habitat (Objective GSHC1.4, associated with CM10).

7 In addition to this conservation action, creation of similar habitat values by restoring tidal brackish  
8 emergent wetland and tidal freshwater emergent wetland as part of CM4 would further offset the  
9 losses of managed wetland. The net effect would be a substantial decrease in the amount of  
10 managed wetlands, but an increase in similar habitat value for special-status and common species as  
11 the managed wetland is converted to tidal marsh. Impacts on this natural community would not be  
12 adverse for NEPA purposes and would be less than significant for CEQA purposes. Refer to the  
13 *Shorebirds and Waterfowl* impacts discussion at the end of this section (Section 12.3.3.4) for further  
14 consideration of the effects of removing managed wetland natural community.

15 **Table 12-1C-9. Changes in Managed Wetland Associated with Alternative 1C (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Permanent		Temporary		Periodic <sup>d</sup>	
	NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	1	1	145	145	0	0
CM2	24	24	44	44	931–2,612	0
CM4	5,718	13,746	0	0	0	0
CM5	0	0	0	0	0	6
CM6	Unk.	Unk.	Unk.	Unk.	0	0
<b>TOTAL IMPACTS</b>	<b>5,743</b>	<b>13,771</b>	<b>189</b>	<b>189</b>	<b>931–2,612</b>	<b>6</b>

<sup>a</sup> See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

Unk. = unknown

16  
17 **Impact BIO-24: Changes in Managed Wetland Natural Community as a Result of Implementing**  
18 **BDCP Conservation Measures**

19 Construction, land grading and habitat restoration activities that would accompany the  
20 implementation of CM1, CM2, CM4, and CM6 would eliminate an estimated 13,960 acres of managed  
21 wetland in the study area. This modification represents approximately 20% of the 70,798 acres of  
22 managed wetland that is mapped in the study area. This loss would occur through the course of the  
23 BDCP restoration program, as construction activity and tidal marsh restoration proceeds. Managed

1 wetland protection (8,100 acres) and restoration (500 acres) would take place over the same  
2 period, but would not replace the acreage lost. The BDCP beneficial effects analysis for Alternative 4  
3 (Chapter 5, Section 5.4.9.2) states that at least 8,100 acres of managed wetlands would be protected,  
4 of which at least 1,500 acres would be located within the Grizzly Island marsh complex, consistent  
5 with the U.S. Fish and Wildlife Service salt marsh harvest mouse recovery plan. Although the  
6 primary purpose of the 1,500 acres of protection is to protect and enhance habitat for the salt marsh  
7 harvest mouse, it is also expected to benefit the managed wetland natural community and the  
8 diversity of species that use it, including migratory waterfowl and the western pond turtle. These  
9 conservation measures would also be implemented under Alternative 1C.

10 The individual effects of the relevant conservation measures are addressed below. A summary  
11 statement of the combined impacts and NEPA and CEQA conclusions follows the individual  
12 conservation measure discussions.

- 13 • *CM1 Water Facilities and Operation*: Construction of the Alternative 1C water conveyance  
14 facilities would permanently remove 1 acre and temporarily remove 145 acres of managed  
15 wetland community. The permanent loss would be created by construction of the main  
16 transmission line for this alternative, which would extend westward through CZs 1 and 2 and  
17 open lands west of the Plan Area. The effect would occur approximately one mile west of Liberty  
18 Island Road. The temporary losses would occur primarily on lands just east of Miner Slough on  
19 Ryer Island. Small patches of managed wetland would be temporarily lost as a result of  
20 constructing Intake 5 adjacent to the west bank of the Sacramento River, constructing a siphon  
21 under Duck Slough just north of North Courtland Road, and constructing electrical transmission  
22 lines adjacent to the tunnel alignment and to the west of the Plan Area, west of CZ 1 (see  
23 Terrestrial Biology Mapbook). These losses would take place during the near-term construction  
24 period.
- 25 • *CM2 Yolo Bypass Fisheries Enhancement*: Implementation of CM2 involves a number of  
26 construction activities that could permanently or temporarily remove managed wetland,  
27 including west side channels modifications, Putah Creek realignment activities, Lisbon Weir  
28 modification and Sacramento Weir improvements. All of these activities could involve  
29 excavation and grading in managed wetland areas to improve passage of fish through the  
30 bypasses. Based on hypothetical construction footprints, a total of 24 acres could be  
31 permanently removed and 44 acres could be temporarily removed. This activity would occur  
32 primarily in the near-term timeframe.
- 33 • *CM4 Tidal Natural Communities Restoration*: Based on the use of hypothetical restoration  
34 footprints, implementation of CM4 would permanently inundate or remove 13,746 acres of  
35 managed wetland community. These losses would be expected to occur primarily in the Suisun  
36 Marsh ROA, but could also occur in the Cache Slough and West Delta ROAs (see Figure 12-1).  
37 These acres of managed wetland would be converted to natural wetland, including large  
38 acreages of tidal brackish emergent wetland and tidal freshwater emergent wetland. These  
39 natural wetlands provide comparable or improved habitat for the special-status species that  
40 occupy managed wetland. The newly created tidal marsh would not create a barrier or result in  
41 fragmentation of managed wetland, as most species are capable of utilizing both communities.  
42 An estimated 500 acres of managed wetland would be restored and 8,100 acres would be  
43 enhanced and protected through *CM3 Natural Communities Protection and Restoration*. All of the  
44 restoration and 4,800 acres of the protection would happen during the first 10 years of  
45 Alternative 1C implementation, which would coincide with the timeframe of water conveyance  
46 facilities construction and early implementation of CM4. The remaining restoration would be

1 spread over the following 30 years. Managed wetland restoration is expected to include at least  
2 320 acres in CZs 3, 4, 5, and 6 (Figure 12-1) to benefit sandhill crane, as stated in BDCP Objective  
3 GSHC1.3. The enhancement and protection would be focused in Suisun Marsh, but could also  
4 occur in CZs with existing managed wetland (CZs 1, 2, 4, 5, 6, and 7).

- 5 • *CM6 Channel Margin Enhancement*: Channel margin habitat enhancement could result in filling  
6 of small amounts of managed wetland habitat along 20 miles of river and sloughs. The extent of  
7 this loss cannot be quantified at this time, but the majority of the enhancement activity would  
8 occur on the edges of tidal perennial aquatic habitat, including levees and channel banks.  
9 Managed wetland adjacent to these tidal areas could be affected. The improvements would  
10 occur within the study area on sections of the Sacramento, San Joaquin and Mokelumne Rivers,  
11 and along Steamboat and Sutter Sloughs.

12 The following paragraphs summarize the combined effects discussed above and describe other  
13 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA impact conclusions are  
14 also included.

### 15 ***Near-Term Timeframe***

16 During the near-term timeframe (the first 10 years of BDCP implementation), Alternative 1C would  
17 permanently remove 5,743 acres and temporarily remove 189 acres of managed wetland through  
18 inundation or construction-related losses in habitat from CM1, CM2, and CM4 activities. An  
19 estimated 1 acre of permanent loss and 145 acres of temporary loss would be associated with  
20 construction of the water conveyance facilities (CM1). These near-term losses would occur in  
21 various locations, but the majority would occur in Suisun Marsh and the lower Yolo Bypass as tidal  
22 marsh is restored.

23 The construction or inundation loss of this special-status natural community would represent an  
24 adverse effect if it were not offset by other conservation actions. Loss of managed wetland natural  
25 community would be considered both a loss in acreage of a sensitive natural community and  
26 potentially a loss of wetland as defined by Section 404 of the CWA. Many managed wetland areas are  
27 interspersed with small natural wetlands that would be regulated under Section 404. The  
28 restoration of 500 acres (CM10) and protection and enhancement of 4,800 acres of managed  
29 wetland (CM3) during the first 10 years of Alternative 1C implementation would fully offset the  
30 losses associated with CM1, but would only partially offset the total near-term loss. Typical project-  
31 level mitigation ratios (1:1 for protection) would indicate 146 acres of protection would be needed  
32 to offset the 146 acres of loss associated with CM1; a total of 5,932 acres of protection would be  
33 needed to offset (i.e., mitigate) the 5,932 acres of permanent and temporary loss from all near-term  
34 actions (see Table 12-1C-9). The combined protection and restoration proposed for managed  
35 wetland in the near-term would fall 632 acres short of full replacement. However, the CM4 marsh  
36 restoration activities that would be creating this loss would be simultaneously creating 2,000 acres  
37 of tidal brackish emergent wetland and 8,850 acres of tidal freshwater emergent wetland in place of  
38 the managed wetland in the near-term. This acreage would significantly exceed the number of acres  
39 of managed wetland lost. Mitigation measures would also be undertaken to reduce the effects of  
40 managed wetland loss on waterfowl in Suisun Marsh (Mitigation Measure BIO-179a) and the  
41 Yolo/Delta basins (Mitigation Measure 179b) if the protection and enhancement actions of CM3 and  
42 CM10 were not sufficient to replace the value of managed wetlands for waterfowl in these basins.  
43 Refer to the *General Terrestrial Biology Effects* discussion later in this section.

1 The Plan also includes commitments to implement *AMM1 Worker Training Awareness*, *AMM2*  
2 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
3 *Plan*, *AMM4 Erosion and Sediment Control Plan*, and *AMM10 Restoration of Temporarily Affected*  
4 *Natural Communities*. All of these AMMs include elements that avoid or minimize the risk of affecting  
5 habitats at work areas. The AMMs are described in detail in BDCP Appendix 3.C.

6 In spite of the managed wetland protection, restoration and avoidance measures contained in  
7 Alternative 1C, there would be a net reduction in the acreage of this special-status natural  
8 community in the near-term. This would be an adverse effect when judged by the significance  
9 criteria listed earlier in this chapter. However, the conversion of these managed habitats to natural  
10 tidal wetland types that support similar ecological functions (2,000 acres of tidal brackish emergent  
11 wetland and 8,850 acres of tidal freshwater emergent wetland) would offset this adverse effect.  
12 Also, there are other conservation actions contained in the BDCP (CM3 and CM11) that would  
13 improve management and enhance existing habitat values, further offsetting the effects of managed  
14 wetland loss on covered and noncovered special-status terrestrial species and on common species  
15 that rely on this natural community for some life phase. As a result, there would be no adverse  
16 effect.

### 17 ***Late Long-Term Timeframe***

18 At the end of the Plan period, 13,960 acres of managed wetland natural community would be  
19 removed by conservation actions, 8,100 acres would be protected and 500 acres would be restored.  
20 There would be a net permanent reduction in the acreage of this special-status natural community  
21 within the study area. Simultaneously, there would be the creation of 6,000 acres of tidal brackish  
22 emergent wetland and 24,000 acres of tidal freshwater emergent wetland in place of this managed  
23 wetland.

24 ***NEPA Effects:*** During the near-term timeframe (the first 10 years of BDCP implementation),  
25 Alternative 1C would permanently remove 5,743 acres and temporarily remove 189 acres of  
26 managed wetland through inundation or construction-related losses in habitat from CM1, CM2, and  
27 CM4 activities. Through the entire Plan period, Alternative 1C would result in a loss 13,960 acres of  
28 managed wetland within the study area; however, it would also protect and enhance 8,100 acres  
29 and restore 500 acres of this habitat. In addition, Alternative 1C would restore 6,000 acres of tidal  
30 brackish emergent wetland and 24,000 acres of tidal freshwater emergent wetland that support  
31 similar ecological functions to those of managed wetland. Therefore, there would be no adverse  
32 effect on managed wetland natural community.

### 33 ***CEQA Conclusion:***

#### 34 ***Near-Term Timeframe***

35 During the near-term timeframe (the first 10 years of BDCP implementation), Alternative 1C would  
36 permanently remove 5,743 acres and temporarily remove 189 acres of managed wetland through  
37 inundation or construction-related losses in habitat from CM1, CM2, and CM4 activities. An  
38 estimated 146 acres of this loss would be associated with construction of the water conveyance  
39 facilities (CM1). These losses would occur in various locations, but the majority of the near-term loss  
40 would occur in Suisun Marsh and the lower Yolo Bypass as tidal marsh is restored.

41 The construction or inundation loss of this special-status natural community would represent a  
42 significant impact if it were not offset by other conservation actions. Loss of managed wetland  
43 natural community would be considered both a loss in acreage of a sensitive natural community and

1 potentially a loss of wetland as defined by Section 404 of the CWA. The restoration of 500 acres and  
2 protection and enhancement of 4,800 acres of managed wetland as part of CM3 during the first 10  
3 years of Alternative 1C implementation would fully offset the losses associated with CM1, but would  
4 only partially offset the total near-term loss. Typical project-level mitigation ratios (1:1 for  
5 protection) would indicate 146 acres of protection would be needed to offset the 146 acres of loss  
6 associated with CM1; a total of 5,932 acres of protection would be needed to offset (i.e., mitigate) the  
7 5,932 acres of permanent and temporary loss from all near-term actions. The combined protection  
8 and restoration proposed for managed wetland in the near-term would fall 632 acres short of full  
9 replacement. However, the CM4 marsh restoration activities that would be creating this loss would  
10 be simultaneously creating 2,000 acres of tidal brackish emergent wetland and 8,850 acres of tidal  
11 freshwater emergent wetland in place of the managed wetland in the near-term. This acreage would  
12 significantly exceed the number of acres of managed wetlands lost. Mitigation measures would also  
13 be undertaken to reduce the effects of managed wetland loss on waterfowl in Suisun Marsh  
14 (Mitigation Measure BIO-179a) and the Yolo/Delta basins (Mitigation Measure 179b) if the  
15 protection and enhancement actions of CM3 and CM10 were not sufficient to replace the value of  
16 managed wetlands for waterfowl in these basins. Refer to the *General Terrestrial Biology Effects*  
17 discussion later in this section.

18 The Plan also includes commitments to implement *AMM1 Worker Training Awareness*, *AMM2*  
19 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
20 *Plan*, *AMM4 Erosion and Sediment Control Plan*, and *AMM10 Restoration of Temporarily Affected*  
21 *Natural Communities*. All of these AMMs include elements that avoid or minimize the risk of affecting  
22 habitats at work areas. The AMMs are described in detail in BDCP Appendix 3.C.

23 In spite of the managed wetland protection, restoration and avoidance measures contained in  
24 Alternative 1C, there would be a net reduction in the acreage of this special-status natural  
25 community in the near-term. This would be a significant impact when judged by the significance  
26 criteria listed earlier in this chapter. However, the conversion of these managed habitats to natural  
27 tidal wetland types that support similar ecological functions (2,000 acres of tidal brackish emergent  
28 wetland and 8,850 acres of tidal freshwater emergent wetland) would offset this significant impact.  
29 Also, there are other conservation actions contained in the BDCP (CM3 and CM11) that would  
30 improve management and enhance existing habitat values, further offsetting the impacts of  
31 managed wetland loss on covered and noncovered special-status terrestrial species and on common  
32 species that rely on this natural community for some life phase. As a result, there would be a less-  
33 than-significant impact.

#### 34 ***Late Long-Term Timeframe***

35 At the end of the Plan period, 13,960 acres of managed wetland natural community would be  
36 removed by conservation actions, 8,100 acres would be protected and 500 acres would be restored.  
37 There would be a net permanent reduction in the acreage of this special-status natural community  
38 within the study area. Simultaneously, there would be the creation of 6,000 acres of tidal brackish  
39 emergent wetland and 24,000 acres of tidal freshwater emergent wetland in place of this managed  
40 wetland. Because these natural wetlands support similar ecological functions to those of managed  
41 wetland, there would be a less-than-significant impact.

1 **Impact BIO-25: Increased Frequency, Magnitude and Duration of Periodic Inundation of**  
2 **Managed Wetland Natural Community**

3 Two Alternative 1C conservation measures would modify the inundation/flooding regimes of both  
4 natural and man-made waterways in the study area. CM2, which is designed to improve fish passage  
5 and shallow flooded habitat for Delta fishes in the Yolo Bypass, would increase periodic inundation  
6 of managed wetland on wildlife management areas and duck clubs scattered up and down the  
7 central and southern bypass. CM5 would expose this community to additional flooding as channel  
8 margins are modified and levees are set back to improve fish habitat along some of the major rivers  
9 and waterways in the south Delta.

- 10 ● *CM2 Yolo Bypass Fisheries Enhancement*: Operation of the Yolo Bypass under Alternative 1C  
11 would result in an increase in the frequency, magnitude and duration of inundation of 931-2,612  
12 acres of managed wetland natural community. The methods used to estimate these inundation  
13 acreages are described in BDCP Appendix 5.J, *Effects on Natural Communities, Wildlife, and*  
14 *Plants*. The area more frequently affected by inundation would vary with the flow volume that  
15 would pass through the newly constructed notch in the Fremont Weir. The 931-acre increase in  
16 inundation would be associated with a notch flow of 8,000 cubic feet per second (cfs), and the  
17 2,612-acre increase would result from a notch flow of 4,000 cfs. Plan-related increases in flow  
18 through Fremont Weir would be expected in 30% of the years. Based on the theoretical  
19 modeling that has been completed to-date, the largest acreages would be associated with the  
20 Sacramento Bypass Wildlife Area, the Yolo Bypass Wildlife Area, and private managed wetlands  
21 south of Putah Creek. The anticipated change in management of flows in the Yolo Bypass  
22 includes more frequent releases in flows into the bypass from the Fremont and Sacramento  
23 Weirs, and in some years, later releases into the bypass in spring months (April and May). With  
24 larger flows, the water depths may also increase over Existing Conditions. While the managed  
25 wetlands of the Yolo Bypass are conditioned to periodic inundation events, the more frequent  
26 and extended inundation periods may make it more difficult to actively manage the areas for  
27 maximum food production for certain species (waterfowl primarily) and may alter the plant  
28 assemblages in some years. The effects of this periodic inundation on birds and other terrestrial  
29 species are discussed later in this chapter. The additional inundation would not be expected to  
30 reduce the acreage of managed wetland on a permanent basis. The extended inundation would  
31 be designed to expand foraging and spawning habitat for Delta fishes.
- 32 ● *CM5 Seasonally Inundated Floodplain Restoration*: Floodplain restoration would result in an  
33 increase in the frequency and duration of inundation of an estimated 6 acres of managed  
34 wetland. Specific locations for this restoration activity have not been identified, but they would  
35 likely be focused in the south Delta area, along the major rivers and Delta channels. The  
36 connection of these wetlands to stream flooding events would be beneficial to the ecological  
37 function of managed wetlands, especially as they relate to BDCP target aquatic species. Foraging  
38 activity and refuge sites would be expanded into areas currently unavailable or infrequently  
39 available to some aquatic species. The more frequent flooding would periodically interfere with  
40 management activities associated with terrestrial species (primarily waterfowl) and may result  
41 in changes in plant composition and management strategies over time.

42 In summary, from 937-2,618 acres of managed wetland community in the study area would be  
43 subjected to more frequent inundation as a result of implementing two Alternative 1C conservation  
44 measures (CM2 and CM5).

1 **NEPA Effects:** Managed wetland community would not be adversely affected because much of the  
2 acreage affected is conditioned to periodic inundation. The more frequent inundation could create  
3 management problems associated with certain species, especially waterfowl, and result in changes  
4 over time in plant species composition. The total acreage of managed wetland would not be  
5 expected to change permanently as a result of the periodic inundation.

6 **CEQA Conclusion:** An estimated 937-2,618 acres of managed wetland community in the study area  
7 would be subjected to more frequent inundation as a result of implementing CM2 and CM5 under  
8 Alternative 1C. Managed wetland community would not be significantly impacted because periodic  
9 inundation is already experienced by most of the land that would be affected. There could be  
10 increased management problems and a long-term shift in plant species composition. The periodic  
11 inundation would not be expected to result in a net permanent reduction in the acreage of this  
12 community in the study area. Therefore, there would be a less-than-significant impact on the  
13 community.

#### 14 **Impact BIO-26: Modification of Managed Wetland Natural Community from Ongoing** 15 **Operation, Maintenance and Management Activities**

16 Once the physical facilities associated with Alternative 1C are constructed and the stream flow  
17 regime associated with changed water management is in effect, there would be new ongoing and  
18 periodic actions associated with operation, maintenance and management of the BDCP facilities and  
19 conservation lands that could affect managed wetland natural community in the study area. The  
20 ongoing actions include the diversion of Sacramento River flows in the north Delta, reduced  
21 diversions from south Delta channels, and recreational use of reserve areas. These actions are  
22 associated with CM1 and CM11 (see the impact discussion above for effects associated with CM2).  
23 The periodic actions would involve access road and conveyance facility repair, vegetation  
24 management at the various water conveyance facilities and habitat restoration sites (CM11), levee  
25 and canal repair and replacement of levee armoring, channel dredging, and habitat enhancement in  
26 accordance with natural community management plans. The potential effects of these actions are  
27 described below.

- 28 ● *Modified river flows upstream of and within the study area and reduced diversions from south*  
29 *Delta channels.* Changes in releases from reservoirs upstream of the study area, increased  
30 diversion of Sacramento River flows in the north Delta, and reduced diversions from south Delta  
31 channels (associated with Operational Scenario A) would not result in the reduction in acreage  
32 of the managed wetland natural community in the study area. Flow levels in the upstream rivers  
33 would not change to the degree that water levels in adjacent managed wetlands would be  
34 altered. Similarly, increased diversions of Sacramento River flows in the north Delta would not  
35 result in a permanent reduction in the managed wetland community downstream of these  
36 diversions. The majority of the managed wetlands below the diversions is not directly connected  
37 to the rivers. Reduced diversions from the south Delta channels would not create a reduction in  
38 this natural community.
- 39 ● *Access road, water conveyance facility and levee repair.* Periodic repair of access roads, water  
40 conveyance facilities and levees associated with the BDCP actions have the potential to require  
41 removal of adjacent vegetation and could entail earth and rock work in managed wetland  
42 habitats. This activity could lead to increased soil erosion, turbidity and runoff entering  
43 managed wetlands. These activities would be subject to normal erosion, turbidity and runoff  
44 control management practices, including those developed as part of *AMM2 Construction Best*

1        *Management Practices and Monitoring* and *AMM4 Erosion and Sediment Control Plan*. Any  
2        vegetation removal or earthwork adjacent to or within managed wetland habitats would require  
3        use of sediment and turbidity barriers, soil stabilization and revegetation of disturbed surfaces.  
4        Proper implementation of these measures would avoid permanent adverse effects on this  
5        community.

- 6        • *Vegetation management*. Vegetation management, in the form of physical removal and chemical  
7        treatment, would be a periodic activity associated with the long-term maintenance of water  
8        conveyance facilities and restoration sites. Vegetation management is also the principal activity  
9        associated with *CM11 Natural Communities Enhancement and Management*. Use of herbicides to  
10       control nuisance vegetation could pose a long-term hazard to managed wetland natural  
11       community at or adjacent to treated areas. The hazard could be created by uncontrolled drift of  
12       herbicides, uncontrolled runoff of contaminated stormwater onto the community, or direct  
13       discharge of herbicides to managed wetland areas being treated for invasive species removal.  
14       Environmental commitments and *AMM5 Spill Prevention, Containment and Countermeasure Plan*  
15       have been made part of the BDCP to reduce hazards to humans and the environment from use of  
16       various chemicals during maintenance activities, including the use of herbicides. These  
17       commitments are described in Appendix 3B, including the commitment to prepare and  
18       implement spill prevention, containment, and countermeasure plans and stormwater pollution  
19       prevention plans. Best management practices, including control of drift and runoff from treated  
20       areas, and use of herbicides approved for use in aquatic and terrestrial environments would also  
21       reduce the risk of affecting natural communities adjacent to water conveyance features and  
22       levees associated with restoration activities.

23       Herbicides to remove aquatic invasive species as part of CM13 would be used to restore the  
24       normal ecological function of tidal and nontidal aquatic habitats in planned restoration areas.  
25       The treatment activities would be conducted in concert with the California Department of  
26       Boating and Waterways' invasive species removal program. Eliminating large stands of water  
27       hyacinth and Brazilian waterweed would improve habitat conditions for some aquatic species  
28       by removing cover for nonnative predators, improving water flow and removing barriers to  
29       movement (see Chapter 11, *Fish and Aquatic Resources*). These habitat changes should also  
30       benefit terrestrial species that use managed wetland natural community for movement  
31       corridors and for foraging. Vegetation management effects on individual species are discussed in  
32       the species sections on following pages.

- 33       • *Habitat enhancement*. The BDCP includes a long-term management element for the natural  
34       communities within the Plan Area (CM11). For the managed wetland natural community, a  
35       management plan would be prepared that specifies actions to improve the value of the habitats  
36       for covered species. Actions would include control of invasive nonnative plant and animal  
37       species, fire management, restrictions on vector control and application of herbicides, and  
38       maintenance of infrastructure that would allow for movement through the community. The  
39       enhancement efforts would improve the long-term value of this community for both special-  
40       status and common species.
- 41       • *Recreation*. The BDCP would allow hunting, fishing and hiking in managed wetland reserve  
42       areas. *CM11 Natural Communities Enhancement and Management* (BDCP Chapter 3, Section  
43       3.4.11) describes this program and identifies applicable restrictions on recreation that might  
44       adversely affect managed wetland habitat. BDCP also includes an avoidance and minimization  
45       measure (AMM37) that further dictates limits on recreation activities that might affect this

1 natural community. Hunting would be the dominant activity in fall and winter months, while  
2 fishing and hiking would be allowed in non-hunting months.

3 The various operations and maintenance activities described above could alter acreage of managed  
4 wetland natural community in the study area through facilities maintenance, vegetation  
5 management, and recreation. Activities could also introduce sediment and herbicides that would  
6 reduce the value of this community to common and sensitive plant and wildlife species. Other  
7 periodic activities associated with the Plan, including management, protection and enhancement  
8 actions associated with *CM3 Natural Communities Protection and Restoration* and *CM11 Natural*  
9 *Communities Enhancement and Management*, would be undertaken to enhance the value of the  
10 community. While some of these activities could result in small changes in acreage, these changes  
11 would be offset by restoration activities planned as part of *CM10 Nontidal Marsh Restoration and*  
12 *CM4 Tidal Natural Communities Restoration*, and protection and restoration actions associated with  
13 *CM3 Natural Communities Protection and Restoration*. Recreation activity effects would be  
14 minimized by AMM37 (see BDCP Appendix 3.C). The management actions associated with levee  
15 repair and control of invasive plant species would also result in a long-term benefit to the species  
16 associated with managed wetland habitats by improving water movement.

17 **NEPA Effects:** Ongoing operation, maintenance and management activities associated with  
18 Alternative 1C would not result in a net permanent reduction in acreage of the managed wetland  
19 natural community within the study area. Therefore, there would be no adverse effect on this  
20 natural community.

21 **CEQA Conclusion:** The operation and maintenance activities associated with Alternative 1C would  
22 have the potential to create minor changes in total acreage of managed wetland natural community  
23 in the study area, and could create temporary increases in turbidity and sedimentation. The  
24 activities could also introduce herbicides periodically to control nonnative, invasive plants. Hunting  
25 could intermittently reduce the availability of this community to special-status and common wildlife  
26 species. Implementation of environmental commitments and AMM2, AMM4, AMM5 and AMM37  
27 would minimize these impacts, and other operations and maintenance activities, including  
28 management, protection and enhancement actions associated with *CM3 Natural Communities*  
29 *Protection and Restoration* and *CM11 Natural Communities Enhancement and Management*, would  
30 create positive effects, including improved water movement in and adjacent to these habitats. Long-  
31 term restoration activities associated with *CM10 Nontidal Marsh Restoration* and *CM4 Tidal Natural*  
32 *Communities Restoration*, and protection and restoration actions associated with *CM3 Natural*  
33 *Communities Protection and Restoration* would greatly expand the ecological functions of this natural  
34 community in the study area. Ongoing operation, maintenance and management activities would not  
35 result in a net permanent reduction in this sensitive natural community within the study area.  
36 Therefore, there would be a less-than-significant impact.

### 37 **Other Natural Seasonal Wetland**

38 The other natural seasonal wetlands natural community encompasses all the remaining natural (not  
39 managed) seasonal wetland communities other than vernal pools and alkali seasonal wetlands.  
40 These areas mapped by CDFW (Hickson and Keeler-Wolf 2007) and ICF biologists (the western area  
41 of additional analysis; see Figure 12-1) consist of seasonally ponded, flooded, or saturated soils  
42 dominated by grasses, sedges, or rushes. The largest segments of this community in the study area  
43 are located along the Cosumnes River northeast of Thornton, and in the western extension of the  
44 study area northwest of Rio Vista. Most of the smaller mapped areas are located in the Suisun Marsh

ROA on the western edge of the Montezuma Hills, in the interior of the Potrero Hills, and in the western transmission corridor that extends west from CZ 1. There are also other natural seasonal wetlands mapped along Old River and Middle River in CZ 7 (Figure 12-1). The only BDCP conservation measures that would potentially affect this natural community are construction of water conveyance facilities (CM1) and seasonally inundated floodplain restoration (CM5) (see Table 12-1C-10). These conservation measures would have an adverse effect on other natural seasonal wetland complex, but with the implementation of restoration actions associated with alkali seasonal wetland complex and vernal pool complex, and Mitigation Measure BIO-27, the effects would not be adverse for NEPA purposes and less than significant for CEQA purposes.

**Table 12-1C-10. Changes in Other Natural Seasonal Wetland Associated with Alternative 1C (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Permanent		Temporary		Periodic <sup>d</sup>	
	NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	2	2	2	2	0	0
CM2	0	0	0	0	0	0
CM4	0	0	0	0	0	0
CM5	0	0	0	0	0	2
CM6	Unk.	Unk.	Unk.	Unk.	0	0
<b>TOTAL IMPACTS</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>0</b>	<b>0</b>

<sup>a</sup> See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only.

NT = near-term

LLT = late long-term

Unk. = unknown

**Impact BIO-27: Modification of Other Natural Seasonal Wetland Natural Community as a Result of Implementing BDCP Conservation Measures**

Construction that would be required for implementing Alternative 1C conservation measure *CM1 Water Facilities and Operation* would result in the permanent and temporary loss of other natural seasonal wetland community (2 acres permanent loss and 2 acres temporary loss). The 4-acre loss would represent less than 1% of the 842 acres of this community mapped in the study area. The losses would occur in the near-term timeframe along the permanent transmission corridor that would extend westward from the Plan Area just northwest of Rio Vista along Flannery, Goose Haven and Lambie Roads (see Terrestrial Biology Mapbook). These natural seasonal wetlands occupy low areas that extend both north and south of these roads.

Restoration activities planned as part of *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration* would increase the amount of seasonal wetlands in the study area by 139 acres; 98 acres would be restored in the near-term. *CM3 Natural Communities Protection and Restoration* would

1 protect 750 acres of seasonal wetland (vernal pool complex and alkali seasonal wetland complex)  
2 over the course of Alternative 1C implementation; 520 of these acres would be protected in the  
3 near-term. Typical project-level mitigation ratios (2:1 for protection and 1:1 for restoration) would  
4 indicate 8 acres of protection and 4 acres of restoration would be needed to offset (i.e., mitigate) the  
5 4-acre loss.

6 Based on theoretical footprints, *CM5 Seasonally Inundated Floodplain Restoration* could expose 2  
7 acres of other natural seasonal wetland community to additional flooding as channel margins are  
8 modified and levees are set back to improve fish habitat along some of the major rivers and  
9 waterways throughout the study area. Specific locations for this restoration activity have not been  
10 identified, but they would likely be focused in the south Delta area, along the major rivers and Delta  
11 channels, including the channel of Old River. The exposure of these seasonal wetlands to increased  
12 but infrequent episodes of stream flooding would not alter their ecological function or species  
13 composition. Their value to special-status and common plants and wildlife in the study area would  
14 not be affected. The effects of this inundation on wildlife and plant species are described in detail in  
15 later sections of this chapter.

16 **NEPA Effects:** As indicated in discussion of impacts on alkali seasonal wetland complex above, the  
17 Plan does not include sufficient protection and restoration to fully offset effects created by  
18 Alternative 1C on alkali seasonal wetland complex, so its protection and restoration activity cannot  
19 be used to offset effects on other natural seasonal wetland. Similarly, vernal pool restoration  
20 provided in the Plan (up to 67 acres) is only sufficient to offset anticipated Plan effects. Vernal pool  
21 protection (600 acres) more than offsets the estimated 438-acre loss. Without additional mitigation  
22 in the form of seasonal wetland restoration, the modification of the other natural seasonal wetland  
23 natural community under Alternative 1C would have an adverse effect on other natural seasonal  
24 wetland. Mitigation Measure BIO-27, *Compensate for Loss of Other Natural Season Wetland*, is  
25 available to address this effect. The small increase in periodic flooding due to CM5 would not alter  
26 the function or general species makeup of the other natural wetland natural community and,  
27 therefore, would have no adverse effect.

28 **CEQA Conclusion:** An estimated 2 acres of other natural seasonal wetland community in the study  
29 area would be subjected to more frequent inundation from flood flows as a result of implementing  
30 CM5 under Alternative 1C. A small seasonal increase in periodic flooding would not alter the natural  
31 community's ecological function or species composition, and the periodic inundation would not  
32 result in a net permanent reduction in the acreage of this community in the study area. Therefore,  
33 increased periodic flooding due to CM5 would have a less-than-significant impact on the other  
34 seasonal wetland natural community.

35 Alternative 1C would eliminate 4 acres of other natural seasonal wetland complex through  
36 construction of the western transmission corridor northwest of Rio Vista. The construction loss of  
37 this special-status natural community would represent a significant impact if it were not offset by  
38 other conservation actions. Loss of other natural seasonal wetland natural community would be  
39 considered both a loss in acreage of a sensitive natural community and potentially a loss of wetland  
40 as defined by Section 404 of the CWA. The restoration of 139 acres (CM9) and protection and  
41 enhancement of 750 acres (CM3) of vernal pool complex and alkali seasonal wetland complex over  
42 the course of Alternative 1C implementation would fully offset the losses associated with CM1.  
43 Typical project-level mitigation ratios (2:1 for protection and 1:1 for restoration) would indicate 8  
44 acres of protection and 4 acres of restoration would be needed to offset (i.e., mitigate) the 4 acre  
45 loss. However, because Alternative 1C would remove more vernal pool complex and alkali seasonal

1 wetland complex than provided for in BDCP conservation measures, there would be no restoration  
2 actions that would fully offset the loss of other natural seasonal wetland. There would be a net  
3 reduction in the acreage of this natural community in the study area. Therefore, Alternative 1C  
4 would have a significant impact on other natural seasonal wetland. Implementation of Mitigation  
5 Measure BIO-27 would reduce this impact to a less-than-significant level.

6 **Mitigation Measure BIO-27: Compensate for Loss of Other Natural Seasonal Wetland**

7 To fully compensate for loss of other natural seasonal wetland as a result of implementing  
8 Alternative 1C, DWR shall increase the near-term and late long-term goals for restoration of  
9 seasonal wetland by 4 acres.

10 **Impact BIO-28: Modification of Other Natural Seasonal Wetland Natural Community from**  
11 **Ongoing Operation, Maintenance and Management Activities**

12 Once the physical facilities associated with Alternative 1C are constructed and the stream flow  
13 regime associated with changed water management is in effect, there would be new ongoing and  
14 periodic actions associated with operation, maintenance and management of the BDCP facilities and  
15 conservation lands that could affect other natural seasonal wetland natural community in the study  
16 area. The ongoing actions include the diversion of Sacramento River flows in the north Delta, and  
17 reduced diversions from south Delta channels. These actions are associated with CM1. The periodic  
18 actions would involve access road and conveyance facility repair, vegetation management at the  
19 various water conveyance facilities and habitat restoration sites (CM11), levee repair and  
20 replacement of levee armoring, channel dredging, and habitat enhancement in accordance with  
21 natural community management plans. The potential effects of these actions are described below.

- 22 • *Modified river flows upstream of and within the study area and reduced diversions from south*  
23 *Delta channels.* Changes in releases from reservoirs upstream of the study area, increased  
24 diversion of Sacramento River flows in the north Delta, and reduced diversions from south Delta  
25 channels (associated with Operational Scenario A) would not affect other natural seasonal  
26 wetland natural community. The small areas mapped in the study area are not in or adjacent to  
27 streams that would experience changes in water levels as a result of these operations.
- 28 • *Access road, water conveyance facility and levee repair.* Periodic repair of access roads, water  
29 conveyance facilities and levees associated with the BDCP actions have the potential to require  
30 removal of adjacent vegetation and could entail earth and rock work in other natural seasonal  
31 wetland habitats. This activity could lead to increased soil erosion and runoff entering these  
32 habitats. These activities would be subject to normal erosion and runoff control management  
33 practices, including those developed as part of *AMM2 Construction Best Management Practices*  
34 *and Monitoring* and *AMM4 Erosion and Sediment Control Plan*. Any vegetation removal or  
35 earthwork adjacent to or within other natural seasonal wetland habitats would require use of  
36 sediment barriers, soil stabilization and revegetation of disturbed surfaces as required by  
37 *AMM10 Restoration of Temporarily Affected Natural Communities*. Proper implementation of  
38 these measures would avoid permanent adverse effects on this community.
- 39 • *Vegetation management.* Vegetation management, in the form of physical removal and chemical  
40 treatment, would be a periodic activity associated with the long-term maintenance of water  
41 conveyance facilities and restoration sites. Vegetation management is also the principal activity  
42 associated with *CM11 Natural Communities Enhancement and Management*. Use of herbicides to  
43 control nuisance vegetation could pose a long-term hazard to the other natural seasonal wetland

1 natural community at or adjacent to treated areas. The hazard could be created by uncontrolled  
2 drift of herbicides, uncontrolled runoff of contaminated stormwater onto the natural  
3 community, or direct discharge of herbicides to wetland areas being treated for invasive species  
4 removal. Environmental commitments and *AMM5 Spill Prevention, Containment and*  
5 *Countermeasure Plan* have been made part of the BDCP to reduce hazards to humans and the  
6 environment from use of various chemicals during maintenance activities, including the use of  
7 herbicides. These commitments are described in Appendix 3B, including the commitment to  
8 prepare and implement spill prevention, containment, and countermeasure plans and  
9 stormwater pollution prevention plans. Best management practices, including control of drift  
10 and runoff from treated areas, and use of herbicides approved for use in terrestrial or aquatic  
11 environments would also reduce the risk of affecting natural communities adjacent to water  
12 conveyance features and levees associated with restoration activities.

- 13 • *Habitat enhancement.* The BDCP includes a long-term management element for the natural  
14 communities within the Plan Area (CM11). For the other natural seasonal wetland natural  
15 community, a management plan would be prepared that specifies actions to improve the value  
16 of the habitats for covered species. Actions would include control of invasive nonnative plant  
17 and animal species, fire management, restrictions on vector control and application of  
18 herbicides, and maintenance of infrastructure that would allow for movement through the  
19 community. The enhancement efforts would improve the long-term value of this community for  
20 both special-status and common species.

21 The various operations and maintenance activities described above could alter acreage of other  
22 natural seasonal wetland natural community in the study area. Activities could introduce sediment  
23 and herbicides that would reduce the value of this community to common and sensitive plant and  
24 wildlife species. Other periodic activities associated with the Plan, including management,  
25 protection and enhancement actions associated with *CM3 Natural Communities Protection and*  
26 *Restoration* and *CM11 Natural Communities Enhancement and Management*, would be undertaken to  
27 enhance the value of the community. While some of these activities could result in small changes in  
28 acreage, these changes would be minor. The restoration activities planned as part of *CM9 Vernal*  
29 *Pool and Alkali Seasonal Wetland Complex Restoration*, the protection activities planned as part of  
30 *CM3 Natural Communities Protection and Restoration*, the mitigation measure proposed above for  
31 other seasonal wetland, and implementation of AMM2, AMM4, AMM5, and AMM10 would offset any  
32 loss of this community. The vernal pool complex conservation measure includes restoration of 139  
33 acres of seasonal wetlands with similar ecological values as the other natural seasonal wetland  
34 community. The management actions associated with control of invasive plant species would also  
35 result in a long-term benefit to the species associated with other natural seasonal wetland habitats  
36 by eliminating competitive, invasive species of plants.

37 **NEPA Effects:** Ongoing operation, maintenance and management activities associated with  
38 Alternative 1C would not result in a net permanent reduction in the other natural seasonal wetland  
39 natural community within the study area. Therefore, there would be no adverse effect to the  
40 community.

41 **CEQA Conclusion:** The operation and maintenance activities associated with Alternative 1C would  
42 have the potential to create minor changes in total acreage of other natural seasonal wetland natural  
43 community in the study area, and could create temporary increases in sedimentation. The activities  
44 could also introduce herbicides periodically to control nonnative, invasive plants. Implementation of  
45 environmental commitments and AMM2, AMM4, AMM5, and AMM10 would minimize these impacts,

1 and other operations and maintenance activities, including management, protection and  
2 enhancement actions associated with *CM3 Natural Communities Protection and Restoration* and  
3 *CM11 Natural Communities Enhancement and Management*, would create positive effects, including  
4 reduced competition from invasive, nonnative plants in these habitats. Long-term restoration  
5 activities associated with *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*,  
6 protection actions associated with *CM3 Natural Communities Protection and Restoration*, and  
7 Mitigation Measure BIO-27, *Compensate for Loss of Other Natural Seasonal Wetland*, would ensure  
8 that the ecological values provided by this small natural community would not decrease in the study  
9 area. Ongoing operation, maintenance and management activities would not result in a net  
10 permanent reduction in this natural community within the study area. Therefore, there would be a  
11 less-than-significant impact.

## 12 **Grassland**

13 Construction, operation, maintenance and management associated with the conservation  
14 components of Alternative 1C would have no long-term adverse effects on the habitats associated  
15 with the grassland natural community. Initial development and construction of CM1, CM2, CM4,  
16 CM5, CM6, CM7, CM11 and CM18 would result in both permanent and temporary removal of this  
17 community(see Table 12-1C-11). Full implementation of Alternative 1C would also include the  
18 following conservation actions over the term of the BDCP to benefit the grassland natural  
19 community.

- 20 ● Protect 8,000 acres of grassland with at least 2,000 acres protected in Conservation Zone 1, at  
21 least 1,000 acres protected in Conservation Zone 8, and at least 2,000 acres protected in  
22 Conservation Zone 11 (Objective GNC1.1, associated with CM3)
- 23 ● Restore 2,000 acres of grasslands to connect fragmented patches of protected grassland and to  
24 provide upland habitat adjacent to riparian, tidal, and nontidal natural communities for wildlife  
25 foraging and upland refugia (Objective GNC1.2, associated with CM3 and CM8)
- 26 ● Of the 8,000 acres of grassland protected and at least 2,000 acres of grassland restored, protect  
27 or restore grasslands adjacent to restored tidal brackish emergent wetlands to provide 200 feet  
28 of adjacent grasslands beyond the sea level rise accommodation (Objective GNC1.4, associated  
29 with CM3 and CM8)

30 There is a variety of other, less specific conservation goals and objectives in BDCP Chapter 3, Section  
31 3.3 that would improve the value of grassland natural community for terrestrial species. As  
32 explained below, with the protection, restoration and enhancement of the amounts of habitat listed  
33 in the BDCP objectives, in addition to implementation of AMMs, impacts on this natural community  
34 would not be adverse for NEPA purposes and would be less than significant for CEQA purposes.

35

1

**Table 12-1C-11. Changes in Grassland Natural Community Associated with Alternative 1C (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Permanent		Temporary		Periodic <sup>d</sup>	
	NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	358	358	320	320	0	0
CM2	388	388	239	239	385-1,277	0
CM4	448	1,122	0	0	0	0
CM5	0	51	0	34	0	514
CM6	Unk.	Unk.	Unk.	Unk.	0	0
CM7	4	410	0	0	0	0
CM11	13	50	0	0	0	0
CM18	35	35	0	0	0	0
<b>TOTAL IMPACTS</b>	<b>1,246</b>	<b>2,414</b>	<b>559</b>	<b>593</b>	<b>385-1,277</b>	<b>514</b>

<sup>a</sup> See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

Unk. = unknown

2

3 **Impact BIO-29: Changes in Grassland Natural Community as a Result of Implementing BDCP**  
4 **Conservation Measures**

5 Construction, land grading and habitat restoration activities that would accompany the  
6 implementation of CM1, CM2, CM4, CM5, CM6, CM7, CM11 and CM18 would permanently eliminate  
7 an estimated 2,364 acres and temporarily remove 593 acres of grassland natural community in the  
8 study area. These modifications represent approximately 4% of the 78,047 acres of the community  
9 that is mapped in the study area. Approximately 60% of the permanent and temporary losses would  
10 happen during the first 10 years of Alternative 1C implementation, as water conveyance facilities  
11 are constructed and habitat restoration is initiated. Grassland protection (2,000 acres), restoration  
12 (1,140 acres) and enhancement would be initiated during the same period, which would partially  
13 offset the losses. By the end of the Plan period, 2,000 acres of this natural community would be  
14 restored and 8,000 acres would be protected. The BDCP beneficial effects analysis for grassland  
15 (BDCP Chapter 5, Section 5.4.11.2) indicates that 8,000 acres of grasslands would be protected in  
16 Conservation Zones 1, 2, 4, 5, 7, 8, and 11, and 2,000 acres of grassland would be restored. Grassland  
17 protection and restoration would improve connectivity among habitat areas in and adjacent to the  
18 Plan Area, improve genetic interchange among native species' populations, and contribute to the  
19 long-term conservation of grassland-associated covered species. The same conservation actions  
20 would be implemented with Alternative 1C.

1 The individual effects of each relevant conservation measure are addressed below. A summary  
2 statement of the combined impacts and NEPA and CEQA conclusions follows the individual  
3 conservation measure discussions.

- 4 • *CM1 Water Facilities and Operation*: Construction of the Alternative 1C water conveyance  
5 facilities would permanently remove 358 acres and temporarily remove 320 acres of grassland  
6 natural community. The permanent losses would occur at various locations along the western  
7 canal route and at the intake sites along the Sacramento River. Small areas of primarily ruderal  
8 herbaceous grasses and forbs would be permanently removed at all five intakes on the west  
9 bank of the Sacramento River and along the canal route at Winchester Lake and the east bank of  
10 the Sacramento River Deep Water Ship Channel. Larger areas of annual grassland would be  
11 permanently removed by canal construction south of Rock Slough, south of Discovery Bay and  
12 immediately west of Clifton Court Forebay. Both temporary and permanent losses of grassland  
13 would be created by constructing transmission corridors west of the Plan Area and along the  
14 tunnel alignment in the west Delta. Temporary losses would be at siphon construction areas at  
15 Elk Slough, Miner Slough, Rock Slough and Italian Slough; at safe haven work areas on Bethel  
16 Island and just south of Dutch Slough; and at railroad work areas just southwest of Clifton Court  
17 Forebay (see the Terrestrial Biology Mapbook for locations). These losses would take place  
18 during the near-term construction period.

19 The construction activity associated with CM1 also has the potential to lead to increased  
20 nitrogen deposition in grassland habitats in the vicinity of Clifton Court Forebay. A significant  
21 number of cars, trucks, and land grading equipment involved in construction in and around the  
22 forebay would emit small amounts of atmospheric nitrogen from fuel combustion; this material  
23 could be deposited in sensitive grassland areas that are located west of the major construction  
24 areas at Clifton Court Forebay. Nitrogen deposition can pose a risk of adding a fertilizer to  
25 nitrogen-limited soils and their associated plants. Nonnative invasive species can be encouraged  
26 by the added nitrogen available. BDCP Appendix 5.J, Attachment 5J.A, *Construction-Related*  
27 *Nitrogen Deposition on BDCP Natural Communities*, addresses this issue in detail. It has been  
28 concluded that this potential deposition would pose a low risk of changing the grassland in and  
29 adjacent to the construction areas because the construction would contribute a negligible  
30 amount of nitrogen to regional projected emissions and the existing grassland is dominated by  
31 nonnative invasive species of plants. Also, the construction at Clifton Court Forebay would occur  
32 primarily downwind of the natural community. No adverse effect is expected.

- 33 • *CM2 Yolo Bypass Fisheries Enhancement*: Implementation of CM2 involves a number of  
34 construction activities within the Yolo and Sacramento Bypasses, including Fremont Weir and  
35 stilling basin improvements, Putah Creek realignment activities, Toe Drain/Tule Canal and  
36 Lisbon Weir modification and Sacramento Weir improvements. All of these activities could  
37 involve excavation and grading in grassland areas to improve passage of fish through the  
38 bypasses. Based on hypothetical construction footprints, a total of 388 acres could be  
39 permanently lost and another 239 acres could be temporarily removed. Most of the grassland  
40 losses would occur at the north end of the bypass below Fremont Weir where a large expanse of  
41 grassland is present, along the Toe Drain/Tule Canal, and along the west side channels. These  
42 grasslands are composed primarily of upland annual grassland and forbs. Some of this grassland  
43 removal along the side channels of the bypass could pose barriers to grassland species moving  
44 within the bypass. These losses would occur primarily in the near-term timeframe.
- 45 • *CM4 Tidal Natural Communities Restoration*: Based on the use of hypothetical restoration  
46 footprints, implementation of CM4 would permanently inundate or remove 448 acres of

1 grassland in the near-term and inundate or remove 1,122 acres of grassland by the end of the  
2 Plan timeframe. The losses would occur in a number of ROAs established for tidal restoration  
3 (see Figure 12-1). The largest losses would likely occur in the vicinity of Cache Slough, on  
4 Decker Island in the West Delta ROA, on the upslope fringes of Suisun Marsh, and along narrow  
5 bands adjacent to waterways in the South Delta ROA. Most of this grassland is ruderal and  
6 herbaceous vegetation with low habitat value; some of the larger patches of grassland in the  
7 Cache Slough ROA are annual grassland with higher values.

- 8 ● *CM5 Seasonally Inundated Floodplain Restoration*: Floodplain restoration levee construction  
9 would permanently remove 51 acres and temporarily remove 34 acres of grassland natural  
10 community. The construction-related losses would be considered a permanent removal of the  
11 habitats affected. These losses would be expected to occur along the San Joaquin River and other  
12 major waterways in CZ 7 (see Figure 12-1). The grassland in this area is primarily composed of  
13 narrow bands and small patches of ruderal herbaceous grasses and forbs. This activity is  
14 scheduled to start following construction of water conveyance facilities, which is expected to  
15 take 10 years.
- 16 ● *CM6 Channel Margin Enhancement*: Channel margin habitat enhancement could result in  
17 removal of small amounts of grassland natural community along 20 miles of river and sloughs.  
18 The extent of this loss cannot be quantified at this time, but the majority of the enhancement  
19 activity would occur along waterway margins where grassland habitat stringers exist, including  
20 along levees and channel banks. The improvements would occur within the study area on  
21 sections of the Sacramento, San Joaquin and Mokelumne Rivers, and along Steamboat and Sutter  
22 Sloughs.
- 23 ● *CM7 Riparian Natural Community Restoration*; Riparian natural community restoration would  
24 occur in a variety of settings in the Plan Area, with an emphasis on improving connectivity of  
25 existing riparian areas and stream/river corridors, to benefit the movement and interchange of  
26 special-status and common species that use these areas. Large tracts would be restored in  
27 concert with floodplain restoration (CM5), while narrower bands would be developed as part of  
28 channel margin enhancement (CM6) and tidal marsh restoration (CM4). In the process of  
29 expanding woody riparian habitat, existing nonnative grassland would be removed. While  
30 specific locations for these restoration activities have not been fully developed, use of  
31 theoretical footprints for this activity indicate that up to 410 acres of grassland could be lost  
32 through the course of Alternative 1C implementation. A majority of this activity would occur in  
33 the South Delta and Cosumnes/Mokelumne ROAs (see Figure 12-1).
- 34 ● *CM8 Grassland Natural Community Restoration*: The grassland natural community would be  
35 restored primarily on the fringes of the Delta, where upland areas merge with Delta wetland and  
36 agricultural lands. Restoration would focus on CZs 1, 8, and 11, as proposed by BDCP Objective  
37 GNC1.1 (Figure 12-1), with a goal of improving habitat connectivity and increasing the diversity  
38 of grassland species (BDCP Objective GNC1.2). Some of the planned 2,000 acres of restoration  
39 would occur around existing populations of giant garter snake in the east Delta and the Yolo  
40 Bypass area.
- 41 ● *CM11 Natural Communities Enhancement and Management*: Natural communities enhancement  
42 and management would include a wide range of activities designed to improve habitat  
43 conditions in restored and protected lands associated with the BDCP. This measure also  
44 promotes sound use of pesticides, vector control activities, invasive species control and fire  
45 management in preserve areas. To improve the public's ability to participate in recreational

1 activities in and adjacent to restored and protected habitats, a system of trails is proposed. The  
2 location and extent of this system are not yet known, so the analysis of this activity is  
3 programmatic. At the current level of planning, it is assumed that the trail system would be  
4 located entirely in grassland habitats and would include up to 50 acres of habitat loss.

- 5 • *CM18. Conservation Hatcheries:* The BDCP includes a proposal to design and construct a  
6 conservation hatchery to maintain populations of delta smelt and longfin smelt. The location of  
7 this facility is not yet firmly established, but for planning purposes it has been assumed that it  
8 would be constructed in the vicinity of Rio Vista and would be located in grassland habitat. The  
9 grassland in the Rio Vista area includes both California annual grassland and ruderal herbaceous  
10 grasses and forbs. The current estimate of the land needed for this facility is 35 acres.

11 The following paragraphs summarize the combined effects discussed above and describe other  
12 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA impact conclusions are  
13 also included.

#### 14 ***Near-Term Timeframe***

15 During the near-term timeframe (the first 10 years of BDCP implementation), Alternative 1C would  
16 affect the grassland natural community through CM1 construction losses (358 acres permanent and  
17 320 acres temporary), CM2 construction losses (388 acres permanent and 239 acres temporary),  
18 CM11 recreational trail construction (13 acres permanent), CM18 fish hatchery construction (35  
19 acres permanent), and CM7 riparian habitat restoration (4 acres permanent). These losses would  
20 occur at Sacramento River intake sites, at various locations along the west canal corridor, along  
21 transmission corridors west of the Plan Area and along the tunnel route, in the northern Yolo  
22 Bypass, and along the east and west channels within the Yolo Bypass. Approximately 448 acres of  
23 the inundation and construction-related losses in habitat from CM4 would occur in the near-term.  
24 These losses would occur throughout the ROAs mapped in Figure 12-1.

25 The construction losses of this natural community would not represent an adverse effect based on  
26 the significance criteria used for this chapter because grassland is not considered a special-status or  
27 sensitive natural community. Most Central Valley grasslands are dominated by nonnative annual  
28 grasses and herbs. However, the importance of grassland as a habitat that supports life stages of  
29 numerous special-status plants and wildlife is well documented (see BDCP Chapter 3, *Conservation*  
30 *Strategy*). The significance of losses in grassland habitat is, therefore, discussed in more detail in  
31 species analyses later in this chapter. The combination of restoring 1,140 acres (CM8) and  
32 protecting 2,000 acres (CM3) of grassland natural community during the first 10 years of  
33 Alternative 1C implementation, and the commitment to restore temporarily affected grassland (559  
34 acres) to its pre-project condition within one year of completing construction as required by *AMM10*  
35 *Restoration of Temporarily Affected Natural Communities*, would offset this near-term loss and avoid  
36 any loss in the availability of this habitat for special-status species. The restoration of grassland  
37 would include protection in perpetuity, and the protected and restored habitat would be managed  
38 and enhanced to benefit special-status and common wildlife species (CM3 and CM11). Typical  
39 project-level mitigation ratios (2:1 for protection) would indicate that 3,584 acres of protection  
40 would be needed to offset (i.e., mitigate) the 1,792 acres of combined temporary and permanent  
41 loss. The combination of restoration and protection, along with the enhancement and management  
42 associated with CM3 and CM11 contained in the BDCP, is designed to avoid a temporal lag in the  
43 value of grassland habitat available to sensitive species.

1 The Plan also includes commitments to implement *AMM1 Worker Training Awareness, AMM2*  
2 *Construction Best Management Practices and Monitoring, AMM6 Disposal and Reuse of Spoils,*  
3 *Reusable Tunnel Material, and Dredged Material, and AMM7 Barge Operation Plan.* All of these AMMs  
4 include elements that avoid or minimize the risk of affecting habitats at work areas and storage  
5 sites. The AMMs are described in detail in BDCP Appendix 3.C.

### 6 **Late Long-Term Timeframe**

7 Implementation of Alternative 1C as a whole would result in relatively minor (less than 4%) losses  
8 of grassland natural community in the study area. These losses (2,364 acres of permanent and 593  
9 acres of temporary loss) would be largely associated with construction of the water conveyance  
10 facilities (CM1), construction of Yolo Bypass fish improvements (CM2), inundation during tidal  
11 marsh restoration (CM4), and riparian habitat restoration (CM7). Inundation losses would occur  
12 during the course of the Plan's restoration activities at various tidal restoration sites throughout the  
13 study area.

14 **NEPA Effects:** By the end of the Plan timeframe, a total of 2,000 acres of this natural community  
15 would be restored (CM8) and 8,000 acres would be protected (CM3). The restoration would occur  
16 primarily in CZs 1, 8 and 11, in the Cache Slough, Suisun Marsh and Clifton Court Forebay areas.  
17 Temporarily affected grassland would also be restored following construction activity. The 2,000  
18 acres of restoration associated with CM8, and the restoration of temporarily affected grassland  
19 required by AMM10 (593 acres for Alternative 1C) would not totally replace the grassland acres lost  
20 through the Plan timeframe (2,957 acres). There would be a permanent loss of 364 acres of  
21 grassland in the study area. However, the combination of restoration, protection and enhancement  
22 of grassland associated with Alternative 1C would improve the habitat value of this community in  
23 the study area; there would not be an adverse effect on the grassland natural community.

### 24 **CEQA Conclusion:**

#### 25 **Near-Term Timeframe**

26 Alternative 1C would result in the loss of approximately 1,792 acres of grassland natural community  
27 due to construction of the water conveyance facilities (CM1), fish passage improvements (CM2),  
28 recreational trails (CM11) and a fish hatchery (CM18); riparian habitat restoration (CM7) and  
29 inundation during tidal marsh restoration (CM4). These losses would occur at Sacramento River  
30 intake sites, at various locations along the western canal corridor, along the western and tunnel  
31 transmission corridors, at currently unspecified sites for hatchery and recreational trail  
32 construction and riparian habitat restoration, in the northern Yolo Bypass, along the east and west  
33 channels within the Yolo Bypass, and at inundation sites at various tidal restoration sites throughout  
34 the study area. The construction losses would be spread across a 10-year near-term timeframe.

35 The construction losses of this natural community would not represent a significant impact based  
36 on the significance criteria used for this chapter because grassland is not considered a special-status  
37 or sensitive natural community. These losses would be offset by planned restoration of 1,140 acres  
38 of grassland (CM8), protection of 2,000 acres of grassland (CM3), and the commitment to restore  
39 temporarily affected grassland (559 acres) to its pre-project condition within one year of  
40 completing construction (required by *AMM10 Restoration of Temporarily Affected Natural*  
41 *Communities*). All of these offsets would be scheduled for the first 10 years of Alternative 1C  
42 implementation. Typical project-level mitigation ratios (2:1 for protection) would indicate that  
43 3,584 acres of protection would be needed to offset (i.e., mitigate) the 1,792 acres of loss. AMM1,

1 AMM2, AMM6, and AMM7 would also be implemented to minimize impacts. Because of these  
2 offsetting near-term restoration and protection activities and AMMs, and because grassland is not a  
3 special-status natural community, the impacts would be less than significant.

#### 4 **Late Long-Term Timeframe**

5 At the end of the Plan period, 2,957 acres of grassland natural community would be permanently or  
6 temporarily removed by conservation actions, 2,000 acres would be restored and 8,000 acres would  
7 be protected. Temporarily affected areas would also be restored (593 acres for Alternative 1C).  
8 While there would be a net permanent reduction in the acreage of this natural community within  
9 the study area (total loss of 364 acres), there would be an increase in the value of grassland for  
10 special-status and common species in the study area through the combination of conservation  
11 actions (CM3 and CM8) and avoidance and minimization measures (AMM1, AMM2, AMM6, AMM7,  
12 and AMM10). Therefore, Alternative 1C would have a less-than-significant impact on this natural  
13 community.

#### 14 **Impact BIO-30: Increased Frequency, Magnitude and Duration of Periodic Inundation of** 15 **Grassland Natural Community**

16 Two Alternative 1C conservation measures would modify the inundation/flooding regimes of both  
17 natural and man-made waterways in the study area. CM2, which is designed to improve fish passage  
18 and shallow flooded habitat for Delta fishes in the Yolo Bypass, would increase periodic inundation  
19 of grassland natural community at scattered locations, while CM5 would expose this community to  
20 additional flooding as channel margins are modified and levees are set back to improve fish habitat  
21 along some of the major rivers and waterways of the study area.

- 22 ● *CM2 Yolo Bypass Fisheries Enhancement*: Operation of the Yolo Bypass under Alternative 1C  
23 would result in an increase in the frequency, magnitude and duration of inundation of 385–  
24 1,277 acres of grassland natural community. The methods used to estimate this inundation  
25 acreage are described in BDCP Appendix 5.J, *Effects on Natural Communities, Wildlife, and Plants*.  
26 The area more frequently affected by inundation would vary with the flow volume that would  
27 pass through the newly constructed notch in the Fremont Weir. The 385-acre increase in  
28 inundation would occur at the 1,000 cfs flow regime, while the 1,277-acre increase would occur  
29 at the 4,000 cfs flow regime. Plan-related increases in flow through Fremont Weir would be  
30 expected in 30% of the years. The grassland community occurs throughout the bypass, including  
31 a large acreage just below Fremont Weir in the north end of the bypass, in stringers along the  
32 internal waterways of the bypass and in larger patches in the lower bypass. The anticipated  
33 change in management of flows in the Yolo Bypass includes more frequent releases in flows into  
34 the bypass from the Fremont and Sacramento Weirs, and in some years, later releases into the  
35 bypass in spring months (April and May). The modification of periodic inundation events would  
36 not adversely affect grassland habitats, as they have persisted under similar high flows and  
37 extended inundation periods. There is the potential for some change in grass species  
38 composition as a result of longer inundation periods. The effects of this inundation on wildlife  
39 and plant species are described in detail in later sections of this chapter.
- 40 ● *CM5 Seasonally Inundated Floodplain Restoration*: Floodplain restoration would result in an  
41 increase in the frequency and duration of inundation of 514 acres of grassland habitats. Specific  
42 locations for this restoration activity have not been identified, but they would likely be focused  
43 in the south Delta area, along the major rivers and Delta channels in CZ 7 (see Figure 12-1). The

1 increase in periodic stream flooding events would not adversely affect the habitat values and  
2 functions of grassland natural community.

3 In summary, from 899–1,791 acres of grassland natural community in the study area would be  
4 subjected to more frequent inundation as a result of implementing two Alternative 1C conservation  
5 measures (CM2 and CM5).

6 **NEPA Effects:** The grasslands in the Yolo Bypass and along river floodplains in the south Delta are  
7 conditioned to periodic inundation; therefore, periodic inundation would not result in a net  
8 permanent reduction in the acreage of this community in the study area. Increasing periodic  
9 inundation of grassland natural community in the Yolo Bypass and along south Delta waterways  
10 would not constitute an adverse effect.

11 **CEQA Conclusion:** An estimated 899–1,791 acres of grassland natural community in the study area  
12 would be subjected to more frequent inundation as a result of implementing CM2 and CM5 under  
13 Alternative 1C. The grassland natural community is conditioned to periodic inundation; therefore,  
14 periodic inundation would not result in a net permanent reduction in the acreage of this community  
15 in the study area. Increasing periodic inundation of grassland natural community in the Yolo Bypass  
16 and along south Delta waterways would have a less-than-significant impact on the community.

### 17 **Impact BIO-31: Modification of Grassland Natural Community from Ongoing Operation,** 18 **Maintenance and Management Activities**

19 Once the physical facilities associated with Alternative 1C are constructed and the stream flow  
20 regime associated with changed water management is in effect, there would be new ongoing and  
21 periodic actions associated with operation, maintenance and management of the BDCP facilities and  
22 conservation lands that could affect grassland natural community in the study area. The ongoing  
23 actions include the diversion of Sacramento River flows in the north Delta, and reduced diversions  
24 from south Delta channels. These actions are associated with CM1 (see the impact discussion above  
25 for effects associated with CM2). The periodic actions would involve access road and conveyance  
26 facility repair, vegetation management at the various water conveyance facilities and habitat  
27 restoration sites (CM11), levee repair and replacement of levee armoring, channel dredging, and  
28 habitat enhancement in accordance with natural community management plans. The potential  
29 effects of these actions are described below.

- 30 • *Modified river flows upstream of and within the study area and reduced diversions from south*  
31 *Delta channels.* Changes in releases from reservoirs upstream of the study area, increased  
32 diversion of Sacramento River flows in the north Delta, and reduced diversions from south Delta  
33 channels (associated with Operational Scenario A) would not result in the permanent reduction  
34 in acreage of grassland natural community in the study area. Flow levels in the upstream rivers  
35 would not change such that the acreage of this community would be reduced on a permanent  
36 basis. The grassland along rivers upstream of planned north Delta diversions is primarily  
37 ruderal vegetation on levee banks and is dependent on winter and spring rains for germination  
38 and growth rather than on river levels. Similarly, increased diversions of Sacramento River  
39 flows in the north Delta would not result in a permanent reduction in grassland natural  
40 community downstream of these diversions. The reductions in flows below the intakes would  
41 occur primarily in the wet months when the existing nonnative annual grasslands along river  
42 levees are dormant, and like upstream grassland, this community is dependent on winter and  
43 spring rains for germination and growth in the winter and spring months, not on river stage.  
44 Anticipated small changes in river salinity in the west Delta and Suisun Marsh would not create

1 a substantial change in grassland acreage in these areas. Reduced diversions from south Delta  
2 channels would not create a reduction in this natural community.

- 3 ● *Access road, water conveyance facility and levee repair.* Periodic repair of access roads, water  
4 conveyance facilities and levees associated with the BDCP actions have the potential to require  
5 removal of adjacent vegetation and could entail earth and rock work in grassland habitats. This  
6 activity could lead to increased soil erosion and runoff entering these habitats. These activities  
7 would be subject to normal erosion and runoff control management practices, including those  
8 developed as part of *AMM2 Construction Best Management Practices and Monitoring* and *AMM4*  
9 *Erosion and Sediment Control Plan*. Any vegetation removal or earthwork adjacent to or within  
10 grassland habitats would require use of sediment barriers, soil stabilization and revegetation of  
11 disturbed surfaces (*AMM10 Restoration of Temporarily Affected Natural Communities*). Proper  
12 implementation of these measures would avoid permanent adverse effects on this community.
- 13 ● *Vegetation management.* Vegetation management, in the form of physical removal and chemical  
14 treatment, would be a periodic activity associated with the long-term maintenance of water  
15 conveyance facilities and restoration sites. Vegetation management is also the principal activity  
16 associated with *CM11 Natural Communities Enhancement and Management*. Use of herbicides to  
17 control nuisance vegetation could pose a long-term hazard to grassland natural community at or  
18 adjacent to treated areas. The hazard could be created by uncontrolled drift of herbicides,  
19 uncontrolled runoff of contaminated stormwater onto the natural community, or direct  
20 discharge of herbicides to grassland areas being treated for invasive species removal.  
21 Environmental commitments and *AMM5 Spill Prevention, Containment and Countermeasure Plan*  
22 have been made part of the BDCP to reduce hazards to humans and the environment from use of  
23 various chemicals during maintenance activities, including the use of herbicides. These  
24 commitments are described in Appendix 3B, including the commitment to prepare and  
25 implement spill prevention, containment, and countermeasure plans and stormwater pollution  
26 prevention plans. Best management practices, including control of drift and runoff from treated  
27 areas, and use of herbicides approved for use in terrestrial environments would also reduce the  
28 risk of affecting natural communities adjacent to water conveyance features and levees  
29 associated with restoration activities.
- 30 ● *Channel dredging.* Long-term operation of the Alternative 1C intakes on the Sacramento River  
31 would include periodic dredging of sediments that might accumulate in front of intake screens.  
32 The dredging could occur adjacent to grassland natural community. This activity should not  
33 permanently reduce the acreage of grassland natural community because it is periodic in  
34 nature; the grassland in the vicinity of the proposed intakes is ruderal grasses and herbs with  
35 low habitat value.
- 36 ● *Habitat enhancement.* The BDCP includes a long-term management element for the natural  
37 communities within the Plan Area (CM11). For the grassland natural community, a management  
38 plan would be prepared that specifies actions to improve the value of the habitats for covered  
39 species. Actions would include control of invasive nonnative plant and animal species, fire  
40 management, restrictions on vector control and application of herbicides, and maintenance of  
41 infrastructure that would allow for movement through the community. The enhancement efforts  
42 would improve the long-term value of this community for both special-status and common  
43 species.

1 The various operations and maintenance activities described above could alter acreage of grassland  
2 natural community in the study area through changes in flow patterns and changes in periodic  
3 inundation of this community. Activities could also introduce sediment and herbicides that would  
4 reduce the value of this community to common and sensitive plant and wildlife species. Other  
5 periodic activities associated with the Plan, including management, protection and enhancement  
6 actions associated with *CM3 Natural Communities Protection and Restoration* and *CM11 Natural*  
7 *Communities Enhancement and Management*, would be undertaken to enhance the value of the  
8 community. While some of these activities could result in small changes in acreage, these changes  
9 would be greatly offset by restoration activities planned as part of *CM8 Grassland Natural*  
10 *Community Restoration*, or minimized by implementation of AMM2, AMM4, AMM5, and AMM10. The  
11 management actions associated with levee repair, periodic dredging and control of invasive plant  
12 species would also result in a long-term benefit to the species associated with grassland habitats by  
13 improving water movement in adjacent waterways and by eliminating competitive, invasive species  
14 of plants.

15 **NEPA Effects:** Ongoing operation, maintenance and management activities associated with  
16 Alternative 1C would not result in a net permanent reduction in the grassland natural community  
17 within the study area. Therefore, there would be no adverse effect on this natural community.

18 **CEQA Conclusion:** The operation and maintenance activities associated with Alternative 1C would  
19 have the potential to create minor changes in total acreage of grassland natural community in the  
20 study area, and could create temporary increases in sedimentation. The activities could also  
21 introduce herbicides periodically to control nonnative, invasive plants. Implementation of  
22 environmental commitments and AMM2, AMM4, AMM5, and AMM10 would minimize these impacts,  
23 and other operations and maintenance activities, including management, protection and  
24 enhancement actions associated with *CM3 Natural Communities Protection and Restoration* and  
25 *CM11 Natural Communities Enhancement and Management*, would create positive effects, including  
26 reduced competition from invasive, nonnative plants in these habitats. Long-term restoration  
27 activities associated with *CM8 Grassland Natural Community Restoration* and protection actions  
28 associated with *CM3 Natural Communities Protection and Restoration* would increase the value of  
29 this natural community in the study area. Ongoing operation, maintenance and management  
30 activities would not result in a net permanent reduction in this natural community within the study  
31 area. Therefore, there would be a less-than-significant impact.

### 32 **Inland Dune Scrub**

33 The inland dune scrub natural community is composed of vegetated, stabilized sand dunes  
34 associated with river and estuarine systems. In the study area, the inland dune scrub community  
35 includes approximately 20 acres of remnants of low-lying ancient stabilized dunes related to the  
36 Antioch Dunes formation located near the town of Antioch (CZ 10; see Figure 12-1). While inland  
37 dune scrub natural community is within the BDCP Plan Area, none of the Alternative 1C  
38 conservation measures or covered actions is expected to affect this natural community.

### 39 **Cultivated Lands**

40 Cultivated lands is the major land-cover type in the study area (487,106 acres, see Table 12-1). The  
41 Delta, the Yolo Bypass and the Cache Slough drainage are dominated by various types of agricultural  
42 activities, with crop production the dominant element (see Figure 12-1). Major crops and cover  
43 types in agricultural production include grain and hay crops (wheat, oats and barley), field crops  
44 (corn, beans and safflower), truck crops (tomatoes, asparagus and melons), pasture (alfalfa, native

1 and nonnative pasture), rice, orchards, and vineyards. There are approximately 511,832 acres of  
2 cultivated lands in the study area. Tables 12-2 and 12-3 list special-status wildlife species supported  
3 by cultivated lands.

4 The effects of Alternative 1C on cultivated lands are discussed from various perspectives in this  
5 document. Chapter 14, *Agricultural Resources*, contains a detailed analysis of cropland conversion as  
6 it relates to agricultural productivity. Many of the discussions of individual terrestrial plant and  
7 wildlife species later in this chapter also focus on the relevance of cultivated land loss. Because  
8 cultivated lands is not a natural community and because the effects of its loss are captured in the  
9 individual species analyses below, there is no separate analysis of this land cover type presented  
10 here. Table 14-8 in Chapter 14 provides a comparison of important farmland losses from  
11 construction of CM1 water conveyance facilities for each alternative, and Table 14A-1 in Appendix  
12 14A, *Individual Crop Effects as a Result of BDCP Water Conveyance Facility Construction*, provides a  
13 similar comparison for losses of individual crops. Table 12-ES-1 in this chapter's Summary of Effects  
14 identifies the total cultivated land loss for all project alternatives. For Alternative 1C, the total  
15 temporary and permanent loss is estimated to be 67,895 acres. The majority of the permanent loss  
16 would be associated with habitat restoration activities, including Yolo Bypass fisheries enhancement  
17 (CM2; 629 acres), tidal marsh restoration (CM4; 39,565 acres), floodplain restoration (CM5; 2,087  
18 acres), riparian natural community restoration (CM7; 960 acres), grassland restoration (CM8; 2,000  
19 acres) and nontidal marsh restoration (CM10; 1,950 acres). Construction of the western canal  
20 alignment water conveyance facilities (CM1) would permanently remove 5,225 acres of cultivated  
21 land.

## 22 **Developed Lands**

23 Additional lands in the study area that were not designated with a natural community type have  
24 been characterized here as developed lands (90,660 acres). Developed lands include lands with  
25 residential, industrial, and urban land uses, as well as landscaped areas, riprap, road surfaces and  
26 other transportation facilities. (see Figure 12-1 and the Terrestrial Biology Mapbook). Developed  
27 lands support some common plant and wildlife species, whose abundance and species richness vary  
28 with the intensity of development. One special-status species, the giant garter snake, is closely  
29 associated with a small element of developed lands; specifically, embankments and levees near  
30 water that are covered with riprap provide giant garter snake habitat. As with cultivated lands, no  
31 effort has been made to analyze the effects of BDCP covered actions on this land cover type. It is not  
32 a natural community. The effects of its conversion are discussed in Chapter 13, *Land Use*. Where the  
33 loss of developed lands may affect individual special-status species or common species, the impact  
34 analysis is contained in that species discussion.

## 35 **Wildlife Species**

### 36 **Vernal Pool Crustaceans**

37 This section describes the effects of Alternative 1C, including water conveyance facilities  
38 construction and implementation of other conservation components, on vernal pool crustaceans  
39 (California linderiella, Conservancy fairy shrimp, longhorn fairy shrimp, midvalley fairy shrimp,  
40 vernal pool fairy shrimp, and vernal pool tadpole shrimp). The habitat model used to assess effects  
41 for the vernal pool crustaceans consists of: vernal pool complex, which consists of vernal pools and  
42 uplands that display characteristic vernal pool and swale visual signatures that have not been  
43 significantly affected by agricultural or development practices; alkali seasonal wetlands in CZ 8; and

1 degraded vernal pool complex, which consists of low-value ephemeral habitat ranging from areas  
2 with vernal pool and swale visual signatures that display clear evidence of significant disturbance  
3 due to plowing, disking, or leveling to areas with clearly artificial basins such as shallow agricultural  
4 ditches, depressions in fallow fields, and areas of compacted soils in pastures. For the purpose of the  
5 effects analysis, vernal pool complex is categorized as high-value for vernal pool crustaceans and  
6 degraded vernal pool complex is categorized as low-value for these species. Alkali seasonal wetlands  
7 in CZ 8 were included in the model as high-value habitat for vernal pool crustaceans. Also included  
8 as low-value habitat for vernal pool crustaceans are areas along the eastern boundary of CZ 11 that  
9 are mapped as vernal pool complex because they flood seasonally and support typical vernal pool  
10 plants, but which do not include topographic depressions that are characteristic of vernal pool  
11 crustacean habitat.

12 Construction and restoration associated with Alternative 1C conservation measures would result in  
13 permanent losses (see Table 12-1C-12) and indirect conversions of vernal pool crustacean modeled  
14 habitat. The majority of the losses would take place over an extended period of time as tidal marsh is  
15 restored in the Plan Area. Full implementation of Alternative 1C would also include the following  
16 conservation actions over the term of the BDCP to benefit vernal pool crustaceans (BDCP Chapter 3,  
17 *Conservation Strategy*).

- 18 ● Protect 600 acres of vernal pool complex in CZ 1, CZ 8, or CZ 11, primarily in core vernal pool  
19 recovery areas (Objective VPNC1.1, associated with CM3).
- 20 ● Restore vernal pool complex in CZ 1, CZ 8, and CZ 11 to achieve no net loss of vernal pool  
21 acreage (up to 67 acres of vernal pool complex restoration [10 wetted acres])(Objective  
22 VPNC1.2, associated with CM9).
- 23 ● Increase size and connectivity of protected vernal pool complexes in plan area and increase  
24 connectivity with complexes outside the Plan Area (Objective VPNC1.3)
- 25 ● Protect the range of inundation characteristics of vernal pools in the Plan Area (Objective  
26 VPNC1.4)
- 27 ● Maintain and enhance vernal pool complexes to provide appropriate inundation (ponding) for  
28 supporting and sustaining vernal pool species (Objective VPNC2.1)
- 29 ● Protect one currently unprotected occurrence of conservancy fairy shrimp (Objective VPC1.1)

30 As explained below, with the restoration or protection of these amounts of habitat, in addition to  
31 implementation of AMMs and Mitigation Measure BIO-32, *Restore and Protect Vernal Pool*  
32 *Crustacean Habitat*, impacts on vernal pool crustaceans would not be adverse for NEPA purposes  
33 and would be less than significant for CEQA purposes.

1 **Table 12-1C-12. Changes in Vernal Pool Crustacean Modeled Habitat Associated with Alternative**  
2 **1C (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1 <sup>c</sup>	High-value	42	42	33	33	NA	NA
	Low-value	0	0	6	6	NA	NA
<b>Total Impacts CM1</b>		<b>42</b>	<b>42</b>	<b>39</b>	<b>39</b>	<b>NA</b>	<b>NA</b>
CM2–CM18 <sup>b</sup>	High-value	0	0	0	0	0–4	0
	Low-value	201	372	0	0	0	0
<b>Total Impacts CM2–CM18</b>		<b>201</b>	<b>372</b>	<b>0</b>	<b>0</b>	<b>0–4</b>	<b>0</b>
<b>TOTAL IMPACTS</b>		<b>243</b>	<b>414</b>	<b>39</b>	<b>39</b>	<b>0–4</b>	<b>0</b>

<sup>a</sup> See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-32: Loss or Conversion of Habitat for and Direct Mortality of Vernal Pool**  
5 **Crustaceans**

6 Alternative 1C conservation measures would result in the direct, permanent and temporary loss of  
7 up to 453 acres modeled vernal pool crustacean habitat be from conveyance facility construction  
8 (CM1) and tidal natural communities restoration (CM4). In addition, the conservation measures  
9 could result in the indirect conversion due to hydrologic changes of an additional 196 acres of vernal  
10 pool crustacean habitat (140 acres of high-value habitat and 56 acres of low-value habitat) from  
11 conveyance facilities construction (CM1) and hypothetical footprints for tidal restoration (CM4).  
12 Construction of the water conveyance facilities and restoration activities may result in the  
13 modification of hardpan and changes to the perched water table, which could lead to alterations in  
14 the rate, extent, and duration of inundation of nearby vernal pool crustacean habitat. USFWS  
15 typically considers construction within 250 feet of vernal pool crustacean habitat to constitute a  
16 possible conversion of crustacean habitat unless more detailed information is provided to further  
17 refine the limits of any such effects. For the purposes of this analysis, the 250-foot buffer was  
18 applied to the water conveyance facilities work areas where surface and subsurface disturbance  
19 activities would take place and to restoration hypothetical footprints. Habitat enhancement and  
20 management activities (CM11), which include disturbance or removal of nonnative vegetation, could  
21 result in local adverse habitat effects.

22 Alternative 1C would also result in impacts on critical habitat for Conservancy fairy shrimp (248  
23 acres), vernal pool fairy shrimp (281 acres), and vernal pool tadpole shrimp (270 acres). The

1 hypothetical tidal restoration (CM4) footprints in CZ 11 account for all of the effects on critical  
2 habitat for Conservancy fairy shrimp and vernal pool tadpole shrimp. Vernal pool fairy shrimp  
3 critical habitat would also be affected by CM4 in this same area and would be affected by  
4 conveyance facilities construction (CM1) west of Clifton Court Forebay. AMM12 Vernal Pool  
5 Crustaceans would ensure that there would be no adverse modification of the primary constituent  
6 elements of critical habitat for these species.

7 Because the estimates of habitat loss resulting from tidal inundation are based on projections of  
8 where restoration may occur, actual effects are expected to be lower because sites would be selected  
9 and restoration projects designed to minimize or avoid effects on the covered vernal pool  
10 crustaceans. As specified in the *AMM12 Vernal Pool Crustaceans* and *CM9 Vernal Pool and Alkali*  
11 *Seasonal Wetland Complex Restoration*, the BDCP Implementation Office would ensure that tidal  
12 restoration projects and other covered activities would be designed such that no more than a total of  
13 10 wetted acres of vernal pool crustacean habitat would be permanently lost. *AMM12* would also  
14 ensure that no more than 20 wetted acres of vernal pool crustacean habitat are indirectly affected  
15 by alterations to hydrology by adjacent BDCP covered activities. The term *wetted acres* refers to an  
16 area that would be defined by the three parameter wetland delineation method used by USACE to  
17 determine the limits of a wetland, which involves an evaluation of wetland soil, vegetation, and  
18 hydrology characteristics. This acreage differs from vernal pool complex acreages in that a vernal  
19 pool complex is composed of individual wetlands (vernal pools) and those upland areas that are in  
20 between and surrounding them, which provide the supporting hydrology (surface runoff and  
21 groundwater input), organic and nutrient inputs, and refuge for the terrestrial phase of some vernal  
22 pool species.

23 A summary statement of the combined impacts and NEPA and CEQA conclusions follows the  
24 individual conservation measure discussions.

- 25 ● *CM1 Water Facilities and Operation*: Construction of Alternative 1C conveyance facilities would  
26 result in the permanent and temporary loss of 81 acres of vernal pool crustacean habitat (42  
27 permanent and 39 temporary). These impacts would occur from transmission line construction  
28 in the western area of additional analysis and the construction of the canal from southeast of the  
29 town of Brentwood to the area just west of Clifton Court Forebay. These impacts would be on 45  
30 acres of high-value habitat and 6 acres of low-value habitat. The construction of the canal west of  
31 Clifton Court Forebay would impact one CNDDDB record for vernal pool fairy shrimp and the  
32 construction of the transmission line in the western area of additional analysis would result in  
33 permanent and temporary disturbance to an area with one CNDDDB record for vernal pool fairy  
34 shrimp (California Department of Fish and Wildlife 2013). In addition, 61 acres of vernal pool  
35 crustacean habitat (51 acres of high-value habitat and 10 acres of low value habitat) could be  
36 indirectly affected by the construction of the CM1 canal and the transmission line within the  
37 western area of additional analysis. Approximately 11 acres of critical habitat for vernal pool  
38 fairy shrimp would be impacted by a potential borrow and spoil area west of Clifton Court  
39 Forebay. This area of impacted critical habitat does not overlap with modeled habitat for vernal  
40 pool crustaceans and a review of the BDCP natural community data shows these areas  
41 dominated by grassland and cultivated lands.
- 42 ● *CM4 Tidal Natural Communities Restoration*: Tidal natural communities restoration would result  
43 in the permanent loss of approximately 372 acres of low-value vernal pool crustacean habitat,  
44 which consists of degraded vernal pool complex. The BDCP describes degraded vernal pool  
45 complex as areas of low-value ephemeral habitat ranging from areas with vernal pool and swale

1 visual signatures that display clear evidence of significant disturbance due to plowing, disking,  
 2 or leveling to areas with clearly artificial basins such as shallow agricultural ditches, depressions  
 3 in fallow fields, and areas of compacted soils in pastures. The actual density of vernal pools or  
 4 other aquatic features in these areas is unknown, but a 2012 review of Google Earth imagery  
 5 found that these habitats appear to generally have low densities. However, areas mapped as  
 6 degraded vernal pool complex may still provide habitat for vernal pool crustaceans as evidenced  
 7 by records of vernal pool fairy shrimp, vernal pool tadpole shrimp, and California linderiella  
 8 occurring in degraded vernal pool complex in CZ 4 (California Department of Fish and Game  
 9 2012). Helm (1998) notes that many vernal pool crustaceans can occur in degraded vernal pool  
 10 habitats and artificial habitats. In CZs 2 and 4, there are several records of covered vernal pool  
 11 crustaceans occurring outside of modeled habitat in areas that appear to be road side ditches. So  
 12 though degraded vernal pool complexes may not represent botanically diverse vernal pools they  
 13 still can provide habitat for vernal pool crustaceans and thus the loss of 372 acres of degraded  
 14 vernal pool complex may result in the loss of occupied vernal pool crustacean habitat. In  
 15 addition, tidal restoration could result in the indirect conversion of 135 acres of vernal pool  
 16 crustacean habitat, which consist of 89 acres of high-value and 45 acres of low-value habitat. The  
 17 hypothetical restoration footprints overlap with a CNDDDB record for vernal pool fairy shrimp  
 18 near the current edge of Suisun Marsh. Tidal natural community restoration under Alternative  
 19 1C would also result in impacts on critical habitat for Conservancy fairy shrimp (248 acres),  
 20 vernal pool tadpole shrimp (270 acres), and vernal pool fairy shrimp (270 acres). *AMM12 Vernal*  
 21 *Pool Crustaceans* would ensure that there would be no adverse modification of the primary  
 22 constituent elements of critical habitat for these species.

- 23 ● *CM11 Natural Communities Enhancement and Management*: As described in the BDCP,  
 24 restoration/creation of vernal pools to achieve no net loss and the protection of 600 acres of  
 25 vernal pool complex would benefit vernal pool crustaceans (Table 12-1C-12). A variety of  
 26 habitat management actions included in CM11 that are designed to enhance wildlife values in  
 27 BDCP-protected habitats may result in localized ground disturbances that could temporarily  
 28 affect vernal pool crustacean habitat. Ground-disturbing activities, such as removal of nonnative  
 29 vegetation and road and other infrastructure maintenance, are expected to have minor effects  
 30 on vernal pool crustacean habitat and are expected to result in overall improvements to and  
 31 maintenance of vernal pool crustacean habitat values over the term of the BDCP. These effects  
 32 cannot be quantified, but are expected to be minimal and would be avoided and minimized by  
 33 the AMMs listed below.

34 The following paragraphs summarize the combined effects discussed above and describe other  
 35 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA impact conclusions are  
 36 also included. Table 12-1C-13 was prepared to further analyze BDCP effects on vernal pool  
 37 crustaceans using wetted acres of vernal pools in order to compare the effects of this alternative  
 38 with the effect limits established in BDCP Chapter 3, Section 3.3, *Biological Goals and Objectives*,  
 39 which are measured in wetted acres of vernal pools. Wetted acres were estimated by using the  
 40 BDCP's assumption that restored vernal pool complexes would have a 15% density of vernal pools  
 41 (i.e., of 100 acres of vernal pool complex 15 acres would constitute vernal pools and the remaining  
 42 85 acres supporting uplands). Based on an informal evaluation of aerial photographs of the Plan  
 43 Area, it is likely that the actual densities within the Plan Area are approximately 10%, but the 15%  
 44 density value was chosen as a conservative estimate for determining effects.

1 **Table 12-1C-13. Estimated Effects on Wetted Vernal Pool Crustacean Habitat under Alternative 1C**  
2 **(acres)<sup>a</sup>**

	Direct Loss		Indirect Conversion	
	Near-Term	Late Long-Term	Near-Term	Late Long-Term
BDCP Impact Limit <sup>a</sup>	5	10	10	20
Alternative 1C Impact <sup>b</sup>	CM1	12.2	9.2	9.2
	CM4 <sup>c</sup>	30.2	11.0	20.3
<b>Total</b>		<b>42.4</b>	<b>20.2</b>	<b>29.5</b>

<sup>a</sup> Because roughly half of the impacts occur in the near-term, it is assumed that the impact limit in the near-term would be 5 wetted acres for direct loss and 10 acres for indirect.

<sup>b</sup> These acreages were generated by assuming that the modeled habitat identified in Table 12-1C-12 has densities of wetted habitat at 15%. The direct effects numbers include permanent and temporary impacts.

<sup>c</sup> These impacts are based on the hypothetical restoration footprints and would likely be lower based on the BDCP's commitment to minimize and avoid effects on vernal pool crustacean habitat as much as practicable. The values for near-term indirect effects were assumed to be slightly more than half of what the late long-term value would be.

3

4 ***Near-Term Timeframe***

5 Because the water conveyance facilities construction is being evaluated at the project level, the near-  
6 term BDCP conservation strategy has been evaluated to determine whether it would provide  
7 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the effects of  
8 construction would not be adverse under NEPA and would be less than significant under CEQA.  
9 Table 12-1C-12 above lists the impacts on modeled vernal pool crustacean habitat that are based on  
10 the natural community mapping done within the study area. The impacts from tidal natural  
11 communities restoration (CM4) are based on hypothetical footprints and do not reflect actual  
12 impacts to vernal pool crustacean habitat considering the BDCP's commitment to design restoration  
13 projects to minimize or avoid effects on covered vernal pool crustaceans (see AMM12). As seen in  
14 Table 12-1C-13, the effects of CM1 alone would exceed the near-term limit and use 8 of the 10  
15 indirect conversion effects acres allowed in the near-term. Alternative 1C would not meet the Plan's  
16 near-term biological goals and objectives for direct effects. Near-term tidal restoration projects  
17 would have to be designed to ensure that there are no direct effects on wetted vernal pool acreage  
18 (permanent or temporary) and no more than 2 wetted acres of indirect conversions of vernal pools  
19 in order to meet the near-term goal for indirect effects.

20 Typical NEPA and CEQA project-level mitigation ratios for vernal pools affected by CM1 would be  
21 1:1 for restoration and 2:1 for protection. Typically, indirect conversion impacts are mitigated by  
22 protecting vernal pools at a 2:1 ratio. Using these typical ratios would indicate that 12.2 wetted  
23 acres of vernal pool crustacean habitat (or 81 acres of vernal pool complex) should be restored and  
24 42.8 wetted acres (or 285 acres of vernal pool complex) protected to mitigate the CM1 direct and  
25 indirect effects on vernal pool crustacean habitat. Assuming that the BDCP would apply the impact  
26 limits presented in Table 12-1C-13, impacts on wetted vernal pools resulting from tidal restoration  
27 in the near-term would have to avoid direct effects on wetted vernal pool acreage and not exceed 1.6  
28 wetted acres of indirect effects. The BDCP would need to restore 12.2 wetted acres (81 acres of  
29 vernal pool complex) and protect up to 30 wetted acres (200 acres of vernal complex) in the near-  
30 term to offset the effects of CM1 and CM4.

1 The BDCP has committed to near-term goal of protecting 400 acres of vernal pool complex (see  
2 Table 3-4 in Chapter 3, *Description of Alternatives*) by protecting at least 2 wetted acres of vernal  
3 pools for each wetted acre directly or indirectly affected. The BDCP has also committed to  
4 restoring/creating vernal pools such that there is no net loss of vernal pool acreage. The amount of  
5 restoration would be determined during implementation based on the following criteria.

- 6 • If restoration is completed (i.e., restored natural community meets all success criteria) prior to  
7 impacts, then 1.0 wetted acre of vernal pools would be restored for each wetted acre directly  
8 affected (1:1 ratio).
- 9 • If restoration takes place concurrent with impacts (i.e., restoration construction is completed,  
10 but restored habitat has not met all success criteria, prior to impacts occurring), then 1.5 wetted  
11 acres of vernal pools would be restored for each wetted acre directly affected (1.5:1 ratio).

12 The species-specific biological goals and objectives would also inform the near-term protection and  
13 restoration efforts. These Plan goals represent performance standards for considering the  
14 effectiveness of restoration actions.

15 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
16 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
17 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
18 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
19 *Material*, *AMM10 Restoration of Temporarily Affected Natural Communities*, *AMM12 Vernal Pool*  
20 *Crustaceans*, and *AMM37 Recreation*. All of these AMMs include elements that avoid or minimize the  
21 risk of affecting habitats and species adjacent to work areas. The AMMs are described in detail in  
22 BDCP Appendix 3.C.

### 23 **Late Long-Term Timeframe**

24 The BDCP states that covered activities would not result in more than 10 wetted acres of direct loss  
25 and no more than 20 wetted acres of indirect conversion effects on vernal pools by the late long-  
26 term (see Objective VPNC1.2 and AMM12). As seen in Table 12-1C-13, the effects of CM1 alone  
27 would exceed 10 acres of direct effect and roughly half of the acres of indirect effects allowed under  
28 the BDCP. Alternative 1C would not meet Objective VPNC1.2 and the limits set in AMM12. For  
29 Alternative 1C to be in compliance with the indirect effects limits established under AMM12, tidal  
30 restoration projects would have to be designed to ensure that there are no direct effects on wetted  
31 vernal pool acreage (permanent or temporary) and no more than 11.6 wetted acres of indirect  
32 effects on vernal pools.

33 The Plan has committed to a late long-term goal of protecting 600 acres of vernal pool complex in  
34 either Conservation Zones 1, 8, or 11, primarily in core vernal pool recovery areas (Objective  
35 VPNC1.1) by protecting at least 2 wetted acres of vernal pools protected for each wetted acre  
36 directly or indirectly affected. The Plan also includes a commitment to restore or create vernal pools  
37 such that the Plan results in no net loss of vernal pool acreage (Objective VPNC1.2). The protection  
38 and restoration would be achieved using the criteria presented above as well as by the following the  
39 other specific biological goals and objectives.

- 40 • Increasing the size and connectivity of protected vernal pool complexes (VPNC1.3).
- 41 • Protecting the range of inundation characteristics that are currently represented by vernal pool  
42 throughout the Plan Area (VPNC1.4).

- Protecting one currently unprotected occurrence of conservancy fairy shrimp (VPC1.1).

The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and Plant Species*) estimates that the restoration and protection actions discussed above, as well as the restoration and protection of alkali seasonal wetlands that could overlap with the species model, could result in the restoration of 51 acres and the protection of 608 acres of modeled habitat for vernal pool crustaceans.

**NEPA Effects:** The near-term loss of vernal pool crustacean habitat under Alternative 1C would exceed the limit for permanent and temporary impacts set by BDCP Objective VPNC1.2 and AMM12, which states the Plan would restore up to 67 acres of vernal pool complex (or 10 wetted acres of vernal pool). Though the BDCP has measures to redesign restoration projects to limit effects on covered species, it does not provide for redesigning the conveyance alignment to minimize effects. The loss of vernal pool crustacean habitat under Alternative 1C in the near-term would represent an adverse effect. Even though the Plan has a commitment to avoid and minimize effects on vernal pool crustaceans to the maximum extent practicable it is assumed that by the long-term the needs for satisfying the tidal restoration requirements (CM4) would result in additional indirect effects that could exceed the limits established by the plan. Alternative 1C would result in adverse effects on vernal pool crustaceans under NEPA over the Plan's term. Mitigation Measure BIO-32, *Restore and Protect Vernal Pool Crustacean Habitat*, would reduce these effects.

**CEQA Conclusion:**

**Near-Term Timeframe**

Because the water conveyance facilities construction is being evaluated at the project level, the near-term BDCP conservation strategy has been evaluated to determine whether it would provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the impacts of construction would be less than significant. Table 12-1C-12 above lists the impacts on modeled vernal pool crustacean habitat that are based on the natural community mapping done within the study area. The impacts from tidal natural communities restoration (CM4) are based on hypothetical footprints and do not reflect actual impacts on vernal pool crustacean habitat considering the BDCP's commitment to design restoration projects to minimize or avoid effects on covered vernal pool crustaceans. As seen in Table 12-1C-13, the impacts of CM1 alone would exceed the near-term limit and use 8 of the 10 indirect effects acres allowed in the near-term. Alternative 1C would not meet the Plan's near-term biological goals and objectives for direct effects. Near-term tidal restoration projects would have to be designed to ensure that there are no direct effects on wetted vernal pool acreage (permanent or temporary) and no more than 2 wetted acres of indirect effects on vernal pools in order to meet the near-term goal for indirect effects.

Typical NEPA and CEQA project-level mitigation ratios for vernal pools affected by CM1 would be 1:1 for restoration and 2:1 for protection. Typically, indirect conversion impacts are mitigated by protecting vernal pools at a 2:1 ratio. Using these typical ratios would indicate that 12.2 wetted acres of vernal pool crustacean habitat (or 81 acres of vernal pool complex) should be restored and 42.8 wetted acres (or 285 acres of vernal pool complex) protected to mitigate the CM1 direct and indirect effects on vernal pool crustacean habitat. Assuming that the BDCP would apply the impact limits presented in Table 12-1C-13, impacts on wetted vernal pools resulting from tidal restoration in the near-term would have to avoid direct effects on wetted vernal pool acreage and not exceed 1.6 wetted acres of indirect effects. The BDCP would need to restore 12.2 wetted acres (81 acres of

1 vernal pool complex) and protect up to 30 wetted acres (200 acres of vernal complex) in the near-  
2 term to offset the effects of CM1 and CM4.

3 The BDCP has committed to near-term goal of protecting 400 acres of vernal pool complex by  
4 protecting at least 2 wetted acres of vernal pools for each wetted acre directly or indirectly affected.  
5 The BDCP has also committed to restoring/creating vernal pools such that there is no net loss of  
6 vernal pool acreage. The amount of restoration would be determined during implementation based  
7 on the following criteria.

- 8 • If restoration is completed (i.e., restored natural community meets all success criteria) prior to  
9 impacts, then 1.0 wetted acre of vernal pools would be restored for each wetted acre directly  
10 affected (1:1 ratio).
- 11 • If restoration takes place concurrent with impacts (i.e., restoration construction is completed,  
12 but restored habitat has not met all success criteria, prior to impacts occurring), then 1.5 wetted  
13 acres of vernal pools would be restored for each wetted acre directly affected (1.5:1 ratio).

14 The species-specific biological goals and objectives would also inform the near-term protection and  
15 restoration efforts. These Plan goals represent performance standards for considering the  
16 effectiveness of restoration actions.

17 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
18 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
19 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment and*  
20 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
21 *Material*, *AMM10 Restoration of Temporarily Affected Natural Communities*, *AMM12 Vernal Pool*  
22 *Crustaceans*, and *AMM37 Recreation*. All of these AMMs include elements that avoid or minimize the  
23 risk of affecting habitats and species adjacent to work areas. The AMMs are described in detail in  
24 BDCP Appendix 3.C.

25 The near-term loss of vernal pool crustacean habitat under Alternative 1C would exceed the limit for  
26 permanent and temporary impacts set by AMM12, which states that the Plan would not exceed 10  
27 wetted acres of vernal pool crustacean habitat loss. Though the BDCP has measures to redesign  
28 restoration projects to limit effects on covered species, it does not provide for redesigning the  
29 conveyance alignment to minimize effects. The loss of vernal pool crustacean habitat under  
30 Alternative 1C in the near-term would represent an adverse effect. Alternative 1C would result in a  
31 significant impacts on vernal pool crustaceans under CEQA in the near-term. Implementation of  
32 Mitigation Measure BIO-32, *Restore and Protect Vernal Pool Crustacean Habitat*, would reduce  
33 impacts to a less-than-significant level.

#### 34 ***Late Long-Term Timeframe***

35 The BDCP states that covered activities would not result in more than 10 wetted acres of direct loss  
36 and no more than 20 wetted acres of indirect conversion effects on vernal pools by the late long-  
37 term. As seen in Table 12-1C-13, the impacts of CM1 alone would exceed 10 acres of direct effect and  
38 would indirectly affect roughly half of the acres of indirect effects allowed under the BDCP.  
39 Alternative 1C would not meet Objective VPNC1.2 and the limits set under AMM12. For Alternative  
40 1C to be in compliance with the indirect effects limits established under AMM12, tidal restoration  
41 projects would have to be designed to ensure that there are no direct effects on wetted vernal pool  
42 acreage (permanent or temporary) and no more than 11.6 wetted acres of indirect effects on vernal  
43 pools.

1 The Plan has committed to late long-term goal of protecting 600 acres of vernal pool complex in  
2 either Conservation Zones 1, 8, or 11, primarily in core vernal pool recovery areas (Objective  
3 VPNC1.1) by protecting at least 2 wetted acres of vernal pools protected for each wetted acre  
4 directly or indirectly affected. The Plan also includes a commitment to restore or create vernal pools  
5 such that the Plan results in no net loss of vernal pool acreage (Objective VPNC1.2). The protection  
6 and restoration would be achieved using the criteria presented above as well as by following these  
7 other specific biological goals and objectives.

- 8 ● Increasing the size and connectivity of protected vernal pool complexes (VPNC1.3).
- 9 ● Protecting the range of inundation characteristics that are currently represented by vernal pool  
10 throughout the Plan Area (VPNC1.4).
- 11 ● Protecting one currently unprotected occurrence of conservancy fairy shrimp (VPC1.1).

12 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*  
13 *Plant Species*) estimates that the restoration and protection actions discussed above, as well as the  
14 restoration and protection of alkali seasonal wetlands that could overlap with the species model,  
15 could result in the restoration of 51 acres and the protection of 608 acres of modeled habitat for  
16 vernal pool crustaceans.

17 Even though the Plan has a commitment to avoid and minimize effects on vernal pool crustaceans to  
18 the maximum extent practicable it is assumed that by the long-term the needs for satisfying the tidal  
19 restoration requirements (CM4) would result in additional indirect effects that could exceed the  
20 limits established by the plan. Alternative 1C would result in a significant impacts on vernal pool  
21 crustaceans under CEQA over the Plan's term. Mitigation Measure BIO-32, *Restore and Protect*  
22 *Vernal Pool Crustacean Habitat*, would reduce this impacts to a less-than significant level.

### 23 **Mitigation Measure BIO-32: Restore and Protect Vernal Pool Crustacean Habitat**

24 To reduce the effects on modeled vernal pool crustacean habitat, DWR will ensure that there is  
25 no net loss of vernal pool wetted acreage. DWR will restore vernal pools as follows:

- 26 ● If restoration is completed (i.e., restored natural community meets all success criteria) prior  
27 to impacts, then 1.0 wetted acre of vernal pools would be restored for each wetted acre  
28 directly affected (1:1 ratio).
- 29 ● If restoration takes place concurrent with impacts (i.e., restoration construction is  
30 completed, but restored habitat has not met all success criteria, prior to impacts occurring),  
31 then 1.5 wetted acres of vernal pools would be restored for each wetted acre directly  
32 affected (1.5:1 ratio).

33 DWR will also ensure that protected vernal pool complex includes wetted vernal pool area that  
34 meets or exceeds a 2:1 ratio of protected to directly and indirectly impacted vernal pools. These  
35 protected areas will be in place prior to or concurrent with the effects. Protection will occur in  
36 CZs 1, 8, or 11, will target vernal pool recovery areas, and will be coordinated with other BDCP  
37 conservation efforts. In lieu of restoration, an equivalent amount of vernal pool restoration  
38 credit may be purchased at a USFWS- and CDFW-approved mitigation bank if the bank occurs in  
39 the Plan Area. Restoration areas, including banks where credits are purchased, will meet the  
40 following site selection criteria described below and presented in BDCP Chapter 3, Section  
41 3.4.9.3.2.

1 Vernal pool restoration sites will meet the following site selection criteria.

- 2 • The site is in Conservation Zone 1, 8, or 11.
- 3 • The site has evidence of historical vernal pools based on soils, remnant topography,  
4 remnant vegetation, historical aerial photos, or other historical or site-specific data.
- 5 • The site supports suitable soils and landforms for vernal pool restoration.
- 6 • The adjacent land use is compatible with restoration and long-term management to  
7 maintain natural community functions (e.g., not adjacent to urban or rural residential  
8 areas).
- 9 • Sufficient land is available for protection to provide the necessary vernal pool complex  
10 restoration and surrounding grasslands to provide the local watershed for sustaining vernal  
11 pool hydrology, with a vernal pool density representative of intact vernal pool complex in  
12 the vicinity of the restoration site.

13 Acquisition of vernal pool restoration sites will be prioritized based on the following criteria.

- 14 • The site will contribute to establishment of a large, interconnected vernal pool and alkali  
15 seasonal wetland complex reserve system (e.g., adjacent to existing protected vernal pool  
16 complex or alkali seasonal wetland complex).
- 17 • The site is close to known populations of covered vernal pool species.

### 18 **Impact BIO-33: Indirect Effects of Plan Implementation on Vernal Pool Crustaceans**

19 Construction and maintenance activities associated with water conveyance facilities, and restoration  
20 actions could indirectly affect vernal pool crustaceans and their habitat in the vicinity of  
21 construction and restoration areas, and maintenance activities. These potential effects would be  
22 minimized or avoided through AMM1–AMM6, AMM10, and AMM12, which would be in effect  
23 throughout the Plan’s construction phase.

24 **NEPA Effects:** Water conveyance facilities construction and restoration activities could indirectly  
25 affect vernal pool crustaceans and their habitat in the vicinity of construction areas. Ground-  
26 disturbing activities, stockpiling of soils, and maintenance and refueling of heavy equipment could  
27 result in the inadvertent release of sediment and hazardous substances into this habitat. These  
28 potential effects would be avoided and minimized through AMM1–AMM6, which would be in effect  
29 throughout the Plan’s construction phase. Vernal pool crustaceans and their habitat could be  
30 periodically indirectly affected by maintenance activities at water conveyance facilities.  
31 Embankment maintenance activities around Clifton Court Forebays could result in the inadvertent  
32 discharge of sediments and hazardous materials into vernal pool crustacean habitat that occurs  
33 along the southern and western boundaries of the forebays. These potential effects would be  
34 avoided and minimized through AMM1–AMM6, which would be in effect throughout the term of the  
35 Plan. The indirect effects of Alternative 1C on vernal pool crustacean habitat would not be adverse  
36 under NEPA.

37 **CEQA Conclusion:** Construction and maintenance activities associated with water conveyance  
38 facilities, and restoration actions could indirectly impact vernal pool crustaceans and their habitat in  
39 the vicinity of construction and restoration areas, and maintenance activities. These potential  
40 impacts would be minimized or avoided through AMM1–AMM6, AMM10, and AMM12, which would

1 be in effect throughout the construction phase. The indirect impacts of Alternative 1C would be less-  
2 than significant under CEQA.

### 3 **Impact BIO-34: Periodic Effects of Inundation of Vernal Pool Crustacean Habitat as a Result of** 4 **Implementation of Conservation Components**

5 Flooding of the Yolo Bypass under *CM2 Yolo Bypass Fisheries Enhancement* would periodically affect  
6 0 to 4 acres of modeled vernal pool crustacean habitat (Table 12-1C-12). There would be no periodic  
7 effects resulting from *CM5 Seasonally Inundated Floodplain Restoration*

8 **NEPA Effects:** BDCP Appendix 5.J, *Effects on Natural Communities, Wildlife, and Plants*, describes the  
9 methods used to estimate periodic inundation effects in the Yolo Bypass. Based on this method,  
10 periodic inundation could affect vernal pool crustaceans occupying areas ranging from 0 acres of  
11 habitat during most notch flows to an estimated 4 acres during a notch flow of 6,000 cubic feet per  
12 second (cfs). BDCP-associated inundation of areas that would not otherwise have been inundated is  
13 expected to occur in no more than 30% of all years, because Fremont Weir is expected to overtop  
14 the remaining 70% of all years, and during those years notch operations would not typically affect  
15 the maximum extent of inundation. In more than half of all years under Existing Conditions, an area  
16 greater than the BDCP-related inundation area already inundates in the bypass. Yolo Bypass  
17 flooding is expected to have a minimal effect on vernal pool crustaceans and would thus not be  
18 adverse under NEPA.

19 **CEQA Conclusion:** Alternative 1C would periodically inundate up to 4 acres of vernal pool  
20 crustacean habitat during the maximum flows over the Fremont Weir. The periodic inundation is  
21 not anticipated to result in a conversion of vernal pool crustacean habitat into different wetland  
22 habitat. BDCP-associated inundation of areas that would not otherwise have been inundated is  
23 expected to occur in no more than 30% of all years, because Fremont Weir is expected to overtop  
24 the remaining 70% of all years, and during those years notch operations would not typically affect  
25 the maximum extent of inundation. In more than half of all years under Existing Conditions, an area  
26 greater than the BDCP-related inundation area already inundates in the bypass. Yolo Bypass  
27 flooding is expected to have a minimal effect on vernal pool crustaceans and would thus result in  
28 less-than-significant impacts on the species.

### 29 **Valley Elderberry Longhorn Beetle**

30 That habitat model used to assess the effects for valley elderberry longhorn beetle is based on  
31 riparian habitat and nonriparian habitat (channels and grasslands within 200 feet of channels).  
32 Construction and restoration associated with Alternative 1C conservation measures would result in  
33 both temporary and permanent losses of valley elderberry longhorn beetle modeled habitat as  
34 indicated in Table 12-1C-14. The majority of the losses would take place over an extended period of  
35 time as the restoration conservation measures are being implemented. In addition, an estimated 41  
36 elderberry shrubs could be impacted by the Alternative 1C conveyance alignment (CM1). Full  
37 implementation of Alternative 1C would also include the following conservation actions over the  
38 term of the BDCP to benefit valley elderberry longhorn beetle (BDCP Chapter 3, *Conservation*  
39 *Strategy*).

- 40 ● Mitigate impacts on elderberry shrubs consistent with USFWS conservation guidelines for the  
41 species (Objective VELB1.1)
- 42 ● Site elderberry longhorn beetle habitat restoration adjacent to occupied habitat (Objective  
43 VELB1.2)

- 1 • Restore 5,000 acres of valley/foothill riparian (Objective VFRNC1.1, associated with CM7)
- 2 • Protect 750 acres of valley/foothill riparian (Objective VFRNC1.2, associated with CM3)
- 3 • Maintain or increase the abundance and distribution of rare or uncommon vegetation alliances,
- 4 such as Sambuca nigra (blue elderberry stands) alliance (Objective VFRNC3.1, associated with
- 5 CM7 and CM11)

6 As explained below, with the restoration or protection of these amounts of habitat, impacts on valley  
 7 elderberry longhorn beetle would not be adverse for NEPA purposes and would be less than  
 8 significant for CEQA purposes.

9 **Table 12-1C-14. Changes in Valley Elderberry Longhorn Beetle Modeled Habitat Associated with**  
 10 **Alternative 1C (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	Riparian	40	40	86	86	NA	NA
	Non-riparian	69	69	147	147	NA	NA
<b>Total Impacts CM1</b>		<b>109</b>	<b>109</b>	<b>233</b>	<b>233</b>	<b>NA</b>	<b>NA</b>
CM2-CM18	Riparian	381	678	76	111	44-80	266
	Non-riparian	142	311	94	108	103-244	287
<b>Total Impacts CM2-CM18</b>		<b>523</b>	<b>989</b>	<b>170</b>	<b>219</b>	<b>155-332</b>	<b>553</b>
<b>TOTAL IMPACTS</b>		<b>632</b>	<b>1,098</b>	<b>403</b>	<b>452</b>	<b>161-325</b>	<b>553</b>

<sup>a</sup> See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

11

12 **Impact BIO-35: Loss of Valley Elderberry Longhorn Beetle Habitat**

13 Alternative 1C conservation measures would result in the permanent and temporary loss combined  
 14 of up to 1,550 acres of modeled valley elderberry longhorn beetle habitat (915 acres of riparian  
 15 habitat and 635 acres of nonriparian habitat), and an estimated 41 elderberry shrubs from CM1,  
 16 which represent potential habitat for the species (Table 12-1C-14). Due to the limitation of the  
 17 habitat suitability model, all of these effects are assumed to be a large overestimate of the true effect  
 18 on potential valley elderberry longhorn beetle habitat. Conservation measures that would result in  
 19 these losses are conveyance facilities and transmission line construction, and establishment and use  
 20 of borrow and spoil areas (CM1), Fremont Weir/Yolo Bypass improvements (CM2), tidal habitat

1 restoration (CM4), and floodplain restoration (CM5). Habitat enhancement and management  
2 activities (CM11), which include ground disturbance or removal of nonnative vegetation, could  
3 result in local adverse habitat effects. In addition, maintenance activities associated with the long-  
4 term operation of the water conveyance facilities and other BDCP physical facilities could degrade  
5 or eliminate valley elderberry longhorn beetle habitat. Timely implementation of the near-term  
6 habitat protection and restoration contained in the Plan and implementation of AMMs committed to  
7 in the Plan would result in no adverse effects under NEPA and less-than-significant impacts under  
8 CEQA. Each of these activities is described below.

- 9 • *CM1 Water Facilities and Operation*: Construction of Alternative 1C conveyance facilities would  
10 result in the permanent and temporary combined loss of approximately 342 acres of modeled  
11 valley elderberry longhorn beetle habitat, composed of 126 acres of riparian habitat and 216  
12 acres of nonriparian habitat (Table 12-1C-14). In addition, an estimated 41 shrubs could be  
13 potentially removed as a result of conveyance facility construction. The exact number of shrubs  
14 to be impacted would be determined during pre-construction surveys of the footprints of the  
15 conveyance facility and associated work areas as part of the implementation of *AMM15 Valley*  
16 *Elderberry Longhorn Beetle*. Most of these impacts are associated with the intake and forebay  
17 construction in the north delta. There are no records of valley elderberry longhorn beetle within  
18 these impact areas. The portion of the above impacts that result from temporary habitat loss  
19 includes 233 acres of modeled valley elderberry longhorn beetle habitat (86 acres riparian and  
20 147 acres nonriparian habitat). Elderberry shrubs could be affected from ground-disturbing  
21 activities associated with conveyance construction footprints, temporary access roads, and  
22 staging areas.
- 23 • *CM2 Yolo Bypass Fisheries Enhancement*: Construction activity associated with fisheries  
24 improvements in the Yolo Bypass would result in the permanent and temporary removal of  
25 approximately 295 acres of modeled valley elderberry longhorn beetle habitat, composed of 159  
26 acres of riparian habitat and 136 acres of nonriparian habitat. Approximately 265 acres of  
27 permanent impacts (83 acres of riparian and 41 acres of nonriparian) would mostly occur at the  
28 north end of the Yolo Bypass from Fremont Weir improvements. The 170 acres of temporary  
29 impacts (76 acres of riparian and 94 acres of nonriparian) would mostly be from work on the  
30 Fremont Weir, the Sacramento Weir, and levees along the Bypass. Elderberry shrubs could be  
31 affected from ground-disturbing activities associated with the re-contouring of surface  
32 topography, excavation or modification of channels, levee modification, and removal of riprap  
33 and other protections from channel banks.
- 34 • *CM4 Tidal Natural Communities Restoration*: Tidal natural communities restoration would result  
35 in the permanent loss of approximately 813 acres of modeled valley elderberry longhorn beetle  
36 habitat, composed of 552 acres of riparian and 260 acres of nonriparian habitat. The majority of  
37 these impacts would be associated with tidal restoration in the Delta and only 42 acres of these  
38 impacts (all nonriparian) would be from tidal restoration in Suisun Marsh. Elderberry shrubs  
39 could be affected from ground-disturbing activities associated with the re-contouring of surface  
40 topography, excavation or modification of channels, type conversion from riparian and  
41 grasslands to tidal habitat, levee removal and modification, and removal of riprap and other  
42 protections from channel banks.
- 43 • *CM5 Seasonally Inundated Floodplain Restoration*: Levee construction associated with floodplain  
44 restoration in the south Delta (CZ 7) would result in the permanent and temporary removal of  
45 approximately 101 acres of valley elderberry longhorn beetle habitat, composed of 78 acres of  
46 riparian and 23 acres of nonriparian. Approximately half of these impacts (52 acres) would be

1 permanent impacts from levee construction and the other half (49 acres) would be temporary  
2 impacts associated with the levee construction. There is one CNDDDB record of valley elderberry  
3 longhorn beetle occurring in CZ 7 just wet of Middle River on Union Island. This record and  
4 other elderberry shrubs could be affected from ground-disturbing activities associated with the  
5 re-contouring of surface topography, excavation or modification of channels, levee removal and  
6 modification, and removal of riprap and other protections from channel banks.

- 7 • *CM11 Natural Communities Enhancement and Management*: Activities associated with natural  
8 communities enhancement and management, such as grazing practices and ground disturbance  
9 or herbicide use in the control of nonnative vegetation, intended to maintain and improve  
10 habitat functions of BDCP protected habitats for covered species could result in loss of  
11 elderberry shrubs and the potential for injury or mortality to beetles. These effects cannot be  
12 quantified, but are expected to be minimal and would be avoided and minimized by the AMMs  
13 listed below.
- 14 • *Operations and maintenance*: Postconstruction operation and maintenance of the above-ground  
15 water conveyance facilities and restoration infrastructure could result in ongoing but periodic  
16 disturbances that could affect valley elderberry beetle. Maintenance activities would include  
17 vegetation management, levee and structure repair, and re-grading of roads and permanent  
18 work areas could affect elderberry shrubs occupied by the species. These effects, however,  
19 would be reduced by AMMs listed below.

20 The following paragraphs summarize the combined effects discussed above and describe other  
21 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA impact conclusions are  
22 also included.

### 23 ***Near-Term Timeframe***

24 Because the water conveyance facilities construction is being evaluated at the project level, the near-  
25 term BDCP conservation strategy has been evaluated to determine whether it would provide  
26 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the effects of  
27 construction would not be adverse under NEPA and would be less than significant under CEQA.  
28 Alternative 1C would result in permanent and temporary impacts on 1,035 acres of modeled habitat  
29 (583 acres of riparian and 452 acres of nonriparian) for valley elderberry longhorn beetle in the  
30 study area in the near-term. These effects would result from the construction of the water  
31 conveyance facilities (CM1, 126 acres of riparian and 216 acres of nonriparian), and implementing  
32 other conservation measures (Yolo Bypass fisheries improvements [CM2] and tidal restoration  
33 [CM4], 693 acres of modeled habitat). The other conservation measures account for 457 of the 583  
34 acres (78%) of impacts on riparian habitat. Based on the DHCCP survey data of the Conveyance  
35 Planning Area (see Appendix 12C, *2009 to 2011 Bay Delta Conservation Plan EIR/EIS Environmental*  
36 *Data Report*), an estimated 41 elderberry shrubs would be impacted in the near-term by CM1 (see  
37 Section 12.3.2.3 for a discussion on the methods used to make this estimate).

38 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by  
39 CM1 and that are identified as habitat for valley elderberry longhorn beetle in Chapter 3 of the BDCP  
40 would be 1:1 for restoration and 1:1 for protection for riparian habitat. Using these typical ratios  
41 would indicate that 126 acres of the riparian habitat should be restored/created and 126 acres of  
42 existing riparian should be protected to mitigate the CM1 losses of valley elderberry longhorn beetle  
43 habitat. The near-term effects of other conservation actions would require 457 acres of riparian

1 restoration and 457 acres of riparian protection using the same typical NEPA and CEQA ratios (1:1  
2 for restoration and 1:1 for protection).

3 The BDCP has committed to near-term goals of protecting 750 acres of riparian and restoring 800  
4 acres of riparian habitat in the Plan Area. These conservation actions would occur in the same  
5 timeframe as the construction and early restoration losses, thereby minimizing adverse effects on  
6 valley elderberry longhorn beetle. In addition, BDCP Objectives VELB 1.1 and 1.2, which call for  
7 implementing the USFWS conservation guidelines for valley elderberry longhorn beetle  
8 (transplanting elderberry shrubs and planting elderberry seedlings and associated natives) and  
9 siting elderberry restoration within drainages immediately adjacent to or in the vicinity of sites  
10 confirmed to be occupied by valley elderberry longhorn beetle (U.S. Fish and Wildlife Service  
11 1999a). These objectives would be met through the implementation of *CM7 Riparian Natural  
12 Community Restoration*. *CM7 Riparian Natural Community Restoration* specifically calls for the  
13 planting of elderberry shrubs in in large, contiguous clusters with a mosaic of associated natives as  
14 part of riparian restoration consistent with USFWS conservation guidelines (U.S. Fish and Wildlife  
15 Service 1999a). These Plan goals represent performance standards for considering the effectiveness  
16 of restoration actions. The acres of protection and restoration contained in the near-term Plan goals  
17 and the additional species specific measures within CM7 satisfy the typical mitigation that would be  
18 applied to the project-level effects of CM1, as well as mitigating the near-term effects of the other  
19 conservation measures.

20 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2  
21 Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention  
22 Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment and  
23 Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged  
24 Material*, and *AMM15 Valley Elderberry Longhorn Beetle*. AMM15 requires surveys for elderberry  
25 shrubs within 100 feet of any ground disturbing activities, the implementation of avoidance and  
26 minimize measures for any shrubs that are identified within this 100-foot buffer, and transplanting  
27 shrubs that can't be avoided. All of these AMMs include elements that avoid or minimize the risk of  
28 affecting habitats and species adjacent to work areas and RTM storage sites. The AMMs are  
29 described in detail in BDCP Appendix 3.C.

### 30 ***Late Long-Term Timeframe***

31 Based on modeled habitat, the study area supports approximately 34,456 acres of modeled habitat  
32 (17,786 acres of riparian and 16,670 acres of nonriparian) for valley elderberry longhorn beetle.  
33 Alternative 1C as a whole would result in the permanent loss of and temporary effects on 1,550  
34 acres of modeled valley elderberry longhorn beetle habitat (915 acres of riparian habitat and 635  
35 acres of nonriparian habitat)during the term of the Plan (5% of the modeled habitat in the study  
36 area). The locations of these losses are described above in the analyses of individual conservation  
37 measures. These losses would not fragment any known populations of valley elderberry longhorn  
38 beetle. The Plan includes a commitment to protect 750 acres of riparian habitat and  
39 restoring/creating 5,000 acres of riparian habitat in the Plan Area. According to Objective VELB1.2,  
40 the restoration of elderberry longhorn beetle habitat would occur adjacent to occupied habitat,  
41 which would provide connectivity between occupied and restored habitats and improve the species'  
42 ability to disperse within and outside the Plan Area. Other factors relevant to effects on valley  
43 elderberry longhorn beetle include:

- 1 ● Habitat loss is widely dispersed throughout the study area and would not be concentrated in  
2 any one location.
- 3 ● There would be a temporal loss of riparian habitat during the near-term evaluation period  
4 because most of the affected riparian vegetation would be removed during the near-term  
5 timeframe, while large quantities of riparian habitat would not be restored until the early and  
6 late long-term timeframes. Effects on valley elderberry longhorn beetle of this temporal loss of  
7 riparian vegetation are expected to be minimal because much of the riparian habitat in the Plan  
8 Area is not known to be currently occupied by the species, because all elderberry shrubs that  
9 are suitable for transplantation would be moved to conservation areas in the Plan Area, and  
10 because most of the affected community is composed of small patches of riparian scrub and  
11 herbaceous vegetation that are fragmented and distributed across the agricultural landscape of  
12 the Plan Area and thus are likely to provide no or low-value habitat for the beetle.
- 13 ● Temporarily disturbed areas would be restored within 1 year following completion of  
14 construction and management activities. Under AMM10, a restoration and monitoring plan  
15 would be developed prior to initiating any construction-related activities associated with the  
16 conservation measures or other covered activities that would result in temporary effects on  
17 natural communities.

18 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*  
19 *Plant Species*) estimates that the restoration and protection actions discussed above, as well as other  
20 actions that overlap with the nonriparian portions of the species model, could result in the  
21 restoration of 4,857 acres (riparian) and the protection of 2,363 acres (729 acres of riparian and  
22 1,634 acres of nonriparian channels and grassland) of modeled habitat for valley elderberry  
23 longhorn beetle.

24 **NEPA Effects:** The near-term loss of valley elderberry longhorn beetle habitat under Alternative 1C  
25 would not be adverse because the BDCP has committed to restoring and protecting an acreage that  
26 exceeds the typical mitigation ratios described above, in addition to avoiding impacts on shrubs and  
27 transplanting those that can't be avoided. In the absence of other conservation actions, the losses of  
28 valley elderberry longhorn beetle habitat and potential for direct mortality of a special-status  
29 species associated with Alternative 1C in the late long-term would represent an adverse effect.  
30 However, with habitat protection and restoration associated with CM7, guided by species-specific  
31 goals and objectives and by AMM1–AMM6, AMM10, and AMM15, which would be in place  
32 throughout the construction period, the effects of Alternative 1C as a whole on valley elderberry  
33 longhorn beetle would not be adverse under NEPA.

34 **CEQA Conclusion:**

35 **Near-Term Timeframe**

36 Because the water conveyance facilities construction is being evaluated at the project level, the near-  
37 term BDCP conservation strategy has been evaluated to determine whether it would provide  
38 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the impacts of  
39 construction would be less than significant. Alternative 1C would result in permanent and  
40 temporary impacts on 1,035 acres of modeled habitat (583 acres of riparian and 452 acres of  
41 nonriparian) for valley elderberry longhorn beetle in the study area in the near-term. These impacts  
42 would result from the construction of the water conveyance facilities (CM1, 126 acres of riparian  
43 and 216 acres of nonriparian), and implementing other conservation measures (Yolo Bypass

1 fisheries improvements [CM2] and tidal restoration [CM4], 693 acres of modeled habitat). The other  
2 conservation measures account for 457 of the 583 acres (78%) of impacts on riparian habitat. Based  
3 on the DHCCP survey data of the Conveyance Planning Area, an estimated 41 elderberry shrubs  
4 would be impacted in the near-term by CM1 (see Section 12.3.2.3 for a discussion on the methods  
5 used to make this estimate).

6 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by  
7 CM1 and that are identified in the biological goals and objectives for valley elderberry longhorn  
8 beetle in Chapter 3 of the BDCP would be 1:1 for restoration and 1:1 for protection for riparian  
9 habitat. Using these typical ratios would indicate that 126 acres of the riparian habitat should be  
10 restored/created and 126 acres of existing riparian should be protected to mitigate the CM1 losses  
11 of valley elderberry longhorn beetle habitat. The near-term impacts of other conservation actions  
12 would require 457 acres of riparian restoration and 457 acres of riparian protection using the same  
13 typical NEPA and CEQA ratios (1:1 for restoration and 1:1 for protection).

14 The BDCP has committed to near-term goals of protecting 750 acres of riparian and restoring 800  
15 acres of riparian habitat in the Plan Area. These conservation actions would occur in the same  
16 timeframe as the construction and early restoration losses, thereby minimizing adverse effects on  
17 valley elderberry longhorn beetle. In addition, BDCP Objectives VELB 1.1 and 1.2, which call for  
18 implementing the USFWS conservation guidelines for valley elderberry longhorn beetle  
19 (transplanting elderberry shrubs and planting elderberry seedlings and associated natives) and  
20 siting elderberry restoration within drainages immediately adjacent to or in the vicinity of sites  
21 confirmed to be occupied by valley elderberry longhorn beetle (U.S. Fish and Wildlife Service  
22 1999a). These objectives would be met through the implementation of *CM7 Riparian Natural  
23 Community Restoration*. CM7 specifically calls for the planting of elderberry shrubs in in large,  
24 contiguous clusters with a mosaic of associated natives as part of riparian restoration consistent  
25 with USFWS conservation guidelines (U.S. Fish and Wildlife Service 1999a).

26 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2  
27 Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention  
28 Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment and  
29 Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged  
30 Material*, and *AMM15 Valley Elderberry Longhorn Beetle*. AMM15 requires surveys for elderberry  
31 shrubs within 100 feet of any ground disturbing activities, the implementation avoidance and  
32 minimize measures for any shrubs that are identified within this 100-foot buffer, and transplanting  
33 shrubs that can't be avoided. All of these AMMs include elements that avoid or minimize the risk of  
34 affecting habitats and species adjacent to work areas and RTM storage sites. The AMMs are  
35 described in detail in BDCP Appendix 3.C.

36 The natural community restoration and protection activities are expected to be concluded in the  
37 first 10 years of Plan implementation, which is close enough in time to the occurrence of impacts to  
38 constitute adequate mitigation for CEQA purposes. These commitments, implemented together with  
39 the AMMs, are more than sufficient to support the conclusion that the near-term effects of  
40 Alternative 1C would be less than significant under CEQA.

#### 41 **Late Long-Term Timeframe**

42 Alternative 1C as a whole would result in the permanent loss of and temporary impacts on 1,550  
43 acres of modeled valley elderberry longhorn beetle habitat (915 acres of riparian habitat and 635  
44 acres of nonriparian habitat) during the term of the Plan (5% of the modeled habitat in the study

1 area). The locations of these losses are described above in the analyses of individual conservation  
2 measures. These losses would not fragment any known populations of valley elderberry longhorn  
3 beetle. The Plan includes a commitment to protect 750 acres of riparian habitat and  
4 restoring/creating 5,000 acres of riparian habitat in the Plan Area. According to Objective VELB1.2,  
5 the restoration of elderberry longhorn beetle habitat would occur adjacent to occupied habitat,  
6 which would provide connectivity between occupied and restored habitats and improve the species'  
7 ability to disperse within and outside the Plan Area. The BDCP also includes a number of AMMs  
8 (AMM1–AMM6, AMM10, and AMM15) directed at minimizing or avoiding potential impacts on  
9 valley elderberry longhorn beetle. The large acreages of conservation would adequately compensate  
10 for the modeled habitats lost to construction and restoration activities.

11 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*  
12 *Plant Species*) estimates that the restoration and protection actions discussed above, as well as  
13 others actions that overlap with the nonriparian portions of the species model, could result in the  
14 restoration of 4,857 acres (riparian) and the protection of 2,363 acres (729 acres of riparian and  
15 1,634 acres of nonriparian channels and grassland) of modeled habitat for valley elderberry  
16 longhorn beetle.

17 Considering these protection and restoration provisions, which would provide acreages of new or  
18 enhanced habitat in amounts greater than necessary to compensate for habitats lost to construction  
19 and restoration activities, implementation of Alternative 1C as a whole would not result in a  
20 substantial adverse effect through habitat modifications and would not substantially reduce the  
21 number or restrict the range of the species. Therefore, the alternative would have a less-than-  
22 significant impact on valley elderberry longhorn beetle.

### 23 **Impact BIO-36: Indirect Effects on Valley Elderberry Longhorn Beetle and its Habitat**

24 Construction activities associated with water conveyance facilities, conservation components and  
25 ongoing habitat enhancement, as well as operation and maintenance of above-ground water  
26 conveyance facilities, including the transmission facilities, could result in ongoing periodic  
27 postconstruction disturbances with localized impacts on valley elderberry longhorn beetle over the  
28 term of the BDCP. Construction related effects could result from ground-disturbing activities,  
29 stockpiling of soils, and maintenance and refueling of heavy equipment could result in dust and the  
30 inadvertent release of hazardous substances in areas where elderberry shrubs occur. A GIS analysis  
31 (see Section 12.3.2.3 for a discussion on the methods used to make this estimate) estimates that  
32 approximately 12 shrubs could be indirectly affected by conveyance facilities construction (CM1).  
33 Restoration activities could result in excavation or modification of channels, type conversion from  
34 riparian and grasslands to tidal habitat, levee removal and modification, and removal of riprap and  
35 other protections from channel banks that occur within 100 feet of an elderberry shrubs. These  
36 potential effects would be minimized or avoided through AMM1–AMM6, AMM10, and AMM15,  
37 which would be in effect throughout the Plan's construction phase.

38 **NEPA Effects:** The indirect effects on valley elderberry longhorn beetle as a result of implementing  
39 Alternative 1C conservation actions would not have an adverse effect on valley elderberry longhorn  
40 beetle.

41 **CEQA Conclusion:** Ground-disturbing activities, stockpiling of soils, and the potential release of dust  
42 and hazardous substances would accompany construction of the water conveyance facilities. An  
43 estimated 12 shrubs could be indirectly affected by conveyance facilities construction (CM1). In  
44 addition, ground-disturbing activities associated with the re-contouring of surface topography,

1 excavation or modification of channels, type conversion from riparian and grasslands to tidal  
2 habitat, levee removal and modification, and removal of riprap and other protections from channel  
3 banks could indirectly affected elderberry shrubs that occur within 100 feet of these restoration  
4 activities. With the implementation of AMM1–AMM6, AMM10, and AMM15 as part of Alternative 1C  
5 construction, operation, and maintenance, the BDCP would avoid the potential for substantial  
6 adverse indirect effects on valley elderberry longhorn beetle in that the Plan would not result in a  
7 substantial reduction in numbers or a restriction in the range of valley elderberry longhorn beetle.  
8 Therefore, the indirect effects under this alternative would have a less-than-significant impact on  
9 valley elderberry longhorn beetle.

10 **Impact BIO-37: Periodic Effects of Inundation of Valley Elderberry Longhorn Beetle Habitat**  
11 **as a Result of Implementation of Conservation Components**

12 Flooding of the Yolo Bypass from *CM2 Yolo Bypass Fisheries Enhancement* would periodically affect  
13 161 to 325 acres of modeled valley elderberry longhorn beetle habitat (Table 12-1C-14). *CM5*  
14 *Seasonally Inundated Floodplain Restoration* would periodically inundate 553 acres of modeled  
15 valley elderberry longhorn beetle habitat (Table 12-1C-14).

16 It is unknown at this time how much of the modeled habitat that would be inundated as a result of  
17 CM2 and CM5 actually contains elderberry shrubs. Elderberry shrubs have been found to be  
18 intolerant of long periods of inundation and there is evidence that they die very quickly after even  
19 short periods of flooding (River Partners 2008). During monitoring of a restoration project at the  
20 San Joaquin River National Wildlife Refuge, River Partners found that nearly all (99% to 100%) of  
21 the 4-year-old elderberry shrubs in restoration plots died after 15-17 weeks of inundation, and  
22 River Partners noted in general that the shrubs died very quickly after even short periods of  
23 flooding (River Partners 2008). Talley et al (2006) in their report assisting the USFWS 5-year review  
24 of the species, note that elderberry shrubs respond negatively to saturated soil conditions and that  
25 they can only tolerate temporary root crown inundation. Therefore, in the areas that would be  
26 periodically inundated by the implementation of CM2 it is likely that there are few, if any, mature  
27 shrubs in these areas because under current conditions they would be inundated in about 50% of all  
28 years for approximately 7 weeks. The areas affected by CM5 are not currently inundated and thus  
29 elderberry shrubs could present in these areas.

30 The periodic effects on modeled habitat for valley elderberry longhorn beetle associated with  
31 implementing Alternative 1C could adversely affect valley elderberry longhorn beetle habitat  
32 (elderberry shrubs) and make modeled habitat there unsuitable for future elderberry  
33 establishment. Based on the information presented above, the current conditions in those areas that  
34 would be periodically inundated in Yolo Bypass (CM2) are not likely very suitable for elderberry  
35 shrubs and, thus, CM2 would likely have minimal effects, if any, on the species. The modeled habitat  
36 that would be periodically inundated from the implementation of CM5 could result in adverse effects  
37 on valley elderberry longhorn beetle.

38 **NEPA Effects:** Periodic effects of the inundation of valley elderberry longhorn beetle habitat as a  
39 result of implementing Alternative 1C conservation actions would not be adverse under NEPA when  
40 taking into consideration CM7 habitat protection and restoration. This habitat protection and  
41 restoration would be guided by species-specific goals and objectives, and by AMM1–AMM6, AMM10,  
42 and AMM15, which would be in place throughout the time period when periodic effects would occur.

43 **CEQA Conclusion:** Alternative 1C (CM2 and CM5) would have periodic impacts on modeled valley  
44 elderberry longhorn beetle habitat. The periodic inundation of between 161 and 325 acres (CM2)

1 and 553 acres (CM5) of modeled habitat could result in the death of elderberry shrubs that may  
2 occur there and thus potentially impact valley elderberry longhorn beetle. The Plan includes the  
3 restoration of 5,000 acres of riparian habitat (Objective VFRNC1.1) and the protection of 750 acres  
4 riparian habitat (Objective VFRNC1.2) would include areas for elderberry restoration and  
5 protection. The BDCP also includes AMM1–AMM6, AMM10, and AMM15 that would minimize and  
6 avoid impacts on valley elderberry longhorn beetle prior to Yolo Bypass fisheries enhancement and  
7 floodplain restoration activities. AMM15, which includes a measure for following the USFWS  
8 conservation guidelines for valley elderberry longhorn beetle, would be used to identify shrubs for  
9 transplanting to conservation areas that otherwise could be adversely affected by periodic  
10 inundation in Yolo Bypass and floodplain restoration areas (U.S. Fish and Wildlife Service 1999a).  
11 These conservation actions would compensate for the periodic impacts on valley elderberry  
12 longhorn beetle.

13 Considering these protection and restoration provisions and avoidance and minimization measures,  
14 implementation of Alternative 1C as a whole would not result in a substantial adverse effect through  
15 habitat modifications and would not substantially reduce the number or restrict the range of the  
16 species. Therefore, periodic effects of inundation resulting from Alternative 1C would have a less-  
17 than-significant impact on valley elderberry longhorn beetle.

#### 18 **Nonlisted vernal pool invertebrates**

19 This section describes the effects of Alternative 1C, including water conveyance facilities  
20 construction and implementation of other conservation components, on nonlisted vernal pool  
21 invertebrates that are not covered by the Plan (Blennosperma vernal pool andrenid bee, hairy water  
22 flea, Ricksecker's water scavenger beetle, curved-foot hygrotus beetle, molestan blister beetle).  
23 Little is known about the range of these species so it is assumed that they have potential to occur in  
24 the same areas described by the vernal pool crustacean modeled habitat. That habitat model  
25 consists of: vernal pool complex, which consists of vernal pools and uplands that display  
26 characteristic vernal pool and swale visual signatures that have not been significantly affected by  
27 agricultural or development practices; alkali seasonal wetlands in CZ 8; and degraded vernal pool  
28 complex, which consists of low-value ephemeral habitat ranging from areas with vernal pool and  
29 swale visual signatures that display clear evidence of significant disturbance due to plowing, discing,  
30 or leveling to areas with clearly artificial basins such as shallow agricultural ditches, depressions in  
31 fallow fields, and areas of compacted soils in pastures. For the purpose of the effects analysis, vernal  
32 pool complex is categorized as high-value and degraded vernal pool complex is categorized as low-  
33 value for these species. Alkali seasonal wetlands in CZ 8 were also included as high-value habitat for  
34 vernal pool crustaceans in the model. Also included as low-value for vernal pool habitat are areas  
35 along the eastern boundary of CZ 11 that are mapped as vernal pool complex because they flood  
36 seasonally and support typical vernal pool plants, but do not include topographic depressions that  
37 are characteristic of vernal pools.

38 Construction and restoration associated with Alternative 1C conservation measures would result in  
39 permanent losses of habitat for nonlisted vernal pool invertebrates as indicated in Table 12-1C-15  
40 and indirect conversions of vernal pool habitat. The majority of the losses would take place over an  
41 extended period of time as tidal marsh is restored in the Plan Area. Full implementation of  
42 Alternative 1C would also include the following conservation actions over the term of the BDCP that  
43 would benefit nonlisted vernal pool invertebrates (BDCP Chapter 3, *Conservation Strategy*).

- 1 • Protect 600 acres of vernal pool complex in CZ 1, CZ 8, or CZ 11, primarily in core vernal pool  
2 recovery areas (ObjectiveVPNC1.1, associated with CM3).
- 3 • Restore vernal pool complex in CZ 1, CZ 8, and CZ 11 to achieve no net loss of vernal pool  
4 acreage (up to 67 acres of vernal pool complex restoration [10 wetted acres])(Objective  
5 VPNC1.2, associated with CM9).
- 6 • Increase size and connectivity of protected vernal pool complexes in plan area and increase  
7 connectivity with complexes outside the Plan Area (ObjectiveVPNC1.3)
- 8 • Protect the range of inundation characteristics of vernal pools in the Plan Area (Objective  
9 VPNC1.4)
- 10 • Maintain and enhance vernal pool complexes to provide appropriate inundation (ponding) for  
11 supporting and sustaining vernal pool species (Objective VPNC2.1)

12 However, as explained below the impacts on nonlisted vernal pool invertebrates would be adverse  
13 for NEPA purposes and would be significant for CEQA purposes. Mitigation Measure BIO-32, *Restore  
14 and Protect Vernal Pool Crustacean Habitat*, would reduce the effects under NEPA and reduce the  
15 impacts to a less-than-significant level under CEQA.

16 **Table 12-1C-15. Changes in Nonlisted Vernal Pool Invertebrate Habitat Associated with Alternative**  
17 **1C (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	High-value	42	42	33	33	NA	NA
	Low-value	0	0	6	6	NA	NA
<b>Total Impacts CM1</b>		<b>42</b>	<b>42</b>	<b>39</b>	<b>39</b>	<b>NA</b>	<b>NA</b>
CM2–CM18	High-value	0	0	0	0	0–4	0
	Low-value	201	372	0	0	0	0
<b>Total Impacts CM2–CM18</b>		<b>201</b>	<b>372</b>	<b>0</b>	<b>0</b>	<b>0–4</b>	<b>0</b>
<b>TOTAL IMPACTS</b>		<b>243</b>	<b>414</b>	<b>39</b>	<b>39</b>	<b>0–4</b>	<b>0</b>

<sup>a</sup> See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

<sup>e</sup>

NT = near-term  
LLT = late long-term  
NA = not applicable

18

1 **Impact BIO-38: Loss or Conversion of Habitat for and Direct Mortality of Nonlisted Vernal**  
2 **Pool Invertebrates**

3 Alternative 1C conservation measures would result in the direct permanent loss of up to 453 acres  
4 of vernal pool habitat from conveyance facility construction (CM1) and tidal natural communities  
5 restoration (CM4). In addition, the conservation measures could result in the indirect conversion  
6 due to hydrologic changes of an additional 196 acres of vernal pool habitat (140 acres of high-value  
7 habitat and 56 acres of low-value habitat) from conveyance facilities construction (CM1) and tidal  
8 restoration (CM4). Construction of the water conveyance facilities and restoration activities may  
9 result in the modification of hardpan and changes to the perched water table, which could lead to  
10 alterations in the rate, extent, and duration of inundation of nearby vernal pool habitat. USFWS  
11 typically considers construction within 250 feet of vernal pools to constitute a possible conversion  
12 of the habitat unless more detailed information is provided to further refine the limits of any such  
13 effects. For the purposes of this analysis, the 250-foot buffer was applied to the water conveyance  
14 facilities work areas where surface and subsurface disturbance activities would take place and to  
15 restoration hypothetical footprints. Habitat enhancement and management activities (CM11), which  
16 include disturbance or removal of nonnative vegetation, could result in local adverse habitat effects.

17 Because the estimates of habitat loss resulting from tidal inundation are based on projections of  
18 where restoration may occur, actual effects are expected to be lower because sites would be selected  
19 and restoration projects designed to minimize or avoid effects on the covered vernal pools. As  
20 specified in the BDCP, the BDCP Implementation Office would ensure that tidal restoration projects  
21 and other covered activities would be designed such that no more than a total of 10 wetted acres of  
22 vernal pool habitat would be permanently lost. *AMM12 Vernal Pool Crustaceans* would ensure that  
23 no more than 20 wetted acres of vernal pool habitat are indirectly affected by BDCP covered  
24 activities. The term *wetted acres* refers to an area that would be defined by the three parameter  
25 wetland delineation method used by USACE to determine the limits of a wetland, which involves an  
26 evaluation of wetland soil, vegetation, and hydrology characteristics. This acreage differs from  
27 vernal pool complex acreages in that a vernal pool complex is comprised of individual wetlands  
28 (vernal pools) and those upland areas that are in between and surrounding them, which provide the  
29 supporting hydrology (surface runoff and groundwater input), organic and nutrient inputs, and  
30 refuge for the terrestrial phase of some vernal pool species.

31 A summary statement of the combined impacts and NEPA and CEQA conclusions follows the  
32 individual conservation measure discussions.

- 33 • *CM1 Water Facilities and Operation*: Construction of Alternative 1C conveyance facilities would  
34 result in the permanent and temporary loss of 81 acres of vernal pool habitat (42 permanent  
35 and 39 temporary). These impacts would occur from transmission line construction in the  
36 western area of additional analysis and the construction of the canal from southeast of the town  
37 of Brentwood to the area just west of Clifton Court Forebay. These impacts would be on 45 acres  
38 of high-value habitat and 6 acres of low-value habitat. In addition, 61 acres of vernal pool habitat  
39 (51 acres of high-value habitat and 10 acres of low-value habitat) could be indirectly affected by  
40 the construction of the CM1 canal and the transmission line within the western area of  
41 additional analysis.
- 42 • *CM4 Tidal Natural Communities Restoration*: Tidal natural communities restoration would result  
43 in the permanent loss of approximately 372 acres of low-value vernal pool habitat, which  
44 consists of degraded vernal pool complex. The BDCP describes degraded vernal pool complex as

1 areas of low-value ephemeral habitat ranging from areas with vernal pool and swale visual  
2 signatures that display clear evidence of significant disturbance due to plowing, disking, or  
3 leveling to areas with clearly artificial basins such as shallow agricultural ditches, depressions in  
4 fallow fields, and areas of compacted soils in pastures. The actual density of vernal pools or  
5 other aquatic features in these areas is unknown, but a 2012 review of Google Earth imagery  
6 found that these habitats appear to generally have low densities. However, areas mapped as  
7 degraded vernal pool complex may still provide habitat for nonlisted vernal pool invertebrates.  
8 So though degraded vernal pool complexes may not represent botanically diverse vernal pools  
9 they still can provide habitat for nonlisted vernal pool invertebrates and thus the loss of 372  
10 acres of degraded vernal pool complex may result in the loss of occupied nonlisted vernal pool  
11 invertebrate habitat. In addition, tidal restoration could result in the indirect conversion of 135  
12 acres of vernal pool habitat, which consist of 89 acres of high-value and 45 acres of low-value  
13 habitat. No records of nonlisted vernal pool invertebrates would be directly impacted by CM4.

- 14 • *CM11 Natural Communities Enhancement and Management*: As described in the BDCP,  
15 restoration/creation of vernal pools to achieve no net loss and the protection of 600 acres of  
16 vernal pool complex would benefit vernal pool invertebrates (Table 12-1C-15). A variety of  
17 habitat management actions included in CM11 that are designed to enhance wildlife values in  
18 BDCP-protected habitats may result in localized ground disturbances that could temporarily  
19 affect vernal pool invertebrate habitat. Ground-disturbing activities, such as removal of  
20 nonnative vegetation and road and other infrastructure maintenance, are expected to have  
21 minor effects on vernal pool invertebrate habitat and are expected to result in overall  
22 improvements to and maintenance of vernal pool habitat values over the term of the BDCP.  
23 These effects cannot be quantified, but are expected to be minimal and would be avoided and  
24 minimized by the AMMs listed below.

25 The following paragraphs summarize the combined effects discussed above and describe other  
26 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA impact conclusions are  
27 also included. Table 12-1C-16 was prepared to further analyze BDCP effects on vernal pools using  
28 wetted acres of vernal pools in order to compare to the effects of this alternative with the effect  
29 limits established in BDCP Chapter 3, Section 3.3, *Biological Goals and Objectives*, which are  
30 measured in wetted acres of vernal pools. Wetted acres were estimated by using the BDCP's  
31 assumption that vernal pool and degraded vernal pool complexes would have a 15% density of  
32 vernal pools (i.e., of 100 acres of vernal pool complex 15 acres would constitute vernal pools and the  
33 remaining 85 acres supporting uplands). Based on an informal evaluation of aerial photographs of  
34 the Plan Area, it is likely that the actual densities within the Plan Area are approximately 10%, but  
35 the 15% density value was chosen as a conservative estimate for determining effects.

1 **Table 12-1C-16. Estimated Effects on Wetted Vernal Pools Associated with Alternative 1C (acres)<sup>a</sup>**

		Direct Loss		Indirect Conversion	
		Near-Term	Late Long-Term	Near-Term	Late Long-Term
BDCP Impact Limit		5	10	10	20
Alternative 1C Impact <sup>a</sup>	CM1	12.2	12.2	9.2	9.2
	CM4 <sup>b</sup>	30.2	55.8	11.0	20.3
<b>Total</b>		<b>42.4</b>	<b>68.0</b>	<b>20.2</b>	<b>29.5</b>

<sup>a</sup> Because roughly half of the impacts occur in the near-term, it is assumed that the impact limit in the near-term would be 5 wetted acres for direct loss and 10 acres for indirect.

<sup>b</sup> These acreages were generated by assuming that the modeled habitat identified in Table 12-1C-15 has densities of wetted vernal pools at 15%. The direct effects numbers include permanent and temporary impacts.

<sup>c</sup> These impacts are based on the hypothetical restoration footprints and would likely be lower based on the BDCP's commitment to minimize and avoid effects on vernal pool habitat as much as practicable. The values for near-term indirect effects were assumed to be slightly more than half of what the late long-term value would be.

2

3 ***Near-Term Timeframe***

4 Because the water conveyance facilities construction is being evaluated at the project level, the near-  
 5 term BDCP conservation strategy has been evaluated to determine whether it would provide  
 6 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the effects of  
 7 construction would not be adverse under NEPA and would be less than significant under CEQA.  
 8 Table 12-1C-15 above lists the impacts on vernal pool habitat that are based on the natural  
 9 community mapping done within the study area. The impacts from tidal natural communities  
 10 restoration (CM4) are based on hypothetical footprints and do not reflect actual impacts on vernal  
 11 pool habitat considering the BDCP's commitment to design restoration projects to minimize or avoid  
 12 effects on nonlisted vernal pool invertebrates (see AMM12). As seen in Table 12-1C-16, the effects of  
 13 CM1 alone would exceed the near-term limit and use 9 of the 10 indirect effects acres allowed in the  
 14 near-term. Alternative 1C would not meet the Plan's near-term biological goals and objectives for  
 15 direct effects. Near-term tidal restoration projects would have to be designed to ensure that there  
 16 are no direct effects on wetted vernal pool acreage (permanent or temporary) and no more than 2  
 17 wetted acres of indirect effects on vernal pools in order to meet the near-term goal for indirect  
 18 effects.

19 Typical NEPA and CEQA project-level mitigation ratios for vernal pools affected by CM1 would be  
 20 1:1 for restoration and 2:1 for protection. Typically, indirect impacts are mitigated by protecting  
 21 vernal pools at a 2:1 ratio. Using these typical ratios would indicate that 12.2 wetted acres of vernal  
 22 pools (or 81 acres of vernal pool complex) should be restored and 42.8 wetted acres (or 285 acres of  
 23 vernal pool complex) protected to mitigate the CM1 direct and indirect effects on vernal pool  
 24 habitat. Assuming that the BDCP would apply the impact limits presented in Table 12-1C-16,  
 25 impacts on wetted vernal pools resulting from tidal restoration in the near-term would have to  
 26 avoid direct effects on wetted vernal pool acreage and not exceed 1.6 wetted acres of indirect  
 27 effects. The BDCP would need to restore 12.2 wetted acres (81 acres of vernal pool complex) and  
 28 protect up to 30 wetted acres (200 acres of vernal complex) in the near-term to offset the effects of  
 29 CM1 and CM4.

1 The BDCP has committed to near-term goal of protecting 400 acres of vernal pool complex (see  
2 Table 3-4 in Chapter 3, *Description of Alternatives*) by protecting at least 2 wetted acres of vernal  
3 pools for each wetted acre directly or indirectly affected. The BDCP has also committed to  
4 restoring/creating vernal pools such that there is no net loss of vernal pool acreage. The amount of  
5 restoration would be determined during implementation based on the following criteria.

- 6 ● If restoration is completed (i.e., restored natural community meets all success criteria) prior to  
7 impacts, then 1.0 wetted acre of vernal pools would be restored for each wetted acre directly  
8 affected (1:1 ratio).
- 9 ● If restoration takes place concurrent with impacts (i.e., restoration construction is completed,  
10 but restored habitat has not met all success criteria, prior to impacts occurring), then 1.5 wetted  
11 acres of vernal pools would be restored for each wetted acre directly affected (1.5:1 ratio).

12 The Plans biological goals and objectives would also inform the near-term protection and  
13 restoration efforts. These Plan goals represent performance standards for considering the  
14 effectiveness of restoration actions.

15 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
16 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
17 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment and*  
18 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
19 *Material*, *AMM10 Restoration of Temporarily Affected Natural Communities*, and *AMM37 Recreation*.  
20 *AMM12 Vernal Pool Crustaceans*, though developed for vernal pool crustaceans, includes measures  
21 to avoid and minimize direct and indirect effects on vernal pools and would thus be applicable to  
22 nonlisted vernal pool invertebrates as well. All of these AMMs include elements that avoid or  
23 minimize the risk of affecting habitats and species adjacent to work areas. The AMMs are described  
24 in detail in BDCP Appendix 3.C.

### 25 **Late Long-Term Timeframe**

26 The BDCP states that covered activities would not result in more than 10 wetted acres of direct loss  
27 and no more than 20 wetted acres of indirect conversion effects on vernal pools by the late long-  
28 term (see Objective VPNC1.2 and AMM12). As seen in Table 12-1C-16, the effects of CM1 alone  
29 would exceed 10 acres of direct effect and roughly half of the acres of indirect effects allowed under  
30 the BDCP. In order for Alternative 1C to meet the biological goals and objectives of the Plan, tidal  
31 restoration projects would have to be designed to ensure that there are no direct effects on wetted  
32 vernal pool acreage (permanent or temporary) and no more than 11.6 wetted acres of indirect  
33 effects on vernal pools.

34 The Plan has committed to a late long-term goal of protecting 600 acres of vernal pool complex in  
35 either Conservation Zones 1, 8, or 11, primarily in core vernal pool recovery areas (Objective  
36 VPNC1,1) by protecting at least 2 wetted acres of vernal pools protected for each wetted acre  
37 directly or indirectly affected. The Plan also includes a commitment to restore or create vernal pools  
38 such that the Plan results in no net loss of vernal pool acreage (Objective VPNC1.2). The protection  
39 and restoration would be achieved using the criteria presented above as well as by following these  
40 other specific biological goals and objectives.

- 41 ● Increasing the size and connectivity of protected vernal pool complexes (Objective VPNC1.3).
- 42 ● Protecting the range of inundation characteristics that are currently represented by vernal pool  
43 throughout the Plan Area (Objective VPNC1.4).

1 **NEPA Effects:** The near-term loss of vernal pool habitat under Alternative 1C would exceed the limit  
2 for permanent and temporary impacts set by BDCP Objective VPNC1.2, which states the Plan would  
3 restore up to 67 acres of vernal pool complex (or 10 wetted acres of vernal pool). Though the BDCP  
4 has measures to redesign restoration projects to limit effects to natural communities and species it  
5 does not provide for redesigning the conveyance alignment to minimize effects. The loss of nonlisted  
6 vernal pool species habitat under Alternative 1C in the near-term would represent an adverse effect.  
7 Even though the Plan has a commitment to avoid and minimize effects on vernal pools to the  
8 maximum extent practicable it is assumed that by the long-term the needs for satisfying the tidal  
9 restoration requirements (CM4) would result in additional indirect effects that could exceed the  
10 limits established by the plan. Alternative 1C would result in adverse effects on nonlisted vernal  
11 pool species under NEPA over the Plan's term. Mitigation Measure BIO-32, *Restore and Protect*  
12 *Vernal Pool Crustacean Habitat*, would reduce these effects.

13 **CEQA Conclusion:**

14 **Near-Term Timeframe**

15 Because the water conveyance facilities construction is being evaluated at the project level, the near-  
16 term BDCP conservation strategy has been evaluated to determine whether it would provide  
17 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the impacts of  
18 construction would be less than significant. Table 12-1C-15 above lists the impacts on vernal pool  
19 habitat that is based on the natural community mapping done within the study area. The impacts  
20 from tidal natural communities restoration (CM4) are based on hypothetical footprints and do not  
21 reflect actual impacts on vernal pool habitat considering the BDCP's commitment to design  
22 restoration projects to minimize or avoid effects on vernal pools. As seen in Table 12-1C-16, the  
23 effects of CM1 alone would exceed the near-term limit and use 9 of the 10 indirect effects acres  
24 allowed in the near-term. Alternative 1C would not meet the Plan's near-term biological goals and  
25 objectives for direct effects. Near-term tidal restoration projects would have to be designed to  
26 ensure that there are no direct effects on wetted vernal pool acreage (permanent or temporary) and  
27 no more than 2 wetted acres of indirect effects on vernal pools in order to meet the near-term goal  
28 for indirect effects.

29 Typical NEPA and CEQA project-level mitigation ratios for vernal pools affected by CM1 would be  
30 1:1 for restoration and 2:1 for protection. Typically, indirect impacts are mitigated by protecting  
31 vernal pools at a 2:1 ratio. Using these typical ratios would indicate that 12.2 wetted acres of vernal  
32 pools (or 81 acres of vernal pool complex) should be restored and 42.8 wetted acres (or 285 acres of  
33 vernal pool complex) protected to mitigate the CM1 direct and indirect effects on vernal pool  
34 habitat. Assuming that the BDCP would apply the impact limits presented in Table 12-1C-16,  
35 impacts on wetted vernal pools resulting from tidal restoration in the near-term would have to  
36 avoid direct effects to wetted vernal pool acreage and not exceed 1.6 wetted acres of indirect effects.  
37 The BDCP would need to restore 12.2 wetted acres (81 acres of vernal pool complex) and protect up  
38 to 30 wetted acres (200 acres of vernal complex) in the near-term to offset the effects of CM1 and  
39 CM4.

40 The BDCP has committed to near-term goal of protecting 400 acres of vernal pool complex by  
41 protecting at least 2 wetted acres of vernal pools for each wetted acre directly or indirectly affected.  
42 The BDCP has also committed to restoring/creating vernal pools such that there is no net loss of  
43 vernal pool acreage. The amount of restoration would be determined during implementation based  
44 on the following criteria.

- 1 • If restoration is completed (i.e., restored natural community meets all success criteria) prior to  
2 impacts, then 1.0 wetted acre of vernal pools would be restored for each wetted acre directly  
3 affected (1:1 ratio).
- 4 • If restoration takes place concurrent with impacts (i.e., restoration construction is completed,  
5 but restored habitat has not met all success criteria, prior to impacts occurring), then 1.5 wetted  
6 acres of vernal pools would be restored for each wetted acre directly affected (1.5:1 ratio).

7 The species-specific biological goals and objectives would also inform the near-term protection and  
8 restoration efforts. These Plan goals represent performance standards for considering the  
9 effectiveness of restoration actions.

10 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
11 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
12 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment and*  
13 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
14 *Material*, *AMM10 Restoration of Temporarily Affected Natural Communities*, and *AMM37 Recreation*.  
15 *AMM12 Vernal Pool Crustaceans*, though developed for vernal pool crustaceans, includes measures  
16 to avoid and minimize direct and indirect effects to vernal pools and would thus be applicable to  
17 nonlisted vernal pool invertebrates as well. All of these AMMs include elements that avoid or  
18 minimize the risk of affecting habitats and species adjacent to work areas. The AMMs are described  
19 in detail in BDCP Appendix 3.C.

20 The near-term loss of nonlisted vernal pool species habitat under Alternative 1C would exceed the  
21 limit for permanent and temporary impacts on wetted vernal pool acreage set by BDCP Objective  
22 VPNC1.2, which states that the Plan would restore up to 67 acres of vernal pool complex (or 10  
23 wetted acres of vernal pool). Though the BDCP has measures to redesign restoration projects to  
24 limit effects to natural communities and species it does not provide for redesigning the conveyance  
25 alignment to minimize effects. The loss of nonlisted vernal pool species habitat under Alternative 1C  
26 in the near-term would represent an adverse effect. Alternative 1C would result in a significant  
27 impacts on nonlisted vernal pool species under CEQA in the near-term. Implementation of  
28 Mitigation Measure BIO-32, *Restore and Protect Vernal Pool Crustacean Habitat*, would reduce  
29 impacts to a less-than-significant level.

### 30 ***Late Long-Term Timeframe***

31 The BDCP states that covered activities would not result in more than 10 wetted acres of direct loss  
32 and no more than 20 wetted acres of indirect effects on vernal pools by the late long-term. As seen  
33 in Table 12-1C-16, the effects of CM1 alone would exceed 10 acres of direct effect and roughly half of  
34 the acres of indirect effects allowed under the BDCP. In order for Alternative 1C to meet the  
35 biological goals and objectives of the Plan, tidal restoration projects would have to be designed to  
36 ensure that there are no direct effects on wetted vernal pool acreage (permanent or temporary) and  
37 no more than 11.6 wetted acres of indirect effects on vernal pools.

38 The Plan has committed to late long-term goal of protecting 600 acres of vernal pool complex in  
39 either Conservation Zones 1, 8, or 11, primarily in core vernal pool recovery areas (Objective  
40 VPNC1.1) by protecting at least 2 wetted acres of vernal pools protected for each wetted acre  
41 directly or indirectly affected. The Plan also includes a commitment to restore or create vernal pools  
42 such that the Plan results in no net loss of vernal pool acreage (Objective VPNC1.2). The protection

1 and restoration would be achieved using the criteria presented above as well as by following these  
2 other specific biological goals and objectives.

- 3 • Increasing the size and connectivity of protected vernal pool complexes (Objective VPNC1.3)
- 4 • Protecting the range of inundation characteristics that are currently represented by vernal pool  
5 throughout the Plan Area (Objective VPNC1.4)

6 Even though the Plan has a commitment to avoid and minimize effects on vernal pool habitats to the  
7 maximum extent practicable it is assumed that by the long-term the needs for satisfying the tidal  
8 restoration requirements (CM4) would result in additional indirect effects that could exceed the  
9 limits established by the plan. Alternative 1C would result in a significant impacts on nonlisted  
10 vernal pool species under CEQA over the Plan's term. Mitigation Measure BIO-32, *Restore and*  
11 *Protect Vernal Pool Crustacean Habitat*, would reduce this impacts on a less-than significant level.

### 12 **Mitigation Measure BIO-32: Restore and Protect Vernal Pool Crustacean Habitat**

13 See Mitigation Measure BIO-32 under Impact BIO-32.

### 14 **Impact BIO-39: Indirect Effects of Plan Implementation on Nonlisted Vernal Pool** 15 **Invertebrates**

16 Construction and maintenance activities associated with water conveyance facilities, and restoration  
17 actions could indirectly affect nonlisted vernal pool invertebrates and their habitat in the vicinity of  
18 construction and restoration areas, and maintenance activities. These potential effects would be  
19 minimized or avoided through AMM1-AMM6, AMM10, and AMM12, which would be in effect  
20 throughout the Plan's construction phase.

21 **NEPA Effects:** Water conveyance facilities construction and restoration activities could indirectly  
22 affect nonlisted vernal pool invertebrates and their habitat in the vicinity of construction areas.  
23 Ground-disturbing activities, stockpiling of soils, and maintenance and refueling of heavy equipment  
24 could result in the inadvertent release of sediment and hazardous substances into this habitat.  
25 These potential effects would be avoided and minimized through AMM1-AMM6, which would be in  
26 effect throughout the Plan's construction phase. Nonlisted vernal pool invertebrates and their  
27 habitat could be periodically indirectly affected by maintenance activities at water conveyance  
28 facilities. Embankment maintenance activities around Clifton Court Forebays could result in the  
29 inadvertent discharge of sediments and hazardous materials into vernal pool habitat that occurs  
30 along the southern and western boundaries of the forebays. These potential effects would be  
31 avoided and minimized through AMM1-AMM6, which would be in effect throughout the term of the  
32 Plan. The indirect effects of Alternative 1C implementation would not be adverse.

33 **CEQA Conclusion:** Construction and maintenance activities associated with water conveyance  
34 facilities, and restoration actions could indirectly impact nonlisted vernal pool invertebrates and  
35 their habitat in the vicinity of construction and restoration areas, and maintenance activities. These  
36 potential impacts would be minimized or avoided through AMM1-AMM6, AMM10, and AMM12,  
37 which would be in effect throughout the Plan's construction phase. The indirect impacts of  
38 Alternative 1C would be less than significant.

1 **Impact BIO-40: Periodic Effects of Inundation of Nonlisted Vernal Pool Invertebrates' Habitat**  
2 **as a Result of Implementation of Conservation Components**

3 Flooding of the Yolo Bypass under *CM2 Yolo Bypass Fisheries Enhancement* would periodically affect  
4 0 to 4 acres of modeled habitat for nonlisted vernal pool invertebrates (Table 12-1C-15). There  
5 would be no periodic effects resulting from *CM5 Seasonally Inundated Floodplain Restoration*

6 **NEPA Effects:** BDCP Appendix 5.J, *Effects on Natural Communities, Wildlife, and Plants*, describes the  
7 methods used to estimate periodic inundation effects in the Yolo Bypass. Based on this method,  
8 periodic inundation could affect nonlisted vernal pool invertebrates occupying areas ranging from 0  
9 acres of habitat during most notch flows to an estimated 4 acres during a notch flow of 6,000 cfs.  
10 BDCP-associated inundation of areas that would not otherwise have been inundated is expected to  
11 occur in no more than 30% of all years, because Fremont Weir is expected to overtop the remaining  
12 70% of all years, and during those years notch operations would not typically affect the maximum  
13 extent of inundation. In more than half of all years under Existing Conditions, an area greater than  
14 the BDCP-related inundation area already inundates in the bypass. Yolo Bypass flooding is expected  
15 to have a minimal effect on nonlisted vernal pool invertebrates and would thus not be adverse.

16 **CEQA Conclusion:** Alternative 1C would periodically inundate up to 4 acres of nonlisted vernal pool  
17 invertebrates' habitat during the maximum flows over the Fremont Weir. The periodic inundation is  
18 not anticipated to result in a conversion of nonlisted vernal pool invertebrates' habitat into different  
19 wetland habitat. BDCP-associated inundation of areas that would not otherwise have been  
20 inundated is expected to occur in no more than 30% of all years, because Fremont Weir is expected  
21 to overtop the remaining 70% of all years, and during those years notch operations would not  
22 typically affect the maximum extent of inundation. In more than half of all years under Existing  
23 Conditions, an area greater than the BDCP-related inundation area already inundates in the bypass.  
24 Yolo Bypass flooding is expected to have a minimal effect on nonlisted vernal pool invertebrates and  
25 would thus result in less-than-significant impacts on the species.

26 **Sacramento and Antioch Dunes Anthicid Beetles**

27 This section describes the effects of Alternative 1C, including water conveyance facilities  
28 construction and implementation of other conservation components, on Sacramento and Antioch  
29 Dunes anthicid beetles. Potential habitat in the study area includes inland dune scrub habitat at  
30 Antioch Dunes NWR, sand bars along the Sacramento and San Joaquin Rivers, and sandy dredge  
31 spoil piles (California Department of Fish and Game 2006c and 2006d).

32 The construction, and operations and maintenance of the water conveyance facilities under  
33 Alternative 1C would not likely affect Sacramento and Antioch Dunes anthicid beetles. The  
34 construction of the water conveyance structure and associated infrastructure would generally avoid  
35 affects to channel margins where sand bars are likely to form. Conveyance construction would not  
36 affect inland dune scrub at Antioch Dunes NWR. No dredge spoil areas that could be occupied by  
37 Sacramento anthicid beetle were identified within conveyance facilities footprints during a review  
38 of Google Earth imagery. Also, a review of the locations of the Alternative 1C water intake facilities  
39 on aerial imagery did not reveal any sandbars along the channel margins. These portions of the  
40 Sacramento River have steep, riprap lined channel banks that are likely not conducive to the  
41 formation of sandbars.

42 Implementation of Alternative 1C restoration-based conservation measures could affect habitat for  
43 Sacramento and Antioch Dunes anthicid beetles. Both species are known to utilize interior sand

1 dunes and sandbar habitat. The only interior sand dune habitat within the Plan Area is at Antioch  
2 Dunes, which would not be impacted by the Alternative 1C conservation measures. Both species are  
3 known to occur along the Sacramento River and San Joaquin Rivers. The implementation of BDCP  
4 restoration actions, and other covered activities could affect habitat for Sacramento and Antioch  
5 Dunes anthicid beetles along channels throughout the Plan Area; however the extent of these  
6 habitats in the Plan Area is unknown because these areas were not identified at the scale of mapping  
7 done within the study area. Because of current and historic channel modifications (channel  
8 straightening and dredging) and levee construction throughout the Delta, sandbar habitat is likely  
9 very limited and restricted to channel margins. The implementation of *CM4 Tidal Natural*  
10 *Communities Restoration*, *CM5 Seasonally Inundated Floodplain Restoration*, and *CM6 Channel Margin*  
11 *Enhancement* could impact sandbar habitat along the river channels and possibly sandy, dredge  
12 piles on Delta islands.

13 Over the term of the BDCP, Alternative 1C would likely result in beneficial effects on Sacramento and  
14 Antioch Dunes anthicid beetles. The following Alternative 1C objectives would generally increase  
15 opportunities for the formation of sandbars in the Plan Area.

- 16 • Restore 10,000 acres of seasonally inundated floodplain (Objective L2.11, associated with CM5),
- 17 • Enhance 20 miles of channel margin habitat (Objective L2.12, associated with CM6),
- 18 • Restore 5,000 acres of riparian habitat, with at least 3,000 acres occurring on restored  
19 seasonally inundated floodplain. (VFRNC1.1, associated with CM7).

20 These measures would improve shoreline conditions by creating benches along levees, shallow  
21 habitat along margins and in floodplains, and increasing shoreline vegetation, all of which would  
22 likely contribute to the formation of sandbars along Delta river channels where these measures  
23 would be implemented. Increasing the structural diversity of Delta river channel margins and  
24 floodplains would create opportunities for sand to be deposited and for sandbars to subsequently  
25 form. As explained below, potential impacts on Sacramento and Antioch Dunes anthicid beetles  
26 would not be adverse for NEPA purposes and would be less than significant for CEQA purposes.

1 **Table 12-1C-17. Changes in Sacramento and Antioch Dunes Anthicid Beetle Habitat Associated**  
2 **with Alternative 1C (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1		0	0	0	0	NA	NA
		0	0	0	0	NA	NA
<b>Total Impacts CM1</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>NA</b>	<b>NA</b>
CM2–CM18		0	0	0	0	0	0
		0	0	0	0	0	0
<b>Total Impacts CM2–CM18</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>TOTAL IMPACTS</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

<sup>a</sup> See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only.

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-41: Loss or Conversion of Habitat for and Direct Mortality of Sacramento and**  
5 **Antioch Dunes Anthicid Beetles**

6 Implementation of Alternative 1C conservation measures could affect Sacramento and Antioch  
7 Dunes anthicid beetles and their habitat. As mentioned above, the extent of this habitat in the study  
8 area is unknown but it is assumed that sand bars likely occur along to some degree along the  
9 Sacramento and San Joaquin Rivers and that some islands in the Delta may contain sandy dredge  
10 spoil piles. A review of aerial Google Earth imagery of the north Delta did identify three general  
11 areas that appear to have accumulations of sandy soils (with some vegetation), possibly from dredge  
12 disposal, are Decker Island, the western portion of Bradford Island, and the southwestern tip of  
13 Grand Island. A review of Google Earth imagery of the south Delta did identify sandbar habitat along  
14 the San Joaquin River from the southern end of the Plan Area downstream to an area just west of  
15 Lathrop. An additional area along Paradise Cut was identified just north of I-5. Conservation  
16 measures that could result in impacts on Sacramento and Antioch Dunes anthicid beetles are tidal  
17 natural communities restoration (CM4), seasonally inundated floodplain restoration (CM5), and  
18 channel margin enhancement (CM6). In addition, maintenance activities associated with the long-  
19 term operation of the water conveyance facilities and other BDCP physical facilities could degrade  
20 or eliminate habitat for Sacramento and Antioch Dunes anthicid beetles. Each of these individual  
21 activities is described below. A summary statement of the combined impacts and NEPA and CEQA  
22 conclusions follows the individual conservation measure discussions.

- 23 • *CM4 Tidal Natural Communities Restoration*: Tidal natural communities restoration could impact  
24 the areas of sandy soils identified from aerial photographs on Decker Island, the western  
25 portion of Bradford Island, and on the southwestern tip of Grand Island because these areas fall

1 within the West Delta Restoration Opportunity Area (ROA). The West Delta ROA has been  
2 identified in the BDCP (BDCP Chapter 3, Section 3.4.4, *Conservation Measure 4 Tidal Natural*  
3 *Communities Restoration*) as providing opportunities for creating subtidal aquatic and tidal  
4 marsh habitats. The methods and techniques identified in the BDCP that may be used for tidal  
5 restoration include the recontouring of lands so that they have elevations suitable for the  
6 establishment of marsh plains and the eventual breaching of levees. There are three CNDDDB  
7 records of Sacramento anthonid beetle (just north of Rio Vista, one just south of Rio Vista along  
8 the west shore of the Sacramento River, and one on Grand Island) and one CNDDDB record of  
9 Antioch Dunes anthonid beetle (just north of Rio Vista) that fall within the West Delta ROA  
10 (California Department of Fish and Wildlife 2013). Tidal restoration actions in the West Delta  
11 ROA may eliminate potential habitat and impact occupied habitat of both Sacramento and  
12 Antioch Dunes anthonid beetles.

- 13 ● *CM5 Seasonally Inundated Floodplain Restoration*: Seasonally inundated floodplain restoration  
14 could impact areas with sandbars that were identified in a review of aerial photographs. The  
15 sandbars identified along the San Joaquin River and Paradise Cut are within the conceptual  
16 corridors (Corridors 1a, 1b, 2a, and 4) identified in Figure 3.4-20 of the BDCP. There are four  
17 CNDDDB records for Sacramento anthonid beetle in the conceptual corridor along the San Joaquin  
18 River (California Department of Fish and Wildlife 2013). Floodplain restoration actions in these  
19 conceptual corridors could impact potential habitat for both these species and occupied habitat  
20 of Sacramento anthonid beetle.
- 21 ● *CM6 Channel Margin Enhancement*: Channel margin enhancement could result in impacts on 20  
22 miles of channel margin that could contain sandbars.

23 The following paragraphs summarize the combined effects discussed above and describe other  
24 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA impact conclusions are  
25 also included.

26 Alternative 1C could result in substantial affects to Sacramento and Antioch Dunes anthonid beetles  
27 because all of the habitat identifiable from aerial photo review falls within either the West Delta  
28 ROA, which is being considered for tidal restoration (CM4), or within three of the conceptual  
29 corridors being considered for floodplain restoration (CM5). Furthermore, all seven of the records  
30 for Sacramento anthonid beetle within the study area fall within areas being considered for  
31 restoration (CM4 and CM5), which represent over half of the extant records for this species range  
32 wide (7 of 13), and the only extant record for Antioch Dunes anthonid beetle, which represent one of  
33 five extant records range wide, falls within the West Delta ROA that is just north of Rio Vista. These  
34 occurrences could be affected by restoration if these areas are chosen as restoration projects.  
35 However, over the term of the BDCP, implementation of conservation components would likely  
36 benefit Sacramento and Antioch Dunes anthonid beetles. CM5, CM6, and CM7 would generally  
37 contribute to the formation of sandbar habitat in the Plan Area. These measures would improve  
38 shoreline conditions by creating benches along levees (CM6), creating shallow margin and  
39 floodplain habitat (CM5), and increasing shoreline vegetation (CM7), all of which would likely  
40 contribute to the formation of sandbars along Delta river channels where these measures would be  
41 implemented. Increasing the structural diversity of Delta river channel margins would create areas  
42 of slow water that would allow for sand to be deposited and for sandbars to subsequently form.  
43 Three other factors are relevant to effects on Sacramento and Antioch Dunes anthonid beetles.

- 44 ● The actual extent of suitable and occupied habitat for these species in the plan is unknown.

- 1     • The sandbar habitat occupied by Sacramento anthicid beetle along the San Joaquin River would  
2       likely not be directly impacted where floodplain restoration occurs because the physical  
3       disturbance would be to adjacent levees and agricultural areas. Though these actions would  
4       change hydrologic conditions that could overtime remove the existing sandbars, the expanded  
5       floodplain would create conditions suitable for the formation of new and possibly larger  
6       sandbars.
- 7     • Floodplain restoration would be phased over a period of 30 years so that not all sandbar habitat  
8       within these areas would be affected at once. Furthermore, as floodplain restoration is being  
9       implemented new sandbar habitat would likely be forming prior and/or concurrent with future  
10      floodplain restoration projects that may affect sandbar habitat on the San Joaquin River and/or  
11      Paradise Cut.

12     **NEPA Effects:** The potential impacts on Sacramento and Antioch Dunes anthicid beetles associated  
13      with Alternative 1C as a whole would represent an adverse effect as a result of habitat modification  
14      of a special-status species and potential for direct mortality in the absence of other conservation  
15      actions. However, with implementation of restoration associated with CM5, CM6, and CM7, which  
16      would be phased throughout the time period when the impacts would be occurring, the effects of  
17      Alternative 1C as a whole on Sacramento and Antioch Dunes anthicid beetles would not be adverse  
18      under NEPA.

19     **CEQA Conclusion:** Alternative 1C would impact Sacramento and Antioch Dunes anthicid beetle  
20      habitat and could impact seven occurrences of Sacramento anthicid beetle and one occurrence of  
21      Antioch Dunes anthicid beetle. However, over the term of the BDCP, implementation of conservation  
22      components would likely benefit Sacramento and Antioch Dunes anthicid beetles. BDCP  
23      conservation components, particularly conservation measures CM5, CM6, and CM7, would generally  
24      contribute to the formation of sandbar habitat in the Plan Area. Floodplain restoration (CM5) would  
25      be phased over a period of 30 years so that not all sandbar habitat within these areas would be  
26      affected at once. Furthermore, as floodplain restoration is being implemented new sandbar habitat  
27      would likely be forming prior and/or concurrent with future floodplain restoration projects that  
28      may affect sandbar habitat on the San Joaquin River and/or Paradise Cut.

29     Considering that floodplain (CM5), channel margin enhancement (CM6), and riparian restoration  
30      (CM7) would contribute to the replacement of and possible expansion of sandbar habitat in the  
31      Delta and be phased throughout the time period when the impacts would be occurring, the  
32      implementation of Alternative 1C as a whole would not result in a substantial adverse effect though  
33      habitat modification and would not substantially reduce the number or restrict the range of these  
34      species. Therefore, the alternative would have a less-than significant impact on Sacramento and  
35      Antioch Dunes anthicid beetle.

### 36     **Delta Green Ground Beetle**

37     Suitable habitat for delta green ground beetle in the study area would be vernal pool complexes and  
38      annual grasslands in the general Jepson Prairie area. The construction, and operations and  
39      maintenance of the water conveyance facilities under Alternative 1C would not affect delta green  
40      ground beetle because the facilities and construction area are outside the known range of the  
41      species. Implementation of Alternative 1C could affect delta green ground beetle through the  
42      protection of grasslands and vernal pool complex (CM3) in the vicinity of Jepson Prairie and the  
43      subsequent implementation of habitat enhancement and management actions and recreational trail  
44      construction (CM11) in these areas. In addition, tidal natural communities restoration (CM4) could

1 result in potential impacts on delta green ground beetle and its habitat. Full implementation of  
2 Alternative 1C would likely result in beneficial effects on delta green ground beetle through the  
3 following conservation actions.

- 4 • Protect 2,000 acres of grassland in CZ 1 (Objective GNC1.1, associated with CM3).
- 5 • Protect 600 acres of vernal pool complex in CZs 1, 8, and 11 (Objective VPNC1.1, associated with  
6 CM3).
- 7 • Restore up to 67 acres of vernal pool complex in CZs 1, 8, and/or 11 (Objective VPNC1.2,  
8 associated with CM9).

9 These areas could contain currently occupied habitat for delta green ground beetle and/or create  
10 conditions suitable for eventual range expansion. As explained below, potential impacts on delta  
11 green ground beetle would be adverse for NEPA purposes and would be significant for CEQA  
12 purposes. Mitigation Measure BIO-42, *Avoid Impacts on Delta Green Ground Beetle and its Habitat*,  
13 would reduce the effects under NEPA and reduce the impacts to a less-than-significant level under  
14 CEQA.

15 **Table 12-1C-18. Changes in Delta Green Ground Beetle Habitat Associated with Alternative 1C**  
16 **(acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1		0	0	0	0	NA	NA
		0	0	0	0	NA	NA
<b>Total Impacts CM1</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>NA</b>	<b>NA</b>
CM2-CM18		0	0	0	0	0	0
		0	0	0	0	0	0
<b>Total Impacts CM2-CM18</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>TOTAL IMPACTS</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

<sup>a</sup> See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only.

NT = near-term

LLT = late long-term

NA = not applicable

17  
18 **Impact BIO-42: Loss or Conversion of Habitat for and Direct Mortality of Delta Green Ground**  
19 **Beetle**

20 Alternative 1C conservation measures could result in the conversion of habitat and/or direct  
21 mortality to delta green ground beetle. Conservation measure that could affect delta green ground  
22 beetle include tidal natural communities habitat restoration (CM4) and habitat enhancement and

1 management activities (CM11) in CZ 1. CZ 1 is the only portion of the Plan Area that contains  
2 occupied and potential habitat for delta green ground beetle. The range of the delta green ground  
3 beetle is currently believed to be generally bound by Travis Air Force Base to the west, SR 113 to the  
4 east, Hay Road to the north, and Creed Road to the south (Arnold and Kavanaugh 2007; U.S. Fish and  
5 Wildlife Service 2009). Further discussion of this potential effect is provided below, and NEPA and  
6 CEQA conclusions follow.

- 7 • *CM4 Tidal Natural Communities Restoration:* Tidal restoration in the Cache Slough ROA could  
8 result in the loss of delta green ground beetle habitat if restoration is planned in areas known to  
9 be or potentially occupied by the species. CM4 identifies 5,000 acres of freshwater tidal natural  
10 communities restoration in the Cache Slough ROA and Lindsey Slough and Calhoun Cut have  
11 been identified as areas suitable for restoration. Lindsey Slough is just west of Jepson Prairie  
12 and Calhoun Cut, which is off of Lindsey Slough (see Figure 12-1), goes into the general Jepson  
13 Prairie area and is adjacent to areas of potential habitat for delta green ground beetle. The tidal  
14 restoration methods and techniques identified in CM4 (see BDCP Chapter 3, Section 3.4.4.3.3)  
15 include excavating channels; modifying ditches, cuts, and levees to encourage tidal circulation;  
16 and scalping higher elevation areas to create marsh plains. These disturbances could affect  
17 delta green ground beetle through habitat modification, either directly or indirectly through  
18 hydrologic modifications, and/or result in direct mortality to the species. No CNDDB records for  
19 delta green ground beetle are intersected by the hypothetical tidal restoration footprints being  
20 used by the BDCP.
- 21 • *CM11 Natural Communities Enhancement and Management:* As described in *CM3 Natural*  
22 *Communities Protection and Restoration*, up to 2,000 acres of grasslands would be protected in  
23 CZ 1 and a portion of the 600 acres of protection and possibly some of the up to 10 wetted acres  
24 of vernal pool restoration could also occur in CZ 1. Potential effects from CM11 could include  
25 direct mortality to larvae and adults from the implementation of grassland management  
26 techniques, which may include livestock grazing, prescribed burning, and mowing. In addition to  
27 these grassland and vernal pool complex management actions, CM11 also includes guidelines  
28 and techniques for invasive plant control, which may include manual control (hand-pulling and  
29 digging), mechanical control (large equipment), and chemical control, though some of these  
30 methods would be restricted in areas where rare plants occur or in critical habitat for vernal  
31 pool species. The creation of new recreation trails as part of CM11 would result in impacts on  
32 15.5 acres of grasslands within CZ 1, which could affect delta green ground beetle if present.

33 **NEPA Effects:** The protection of 2,000 acres of grassland in CZ 1 (CM3) and the protection of 600  
34 acres of vernal pool complex and up 10 wetted acres of vernal pool complex restoration, some of  
35 which could occur in CZ 1 (CM3 and CM9) could benefit delta green ground beetle if these areas  
36 occur within the range of the species. The management of these grasslands and vernal pool  
37 complexes according to *CM11 Natural Communities Enhancement and Management* and the  
38 construction of recreational trails in CZ 1 has a potential to affect this species. AMM37 would ensure  
39 that new trails in vernal pool complexes be sited at least 250 feet from wetland features, or closer if  
40 site-specific information indicates that local watershed surrounding a vernal pools is not adversely  
41 affected. Direct mortality and/or the affects to delta green ground beetle habitat would be an  
42 adverse effect under NEPA. Implementation of Mitigation Measure BIO-42 would reduce this effect.

43 **CEQA Conclusion:** The implementation of grassland and vernal pool complex protection (CM3), tidal  
44 natural communities restoration (CM4), vernal pool restoration (CM9), and recreational trail  
45 construction and subsequent enhancement and management actions (CM11) could impact delta

1 green ground beetle. Tidal restoration projects around Calhoun Cut and possible Lindsey Slough  
2 could affect habitat and result in direct mortality to the species from excavating channels; modifying  
3 ditches, cuts, and levees to encourage tidal circulation; and scalping higher elevation areas to create  
4 marsh plains. Potential impacts from CM11 could include direct mortality to larvae and adults  
5 resulting from the implementation of recreation trail construction in 15.5 acres of grassland in CZ 1  
6 and from grassland management techniques, which may include livestock grazing, prescribed  
7 burning, and mowing. AMM37 would ensure that new trails in vernal pool complexes be sited at  
8 least 250 feet from wetland features, or closer if site-specific information indicates that local  
9 watershed surrounding a vernal pools is not adversely affected. In addition to these grassland and  
10 vernal pool complex management actions, CM11 also includes guidelines and techniques for  
11 invasive plant control, which may include manual control (hand-pulling and digging), mechanical  
12 control (large equipment), and chemical control, though some of these methods would be restricted  
13 in areas where rare plants occur and in critical habitat for vernal pool species. These actions could  
14 result in adverse effects through habitat modification and a possible reduction in the number of the  
15 species or restrict its range, and therefore result in significant impacts on delta green ground beetle.  
16 Implementation of Mitigation Measure BIO-42 would reduce these potential impacts to a less-than-  
17 significant level.

#### 18 **Mitigation Measure BIO-42: Avoid Impacts on Delta Green Ground Beetle and its Habitat**

19 As part of the design of recreational trails in CZ 1, the development of tidal restoration plans and  
20 site-specific management plans on protected grasslands and vernal pool complexes, and the  
21 possible implementation of vernal pool restoration in the area of Jepson Prairie, BDCP  
22 proponents will implement the following measures to avoid effects on delta green ground  
23 beetle.

- 24 ● If recreational trail construction, or habitat restoration or protection is planned for the lands  
25 adjacent to Calhoun Cut and noncultivated lands on the western side of Lindsey Slough,  
26 these area will be evaluated by a USFWS approved biologist for potential delta green ground  
27 beetle habitat (large playa pools, or other similar aquatic features, with low growing  
28 vegetation or bare soils around the perimeter). The biologist will have previous experience  
29 with identifying suitable habitat requirements for delta green ground beetle.
- 30 ● Any suitable habitat identified by the biologist (with previous experience with delta green  
31 ground beetle) within the species current range will be considered potentially occupied and  
32 all ground disturbing covered activities in these areas will be avoided, which for the Plan  
33 Area is generally the area west of State Route 113.
- 34 ● Any other areas identified as suitable habitat outside of the current range of the species will  
35 be surveyed by a biologist with previous experience in surveying for and identifying delta  
36 green ground beetle. No ground disturbing covered activities will occur in areas identified as  
37 occupied by delta green ground beetle.
- 38 ● Based on the results of the habitat evaluations and surveys, recreational trail construction  
39 plans, and site-specific restoration and management plans will be developed so that they  
40 don't conflict with the recovery goals for delta green ground beetle in the USFWS's 2005  
41 Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon (U.S. Fish and  
42 Wildlife Service 2005). Plans will include measures to protect and manage for delta green  
43 ground beetle so that they continue to support existing populations or allow for future  
44 colonization.

1 **Callippe Silverspot Butterfly**

2 Suitable habitats for callippe silverspot butterfly are typically in areas influenced by coastal fog with  
3 hilltops that support the species' host-plant, Johnny jump-ups. Preferred nectar flowers used by  
4 adults include thistles, blessed milk thistle, and coyote wild mint. Other native nectar sources  
5 include hairy false goldeneaster, coast buckwheat, mourning bride, and California buckeye. The  
6 construction, and operations and maintenance of the water conveyance facilities under Alternative  
7 1C would not result in impacts on callippe silverspot butterfly or its habitat. If Cordelia Hills and  
8 Potrero Hills are identified for grassland protection opportunities as part of *CM3 Natural*  
9 *Communities Protection and Restoration*, the subsequent implementation of *CM11 Natural*  
10 *Communities Enhancement and Management* could affect callippe silverspot butterfly. Callippe  
11 silverspot butterfly has been documented in the western most portion of the Plan Area (CZ 11) in  
12 the Cordelia Hills (Solano County Water Agency 2009). Potential habitat for the species (grassy hills  
13 with *Viola pedunculata*) is present in the Potrero Hills, but it has not been observed there (EDAW  
14 2005, California Department of Fish and Wildlife 2013). Though CZ 11 has been identified as  
15 potential area for grassland restoration in *CM8 Grassland Natural Community Restoration*, the  
16 primary goal there is to restore small patches of grassland to connect to Jepson Prairie and/or the  
17 restoration of upland grasses adjacent to tidal brackish emergent wetland in Suisun Marsh, both of  
18 which would not be areas suitable for callippe silverspot butterfly. The full implementation  
19 Alternative 1C would protect up to 2,000 acres of grassland in CZ 11 (Objective GNC1.1, associated  
20 with CM3), some of which may contain habitat for callippe silverspot butterfly. As explained below,  
21 potential impacts on callippe silverspot would be adverse for NEPA purposes and would be  
22 significant for CEQA purposes. Mitigation Measure BIO-43, *Avoid and Minimize Loss of Callippe*  
23 *Silverspot Butterfly Habitat*, would reduce the effects under NEPA and reduce the impacts to a less-  
24 than-significant level under CEQA.

1 **Table 12-1C-19. Changes in Callippe Silverspot Butterfly Habitat Associated with Alternative 1C**  
2 **(acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1		0	0	0	0	NA	NA
		0	0	0	0	NA	NA
<b>Total Impacts CM1</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>NA</b>	<b>NA</b>
CM2–CM18		0	0	0	0	0	0
		0	0	0	0	0	0
<b>Total Impacts CM2–CM18</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>TOTAL IMPACTS</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

<sup>a</sup> See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only.

<sup>e</sup> Restored/created and protected habitat acreages represent planned conservation activities that would be implemented over the lifetime of the BDCP (see BDCP Chapter 3, *Conservation Strategy*, for specifics).

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-43: Loss or Conversion of Habitat for and Direct Mortality of Callippe Silverspot**  
5 **Butterfly**

6 Alternative 1C conservation measures could result in the conversion of habitat and/or direct  
7 mortality to callippe silverspot butterfly. Only one conservation measure was identified as  
8 potentially affecting callippe silverspot butterfly, *CM11 Natural Communities Enhancement and*  
9 *Management*, which could result in the disturbance of callippe silverspot butterfly habitat if such  
10 areas are acquired as part of grassland protection under *CM3 Natural Communities Protection and*  
11 *Restoration*. Further discussion of this potential effect is provided below and NEPA and CEQA  
12 conclusions follow.

- 13 • *CM11 Natural Communities Enhancement and Management*: As described in *CM3 Natural*  
14 *Communities Protection and Restoration*, up to 2,000 acres of grasslands would be protected in  
15 CZ 11. If areas chosen for protection include Cordelia Hills or Potrero Hills, where there is  
16 known and potential habitat, respectively, then grassland enhancement and management  
17 actions could affect the callippe silverspot butterfly. Potential effects from CM11 could include  
18 the loss of larval host and nectar sources and direct mortality to larvae and adults from the  
19 installation of artificial nesting burrows and structures and the implementation of grassland  
20 management techniques, which may include livestock grazing, prescribed burning, and mowing.  
21 In addition to these grassland management actions, CM11 also includes guidelines and  
22 techniques for invasive plant control, which may include manual control (hand-pulling and

1 digging), mechanical control (large equipment), and chemical control. Several of the preferred  
2 nectar sources are thistles, some of which have been identified by the California Invasive Plant  
3 Council as having limited to moderate ecological impacts (California Invasive Plant Council  
4 2006).

5 **NEPA Effects:** The protection of 2,000 acres of grassland within CZ 11 could benefit callippe  
6 silverspot butterfly if these protected areas include occupied and potential habitat on the hill tops in  
7 Cordelia Hills and Potrero Hills. The management of these grasslands according to *CM11 Natural*  
8 *Communities Enhancement and Management* has potential to adversely affect this species. Direct  
9 mortality and/or the removal of larval host plants and nectar sources for adults would be an adverse  
10 effect under NEPA. Implementation of Mitigation Measure BIO-43, *Avoid and Minimize Loss of*  
11 *Callippe Silverspot Butterfly Habitat*, would ensure the effect is not adverse.

12 **CEQA Conclusion:** If grasslands within the Cordelia Hills and Potrero Hills are protected as part of  
13 *CM3 Natural Communities Protection and Restoration* then the subsequent management of these  
14 grasslands according to *CM11 Natural Communities Enhancement and Management* has affect this  
15 species. Potential impacts from CM11 could include the loss of larval host and nectar sources and  
16 direct mortality to larvae and adults resulting from the installation of artificial nesting burrows and  
17 structures and the implementation of grassland management techniques, which may include  
18 livestock grazing, prescribed burning, and mowing. In addition to these grassland management  
19 actions, CM11 also includes guidelines and techniques for invasive plant control, which may include  
20 manual control (hand-pulling and digging), mechanical control (large equipment), and chemical  
21 control, which could result in direct and indirect effects on larval host plants and nectar plants.  
22 These actions could result in adverse effects through habitat modification and a possible reduction  
23 in the number of the species or restrict its range and would therefore result in significant impacts on  
24 the species under CEQA. However, over the term of BDCP callippe silverspot butterfly could benefit  
25 from the protection of occupied and potential habitat for the species with the implementation of  
26 Mitigation Measure BIO-43, which would avoid and minimize effects from management actions and  
27 thus reduce the potential impacts on a less-than-significant level.

#### 28 **Mitigation Measures BIO-43: Avoid and Minimize Loss of Callippe Silverspot Butterfly** 29 **Habitat**

30 As part of the development of site-specific management plans on protected grasslands in the  
31 Cordelia Hills and/or Potrero Hills, BDCP proponents will implement the following measures to  
32 avoid and minimize the loss of callippe silverspot habitat.

- 33 • Hilltops in Cordelia Hills and Potrero Hills will be surveyed for callippe silverspot larval host  
34 plants (Johnny jump-ups) by a biologist familiar with identifying this plant species. These  
35 surveys should occur during the plant's blooming period (typically early January through  
36 April)
- 37 • If larval host plants are present, then presence/absence surveys for callippe silverspot  
38 butterfly larvae will be conducted according to the most recent USFWS approved survey  
39 methods by a biologist with previous experience in surveying for and identifying callippe  
40 larvae and/or signs of larval presence. These surveys should be conducted prior to the adult  
41 flight season, which usually starts in mid-May.
- 42 • If larvae are detected then no further surveys are necessary. If larvae are not detected then  
43 surveys for adults will be conducted by a biologist familiar with surveying for and

1 identifying callippe silverspot. Surveys typically start in mid-May and continue weekly for 8  
2 to 10 weeks.

- 3 • If callippe silverspot butterflies are detected, then the site-specific management plans will  
4 be written to include measures to protect and manage for larval host plants and nectar  
5 sources so that they continue to support existing populations and/or allow for future  
6 colonization. Mapping of both larval host plants and nectar sources will be incorporated into  
7 the management plans.

### 8 **California Red-Legged Frog**

9 Modeled California red-legged frog habitat in the study area is restricted to freshwater aquatic and  
10 grassland habitat, and immediately adjacent cultivated lands along the study area's southwestern  
11 edge in CZ 7, CZ 8, CZ 9, and CZ 11. Pools in perennial and seasonal streams and stock ponds provide  
12 potential aquatic habitat for this species. While stock ponds are underrepresented as a modeled  
13 habitat, none is expected to be affected by BDCP actions. Construction and restoration associated  
14 with Alternative 1C conservation measures would result in both temporary and permanent losses of  
15 California red-legged frog modeled habitat as indicated in Table 12-1C-20. Factors considered in  
16 assessing the value of affected habitat for the California red-legged frog, to the extent that  
17 information is available, are presence of limiting habitat (aquatic breeding habitat), known  
18 occurrences and clusters of occurrences, proximity of the affected habitat to existing protected  
19 lands, and the overall degraded or fragmented nature of the habitat. The study area represents the  
20 extreme eastern edge of the species' coastal range, and species' occurrences are reported only from  
21 CZ 8 and CZ 11. Full implementation of Alternative 1C would also include the following biological  
22 objectives over the term of the BDCP to benefit the California red-legged frog (BDCP Chapter 3,  
23 *Conservation Strategy*).

- 24 • Increase native species diversity and relative cover of native plant species, and reduce the  
25 introduction and proliferation of nonnative species (Objective L2.6, associated with CM11,  
26 CM13, and CM20).
- 27 • Protect 8,000 acres of grassland (Objective GNC1.1, associated with CM3).
- 28 • Protect stock ponds and other aquatic features within protected grasslands to provide aquatic  
29 breeding habitat for native amphibians and aquatic reptiles (Objective GNC1.3, associated with  
30 CM3)
- 31 • Increase burrow availability for burrow-dependent species (Objective GNC2.3, associated with  
32 CM11).
- 33 • Maintain and enhance aquatic features in grasslands to provide suitable inundation depth and  
34 duration and suitable composition of vegetative cover to support breeding for covered  
35 amphibian and aquatic reptile species (Objective GNC2.5, associated with CM11).

36 As explained below, with the restoration and protection of these amounts of habitat, in addition to  
37 implementation of AMMs, impacts on California red-legged frog would not be adverse for NEPA  
38 purposes and would be less than significant for CEQA purposes.

1 **Table 12-1C-20. Changes in California Red-Legged Frog Modeled Habitat Associated with**  
2 **Alternative 1C (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	Aquatic	1	1	1	1	NA	NA
	Upland	61	61	10	10	NA	NA
<b>Total Impacts CM1</b>		<b>62</b>	<b>62</b>	<b>11</b>	<b>11</b>	<b>NA</b>	<b>NA</b>
CM2-CM18	Aquatic	0	0	0	0	0	0
	Upland	8	24	0	0	0	0
<b>Total Impacts CM2-CM18</b>		<b>8</b>	<b>24</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>TOTAL IMPACTS</b>		<b>70</b>	<b>86</b>	<b>11</b>	<b>11</b>	<b>0</b>	<b>0</b>

<sup>a</sup> See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only.

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-44: Loss or Conversion of Habitat for and Direct Mortality of California Red-**  
5 **Legged Frog**

6 Alternative 1C conservation measures would result in the permanent and temporary loss combined  
7 of up to 2 acres of modeled aquatic habitat and 95 acres of modeled upland habitat for California  
8 red-legged frog (Table 12-1C-20). There is one California red-legged frog occurrence that overlap  
9 with the Plan footprint. Conservation measures that would result in these losses are conveyance  
10 facilities and transmission line construction (CM1) and recreational facility construction for CM11.  
11 Construction activities associated with the water conveyance facilities and recreational facilities,  
12 including operation of construction equipment, could result in temporary effects on, as well as  
13 injury and mortality of, California red-legged frogs. In addition, natural enhancement and  
14 management activities (CM11), which include ground disturbance or removal of nonnative  
15 vegetation, could result in local adverse habitat effects. In addition, maintenance activities  
16 associated with the long-term operation of the water conveyance facilities and other BDCP physical  
17 facilities could degrade or eliminate California red-legged frog habitat including injury and mortality  
18 of California red-legged frogs. Each of these individual activities is described below. A summary  
19 statement of the combined impacts and NEPA effects and a CEQA conclusion follow the individual  
20 conservation measure discussions.

- 21 • *CM1 Water Facilities and Operation*: Construction of Alternative 1C, including transmission line  
22 construction, would result in the permanent loss of up to 1 acre of aquatic habitat and 61 acres  
23 of upland habitat for California red-legged frog in CZ 8 (Table 12-1C-20). Permanent effects  
24 would be associated with RTM, borrow, and spoils areas, grading, paving, excavating, extension  
25 and installation of cross culverts, installation of structural hardscape, and installation and

1 relocation of utilities. Construction-related effects would temporarily disturb 1 acre of aquatic  
2 habitat and 10 acres of upland habitat for the California red-legged frog (Table 12-1C-20).

- 3 ● *CM11 Natural Communities Enhancement and Management*: Based on the recreation  
4 assumptions described in BDCP Chapter 4, *Covered Activities and Associated Federal Actions*, an  
5 estimated 24 acres of upland cover and dispersal habitat for the California red-legged frog  
6 would be removed as a result of constructing trails and associated recreational facilities. Passive  
7 recreation in the reserve system could result in trampling and disturbance of egg masses in  
8 water bodies, degradation of water quality through erosion and sedimentation, and trampling of  
9 sites adjacent to upland habitat used for cover and movement. However, *AMM37 Recreation*  
10 requires protection of water bodies from recreational activities and requires trail setbacks from  
11 wetlands. With these restrictions, recreation related effects on California red-legged frog are  
12 expected to be minimal.

13 Activities associated with natural community enhancement and management in protected  
14 California red-legged frog habitat, such as ground disturbance or herbicide use to control  
15 nonnative vegetation, could result in local adverse habitat effects on, and injury or mortality of,  
16 California red-legged frogs. These effects would be avoided and minimized with implementation  
17 of the AMMs discussed below. Herbicides would only be used in California red-legged frog  
18 habitat in accordance with the written recommendation of a licensed, registered pest control  
19 advisor and in conformance with label precautions and federal, state, and local regulations in a  
20 manner that avoids or minimizes harm to the California red-legged frog.

- 21 ● *Critical habitat*: Several conservation measures would be implemented in California red-legged  
22 frog habitat and designated critical habitat in CZ 8 and CZ 11. Approximately 2,460 acres of  
23 designated critical habitat for the California red-legged frog overlaps with the study area along  
24 the western edge of CZ 11 in critical habitat unit SOL-1. An additional 862 acres of designated  
25 critical habitat is also present along the western edge of CZ 8 in critical habitat unit ALA-2.  
26 Conservation actions to protect and enhance grassland habitat for covered species, including  
27 California red-legged frog, in CZ 8 could include acquisition and enhancement of designated  
28 critical habitat for the California red-legged frog and California tiger salamander. Any habitat  
29 enhancement actions for these species in designated critical habitat are expected to enhance the  
30 value of any affected designated critical habitat for conservation of California red-legged frog.  
31 These actions would result in an overall benefit to California red-legged frog within the study  
32 area through protection and management of grasslands with associated intermittent stream  
33 habitat and through restoration of vernal pool complex habitat and its associated grassland  
34 habitat.
- 35 ● *Operations and maintenance*: Ongoing water conveyance facilities operation and maintenance is  
36 expected to have little if any adverse effect on the California red-legged frog. Postconstruction  
37 operation and maintenance of the above-ground water conveyance facilities could result in  
38 ongoing but periodic postconstruction disturbances that could affect California red-legged frog  
39 use of the surrounding habitat. Operation of maintenance equipment, including vehicle use  
40 along transmission corridors in CZ 8, could also result in injury or mortality of California red-  
41 legged frogs if present in work sites. Implementation conservation actions and AMM1–AMM6,  
42 AMM10, AMM14, and AMM37, described below, would reduce these effects.
- 43 ● *Injury and direct mortality*: Construction activities associated with the water conveyance  
44 facilities, vernal pool complex restoration, and habitat and management enhancement-related  
45 activities, including operation of construction equipment, could result in injury or mortality of

1 California red-legged frogs. Breeding, foraging, dispersal, and overwintering behavior may be  
2 altered during construction activities, resulting in injury or mortality of California red-legged  
3 frog. Frogs occupying burrows could be trapped and crushed during ground-disturbing  
4 activities. Degradation and loss of estivation habitat is also anticipated to result from the  
5 removal of vegetative cover and collapsing of burrows. Injury or mortality would be avoided and  
6 minimized through implementation of seasonal constraints and preconstruction surveys in  
7 suitable habitat, collapsing unoccupied burrows, and relocating frogs outside of the construction  
8 area as described in AMM1–AMM6, AMM10, AMM14, and AMM37.

9 The following paragraphs summarize the combined effects discussed above and describe other  
10 BDCP conservation actions that offset or avoid these effects. NEPA effects and a CEQA conclusion are  
11 also included.

### 12 ***Near-Term Timeframe***

13 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
14 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
15 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
16 effects of construction would not be adverse under NEPA.

17 Alternative 1C would permanently remove approximately 2 acres of aquatic habitat and 79 acres of  
18 upland terrestrial cover habitat for California red-legged frog. The effects would result from  
19 construction of the water conveyance facilities (CM1, 73 acres) and recreational facilities (CM11, 8  
20 acres).

21 Typical NEPA project-level mitigation ratios for those natural communities that would be affected  
22 and that are identified in the biological goals and objectives for California's red-legged frog in  
23 Chapter 3 of the BDCP would be 1:1 for restoration and 1:1 for protection of nontidal wetlands and  
24 2:1 for protection of grassland habitats. Using these ratios would indicate that 1 acre of aquatic  
25 habitat should be restored, 1 acre of aquatic habitat should be protected, and 158 acres of grassland  
26 should be protected for California red-legged frog to mitigate the near-term losses.

27 The BDCP has committed to near-term protection of up to 2,000 acres grassland in the Plan Area  
28 (Table 3-4 in Chapter 3). Protection of at least 1,000 acres of grassland in CZ 8, west of Byron  
29 Highway, would benefit California red-legged frog by providing habitat in the portion of the Plan  
30 Area with the highest long-term conservation value for the species based on known species  
31 occurrences and large, contiguous habitat areas (Objective GNC1.1). Consistent with Objective  
32 GNC1.3, ponds and other aquatic features within the grasslands would be protected to provide  
33 aquatic habitat for this species, and surrounding grassland would provide dispersal and aestivation  
34 habitat which would compensate for the loss of 1 acre of aquatic habitat. In addition, aquatic  
35 features in grasslands would be maintained and enhanced to provide suitable inundation depth and  
36 duration to support breeding habitat for covered amphibians (Objective GNC2.5).

37 These conservation actions would occur in the same timeframe as the construction losses, thereby  
38 avoiding adverse effects of habitat loss on California red-legged frog. These Plan objectives  
39 represent performance standards for considering the effectiveness of CM3 protection and  
40 restoration actions. The acres of restoration and protection contained in the near-term Plan goals  
41 and the additional detail in the biological objectives for California red-legged frog satisfy the typical  
42 mitigation that would be applied to the project-level effects of CM1, as well as mitigate the near-  
43 term effects of the other conservation measures.

1 The plan also contains commitments to implement *AMM1 Worker Awareness Training, AMM2*  
2 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*  
3 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
4 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
5 *Material, AMM10 Restoration of Temporarily Affected Natural Communities, AMM14 California Red-*  
6 *Legged Frog, and AMM37 Recreation. These AMMs include elements that avoid or minimize the risk*  
7 *of affecting individuals and species habitats adjacent to work areas and storage sites. The AMMs are*  
8 *described in detail in BDCP Appendix 3.C, Avoidance and Minimization Measures.*

### 9 **Late Long-Term Timeframe**

10 The habitat model indicates that the study area supports approximately 159 acres of aquatic and  
11 7,766 acres of upland habitat for California red-legged frog. Alternative 1C as a whole would result  
12 in the permanent loss of and temporary effects on 2 acres of aquatic habitat and 79 acres of upland  
13 habitat for California red-legged frog for the term of the plan (less than 1% of the total aquatic  
14 habitat in the study area and 2% of the total habitat in the study area). The 2 acres of aquatic habitat  
15 that would be permanently lost is not known to be used for breeding. Most of the California red-  
16 legged frog upland habitat that would be removed consists of naturalized grassland or cultivated  
17 land in a highly disturbed or modified setting on lands immediately adjacent to Clifton Court  
18 Forebay. The removed upland cover and dispersal habitat is within 0.5 mile of a cluster of known  
19 California red-legged frog occurrences to the west. However, this habitat consists mostly of  
20 cultivated lands and small patches of grasslands, and past and current surveys in this area have not  
21 found any evidence that this habitat is being used (Appendix 12C, *2009 to 2011 Bay Delta*  
22 *Conservation Plan EIR/EIS Environmental Data Report*).

23 The BDCP has committed to long-term protection of 8,000 acres grassland in the Plan Area (Table 3-  
24 4 in Chapter 3). Protection of at least 1,000 acres of grassland in CZ 8 west of Byron Highway would  
25 benefit the California red-legged frog by providing habitat in the portion of the study area with the  
26 highest long-term conservation value for the species based on known species occurrences and large,  
27 contiguous habitat areas (Objective GNC1.1). Consistent with Objective GNC1.3, ponds and other  
28 aquatic features in the grasslands would also be protected to provide aquatic habitat for this species,  
29 and the surrounding grassland would provide dispersal and aestivation habitat. Aquatic features in  
30 the protected grasslands in CZ 8 would be maintained and enhanced to provide suitable inundation  
31 depth and duration and suitable composition of vegetative cover to support breeding California red-  
32 legged frogs (Objective GNC2.5). Additionally, livestock exclusion from streams and ponds and other  
33 measures would be implemented as described in CM11 to promote growth of aquatic vegetation  
34 with appropriate cover characteristics favorable to California red-legged frogs. Lands protected in  
35 CZ 8 would connect with lands protected under the *East Contra Costa County HCP/NCCP* and the  
36 extensive Los Vaqueros Watershed lands, including grassland areas supporting this species. This  
37 objective would ensure that California red-legged frog upland and associated aquatic habitats would  
38 be protected and enhanced in the largest possible patch sizes adjacent to occupied habitat within  
39 and adjacent to the Plan Area.

40 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*  
41 *Plant Species*) estimates that the restoration and protection actions discussed above, as well as the  
42 restoration of tidal freshwater emergent wetland, grassland, valley/foothill riparian, and vernal pool  
43 complex that could overlap with the species model, would result in the restoration of 16 acres of  
44 aquatic and 351 acres of upland modeled habitat for California red-legged frog. In addition,  
45 protection of managed wetland, grassland, valley/foothill riparian, and vernal pool complex could

1 overlap with the species model and would result in the protection of 3 acres of aquatic and 1,047  
2 acres of upland California red-legged frog modeled habitat.

3 **NEPA Effects:** In the near-term, the loss of California red-legged frog habitat under Alternative 1C  
4 would be not be adverse because the BDCP has committed to protecting and restoring the acreage  
5 required to meet the typical mitigation ratios described above. In the late long-term, the losses of  
6 California red-legged frog aquatic and upland habitat associated with Alternative 1C, in the absence  
7 of other conservation actions, would represent an adverse effect as a result of habitat modification  
8 and potential direct mortality of a special-status species. However, with habitat protection and  
9 restoration associated with the conservation components, guided by landscape-scale goals and  
10 objectives and by AMM1–AMM6, AMM10, AMM14, and AMM37, the effects of Alternative 1C as a  
11 whole on California red-legged frog would not be adverse.

12 **CEQA Conclusion:**

13 **Near-Term Timeframe**

14 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
15 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
16 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
17 effects of construction would be less than significant under CEQA.

18 Alternative 1C would permanently remove approximately 2 acres of aquatic habitat and 79 acres of  
19 upland terrestrial cover habitat for California red-legged frog. The effects would result from  
20 construction of the water conveyance facilities (CM1, 73 acres) and recreational facilities (CM11, 8  
21 acres).

22 Typical CEQA project-level mitigation ratios for those natural communities that would be affected  
23 and that are identified in the biological goals and objectives for California’s red-legged frog in  
24 Chapter 3 of the BDCP would be 1:1 for restoration and 1:1 for protection of nontidal wetlands and  
25 2:1 for protection of grassland habitats. Using these ratios would indicate that 1 acre of aquatic  
26 habitat should be restored, 1 acre of aquatic habitat should be protected, and 158 acres of grassland  
27 should be protected for California red-legged frog to mitigate the near-term losses.

28 The BDCP has committed to near-term protection of up to 2,000 acres grassland in the Plan Area  
29 (Table 3-4 in Chapter 3). Protection of at least 1,000 acres of grassland in CZ 8, west of Byron  
30 Highway, would benefit California red-legged frog by providing habitat in the portion of the Plan  
31 Area with the highest long-term conservation value for the species based on known species  
32 occurrences and large, contiguous habitat areas (Objective GNC1.1). Consistent with Objective  
33 GNC1.3, ponds and other aquatic features within the grasslands would be protected to provide  
34 aquatic habitat for this species, and surrounding grassland would provide dispersal and aestivation  
35 habitat which would compensate for the loss of 1 acre of aquatic habitat. In addition, aquatic  
36 features in grasslands would be maintained and enhanced to provide suitable inundation depth and  
37 duration to support breeding habitat for covered amphibians (Objective GNC2.5).

38 These conservation actions would occur in the same timeframe as the construction losses, thereby  
39 avoiding adverse effects of habitat loss on California red-legged frog. These Plan objectives  
40 represent performance standards for considering the effectiveness of CM3 protection and  
41 restoration actions. The acres of restoration and protection contained in the near-term Plan goals  
42 and the additional detail in the biological objectives for California red-legged frog satisfy the typical

1 mitigation that would be applied to the project-level effects of CM1, as well as mitigate the near-  
2 term effects of the other conservation measures.

3 The BDCP also contains commitments to implement AMM1-AMM6, AMM10, AMM14, and AMM37.  
4 These AMMs include elements that avoid or minimize the risk of affecting individuals and species  
5 habitats adjacent to work areas and storage sites. The AMMs are described in detail in BDCP  
6 Appendix 3.C, *Avoidance and Minimization Measures*

7 These commitments are more than sufficient to support the conclusion that the near-term effects of  
8 Alternative 1C on California red-legged frog would be less than significant, because the number of  
9 acres required to meet the typical ratios described above would be only 1 acre of aquatic habitat  
10 restored, 1 acre of aquatic habitat protected, and 158 acres of upland communities protected.

### 11 **Late Long-Term Timeframe**

12 The habitat model indicates that the study area supports approximately 159 acres of aquatic and  
13 7,766 acres of upland habitat for California red-legged frog. Alternative 1C as a whole would result  
14 in the permanent loss of and temporary effects on 2 acres of aquatic habitat and 79 acres of upland  
15 habitat for California red-legged frog for the term of the plan (less than 1% of the total aquatic  
16 habitat in the study area and 2% of the total habitat in the study area). The 2 acres of aquatic habitat  
17 that would be permanently lost is not known to be used for breeding. Most of the California red-  
18 legged frog upland habitat that would be removed consists of naturalized grassland or cultivated  
19 land in a highly disturbed or modified setting on lands immediately adjacent to Clifton Court  
20 Forebay. The removed upland cover and dispersal habitat is within 0.5 mile of a cluster of known  
21 California red-legged frog occurrences to the west. However, this habitat consists mostly of  
22 cultivated lands and small patches of grasslands, and past and current surveys in this area have not  
23 found any evidence that this habitat is being used (Appendix 12C, *2009 to 2011 Bay Delta*  
24 *Conservation Plan EIR/EIS Environmental Data Report*).

25 The BDCP has committed to long-term protection of 8,000 acres grassland in the Plan Area (Table 3-  
26 4 in Chapter 3). Protection of at least 1,000 acres of grassland in CZ 8 west of Byron Highway would  
27 benefit the California red-legged frog by providing habitat in the portion of the study area with the  
28 highest long-term conservation value for the species based on known species occurrences and large,  
29 contiguous habitat areas (Objective GNC1.1). Consistent with Objective GNC1.3, ponds and other  
30 aquatic features in the grasslands would also be protected to provide aquatic habitat for this species,  
31 and the surrounding grassland would provide dispersal and aestivation habitat. Aquatic features in  
32 the protected grasslands in CZ 8 would be maintained and enhanced to provide suitable inundation  
33 depth and duration and suitable composition of vegetative cover to support breeding California red-  
34 legged frogs (Objective GNC2.5). Additionally, livestock exclusion from streams and ponds and other  
35 measures would be implemented as described in CM11 to promote growth of aquatic vegetation  
36 with appropriate cover characteristics favorable to California red-legged frogs. Lands protected in  
37 CZ 8 would connect with lands protected under the *East Contra Costa County HCP/NCCP* and the  
38 extensive Los Vaqueros Watershed lands, including grassland areas supporting this species. This  
39 objective would ensure that California red-legged frog upland and associated aquatic habitats would  
40 be protected and enhanced in the largest possible patch sizes adjacent to occupied habitat within  
41 and adjacent to the Plan Area.

42 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*  
43 *Plant Species*) estimates that the restoration and protection actions discussed above, as well as the  
44 restoration of tidal freshwater emergent wetland, grassland, valley/foothill riparian, and vernal pool

1 complex that could overlap with the species model, would result in the restoration of 16 acres of  
2 aquatic and 351 acres of upland modeled habitat for California red-legged frog. In addition,  
3 protection of managed wetland, grassland, valley/foothill riparian, and vernal pool complex could  
4 overlap with the species model and would result in the protection of 3 acres of aquatic and 1,047  
5 acres of upland California red-legged frog modeled habitat.

6 In the absence of other conservation actions, the losses of California red-legged frog aquatic and  
7 upland habitat associated with Alternative 1C would represent an adverse effect as a result of  
8 habitat modification and potential direct mortality of a special-status species. However, with habitat  
9 protection and restoration associated with the conservation components, guided by landscape-scale  
10 goals and objectives and by AMM1–AMM6, AMM10, AMM14, and AMM37, the effects of Alternative  
11 1C would have a less-than-significant impact on California red-legged frog.

#### 12 **Impact BIO-45: Indirect Effects of Plan Implementation on California Red-Legged Frog**

13 Noise and visual disturbance outside the project footprint but within 500 feet of construction  
14 activities are indirect effects that could temporarily affect the use of California red-legged frog  
15 habitat, all of which is upland cover and dispersal habitat. The areas to be affected are near Clifton  
16 Court Forebay, and no California red-legged frogs were detected during recent surveys conducted in  
17 this area (Appendix 12C, *2009 to 2011 Bay Delta Conservation Plan EIR/EIS Environmental Data*  
18 *Report*).

19 Maintenance and refueling of heavy equipment could result in the inadvertent release of sediment  
20 and hazardous substances into species habitat. Increased sedimentation could reduce the suitability  
21 of California red-legged frog habitat downstream of the construction area by filling in pools and  
22 smothering eggs. Accidental spills of toxic fluids also could result in the subsequent loss of California  
23 red-legged frog if these materials enter the aquatic system. Hydrocarbon and heavy metal pollutants  
24 associated with roadside runoff also have the potential to enter the aquatic system, affecting water  
25 quality and California red-legged frog.

26 Noise and visual disturbance outside the project footprint but within 500 feet of construction  
27 activities are indirect effects that could temporarily affect the use of California red-legged frog  
28 habitat, all of which is upland cover and dispersal habitat. The areas to be affected are near Clifton  
29 Court Forebay, and no California red-legged frogs were detected during recent surveys conducted in  
30 this area (Appendix 12C, *2009 to 2011 Bay Delta Conservation Plan EIR/EIS Environmental Data*  
31 *Report*).

32 **NEPA Effects:** Implementation of AMM1–AMM6, AMM10, AMM14, and AMM37 as part of  
33 implementing Alternative 1C would avoid the potential for substantial adverse effects on California  
34 red-legged frogs, either indirectly or through habitat modifications. These AMMs would also avoid  
35 and minimize effects that could substantially reduce the number of California red-legged frogs, or  
36 restrict the species' range. Therefore, the indirect effects of Alternative 1C would not have an  
37 adverse effect on California red-legged frog.

38 **CEQA Conclusion:** Indirect effects from conservation measure operations and maintenance, as well  
39 as construction-related noise and visual disturbances, could impact California red-legged frog in  
40 aquatic and upland habitats. The use of mechanical equipment during construction could cause the  
41 accidental release of petroleum or other contaminants that could impact California red-legged frog  
42 or its prey. The inadvertent discharge of sediment or excessive dust adjacent to California red-  
43 legged frog habitat could also have a negative impact on the species or its prey. With

1 implementation of AMM1–AMM6, AMM10, AMM14, and AMM37, construction, operation, and  
2 maintenance under Alternative 1C would avoid the potential for substantial adverse effects on  
3 California red-legged frog, either indirectly or through habitat modifications, and would not result in  
4 a substantial reduction in numbers or a restriction in the range of California red-legged frogs. The  
5 indirect effects of BDCP Alternative 1C would have a less-than-significant impact on California red-  
6 legged frogs.

### 7 **California Tiger Salamander**

8 Modeled California tiger salamander habitat in the study area contains two habitat types: terrestrial  
9 cover and aestivation habitat, and aquatic breeding habitat and is restricted to CZ 1, CZ 2, CZ 4, CZ 5,  
10 CZ 7, CZ 8, and CZ 11 (Figure 12-14). Modeled terrestrial cover and aestivation habitat contains all  
11 grassland types and alkali seasonal wetland with a minimum patch size of 100 acres and within a  
12 geographic area defined by species records and areas most likely to support the species. Patches of  
13 grassland that were below the 100-acre minimum patch size but were contiguous with grasslands  
14 outside of the study area boundary were included. Modeled aquatic breeding habitat for the  
15 California tiger salamander includes vernal pools and seasonal and perennial ponds.

16 Factors considered in assessing the value of affected habitat for California tiger salamander, to the  
17 extent that information is available, include presence of limiting habitat (aquatic breeding habitat),  
18 known occurrences and clusters of occurrences, proximity of the affected habitat to existing  
19 protected lands, and the overall degraded or fragmented nature of the habitat. While conservation  
20 measures implemented in other CZs could have potential effects on California tiger salamander,  
21 those activities in CZ 8 and CZ 11 are considered to have a proportionately larger effect due to their  
22 closer proximity to known occurrences of the species.

23 Alternative 1C is expected to result in the temporary, permanent, and periodic removal of upland  
24 habitat that California tiger salamander uses for cover and dispersal (Table 12-1C-21). While stock  
25 ponds are underrepresented as a modeled habitat, none is expected to be affected by BDCP actions.  
26 Full implementation of Alternative 1C would also include the following biological objectives over the  
27 term of the BDCP to benefit the California tiger salamander (BDCP Chapter 3, *Conservation Strategy*).

- 28 ● Increase the size and connectivity of the reserve system by acquiring lands adjacent to and  
29 between existing conservation lands (Objective L1.6, associated with CM3).
- 30 ● Increase native species diversity and relative cover of native plant species, and reduce the  
31 introduction and proliferation of nonnative species (Objective L2.6, associated with CM11).
- 32 ● Protect and improve habitat linkages that allow terrestrial covered and other native species to  
33 move between protected habitats within and adjacent to the Plan Area (Objective L3.1,  
34 associated with CM3, CM8, and CM11).
- 35 ● Protect 150 acres of alkali seasonal wetland in CZ 1, CZ 8, and CZ 11 among a mosaic of protected  
36 grasslands and vernal pool complex (Objective ASWNC1.1, associated with CM3).
- 37 ● Provide appropriate seasonal flooding characteristics for supporting and sustaining alkali  
38 seasonal wetland species (Objective ASWNC2.1, associated with CM3 and CM11).
- 39 ● Increase burrow availability for burrow-dependent species in grasslands surrounding alkali  
40 seasonal wetlands within restored and protected alkali seasonal wetland complex (Objective  
41 ASWNC2.3, associated with CM11).

- 1       ● Protect 600 acres of existing vernal pool complex in CZ 1, CZ 8, and CZ 11, primarily in core  
2       vernal pool recovery areas identified in the *Recovery Plan for Vernal Pool Ecosystems of*  
3       *California and Southern Oregon* (U.S. Fish and Wildlife Service 2005) (Objective VPNC1.1,  
4       associated with CM3).
- 5       ● Restore vernal pool complex in CZ 1, CZ 8, and CZ 11 to achieve no net loss of vernal pool acreage  
6       (up to 67 acres of vernal pool complex restoration, assuming that all anticipated impacts [10  
7       wetted acres] occur and that the restored vernal pool complex has 15% density of vernal pools)  
8       (Objective VPNC1.2, associated with CM3 and CM9).
- 9       ● Increase the size and connectivity of protected vernal pool complex within the Plan Area and  
10       increase connectivity with protected vernal pool complex adjacent to the Plan Area (Objective  
11       VPNC1.3, associated with CM3).
- 12       ● Protect the range of inundation characteristics that are currently represented by vernal pools  
13       throughout the Plan Area (Objective VPNC1.4, associated with CM3).
- 14       ● Protect 8,000 acres of grassland (Objective GNC1.1, associated with CM3).
- 15       ● Restore 2,000 acres of grasslands to connect fragmented patches of protected (Objective  
16       GNC1.2, associated with CM3 and CM8).
- 17       ● Protect stock ponds and other aquatic features within protected grasslands to provide aquatic  
18       breeding habitat for native amphibians and aquatic reptiles (Objective GNC1.3, associated with  
19       CM3).
- 20       ● Increase burrow availability for burrow-dependent species (Objective GNC2.3, associated with  
21       CM11).
- 22       ● Maintain and enhance aquatic features in grasslands to provide suitable inundation depth and  
23       duration and suitable composition of vegetative cover to support breeding for covered  
24       amphibian and aquatic reptile species (Objective GNC2.5, associated with CM11).

25       As explained below, with the restoration or protection of these amounts of habitat, in addition to the  
26       implementation of AMMs, impacts on California tiger salamander would not be adverse for NEPA  
27       purposes and would be less than significant for CEQA purposes.

1 **Table 12-1C-21. Changes in California Tiger Salamander Modeled Habitat Associated with**  
2 **Alternative 1C (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	Aquatic	2	2	2	2	NA	NA
	Upland	70	70	8	8	NA	NA
<b>Total Impacts CM1</b>		<b>72</b>	<b>72</b>	<b>10</b>	<b>10</b>	<b>NA</b>	<b>NA</b>
CM2-CM18	Aquatic	0	0	0	0	0	0
	Upland	292	634	0	0	191-639	0
<b>Total Impacts CM2-CM18</b>		<b>292</b>	<b>634</b>	<b>0</b>	<b>0</b>	<b>191-639</b>	<b>0</b>
<b>TOTAL IMPACTS</b>		<b>364</b>	<b>706</b>	<b>10</b>	<b>10</b>	<b>191-639</b>	<b>0</b>

<sup>a</sup> See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-46: Loss or Conversion of Habitat for and Direct Mortality of California Tiger**  
5 **Salamander**

6 Alternative 1C conservation measures would result in the permanent and temporary loss combined  
7 of up to 4 acres of modeled aquatic habitat and 712 acres of modeled upland habitat for California  
8 tiger salamander (Table 12-1C-21). There is one California tiger salamander occurrence that  
9 overlaps with the CM1 footprint. Conservation measures that would result in these losses are  
10 conveyance facilities and transmission line construction, and establishment and use of RTM, borrow,  
11 and spoils areas (CM1), Fremont Weir/Yolo Bypass improvements (CM2), tidal natural community  
12 restoration (CM4), construction of recreational facilities (CM11), and construction of a conservation  
13 fish hatchery (CM18). Habitat enhancement and management activities (CM11), which include  
14 ground disturbance or removal of nonnative vegetation, could result in local adverse habitat effects.  
15 In addition, maintenance activities associated with the long-term operation of the water conveyance  
16 facilities and other BDCP physical facilities could degrade or eliminate California tiger salamander  
17 habitat. Each of these individual activities is described below. A summary statement of the combined  
18 impacts and NEPA effects and a CEQA conclusion follow the individual conservation measure  
19 discussions.

- 20 • *CM1 Water Facilities and Operation*: Construction of Alternative 1C conveyance facilities,  
21 including transmission lines, would result in the permanent loss of 2 acres of aquatic habitat and  
22 70 acres of upland habitat for California tiger salamander habitat, primarily in CZ 8 (Table 12-  
23 1C-21). Permanent effects would be associated with RTM, borrow, and spoils areas, grading,  
24 paving, excavating, extension and installation of cross culverts, installation of structural

1 hardscape, and installation and relocation of utilities. Construction-related effects would  
2 temporarily disturb 2 acres of aquatic habitat and 8 acres of upland habitat for the California  
3 tiger salamander (Table 12-1C-21). In addition, there is one California tiger salamander  
4 occurrence just west of Clifton Court Forebay that overlaps with the area of temporary effects.  
5 The area that would be affected by conveyance facilities construction is south of Clifton Court  
6 Forebay, where modeled California tiger salamander habitat is of relatively low value in that it  
7 consists of fragmented patches of primarily terrestrial habitat surrounded by actively cultivated  
8 lands. The highest concentration of California tiger salamander occurrences are in CZ 8 and west  
9 of the conveyance facilities alignment, while lands to the east consist primarily of actively  
10 cultivated lands that are not suitable for the species. Habitat loss in this area is not expected to  
11 contribute to habitat fragmentation or impede important California tiger salamander dispersal.

- 12 ● *CM2 Yolo Bypass Fisheries Enhancement*: Improvements in the Yolo Bypass would result in the  
13 permanent removal of approximately 42 acres of terrestrial cover and aestivation habitat for the  
14 California tiger salamander in the late-longterm. The modeled habitat in the Yolo Bypass is of  
15 low potential for California tiger salamander: There have been no observations of California  
16 tiger salamander in this area based on the results of a number of surveys for vernal pool  
17 invertebrates and plants and the bypass lacks vernal pool complexes with large, deep pools or  
18 large grassland areas with stock ponds and similar aquatic features that hold water long enough  
19 to provide potential breeding habitat for this species.
- 20 ● *CM4 Tidal Natural Communities Restoration*: This activity would result in the permanent  
21 removal of approximately 517 acres of terrestrial cover and aestivation habitat in the study area  
22 in the late longterm. Tidal restoration in the Cache Slough area would result in habitat loss along  
23 the edges of Lindsey Slough and Duck Slough, and adjacent to cultivated land along the eastern  
24 edge of a block of modeled habitat. The modeled aquatic breeding habitat nearby the  
25 hypothetical tidal restoration footprint is of relatively high value, consisting of vernal pool  
26 complex along Lindsey Slough within the Jepson Prairie area in and near open space. The Jepson  
27 Prairie area includes numerous California tiger salamander CNDDDB recorded occurrences and  
28 overlaps with Critical Habitat Unit 2, Jepson Prairie Unit, for this species; however, the  
29 hypothetical tidal restoration footprint does not overlap with critical habitat or recorded  
30 occurrences in this area. The tidal restoration at Lindsey Slough would occur along the  
31 northeastern edge of the Jepson Prairie block of habitat and would not contribute to  
32 fragmentation. Because the estimates of habitat loss resulting from tidal inundation are based  
33 on projections of where restoration may occur, actual effects are expected to be lower because  
34 of the ability to select sites that minimize effects on California tiger salamander.
- 35 ● *CM11 Natural Communities Enhancement and Management*: Based on the recreation  
36 assumptions described in BDCP Chapter 3, *Conservation Strategy*, an estimated 40 acres of  
37 California tiger salamander terrestrial cover and aestivation habitat, primarily in CZ 8, would be  
38 removed in the late long-term as a result of constructing trails and associated recreational  
39 facilities. Passive recreation in the reserve system could result in trampling and disturbance of  
40 eggs and larvae in water bodies, degradation of water quality through erosion and  
41 sedimentation, and trampling of sites adjacent to upland habitat used for cover and movement.  
42 However, *AMM37 Recreation* requires protection of water bodies from recreational activities  
43 and requires trail setbacks from wetlands. With these restrictions, recreation related effects on  
44 California tiger salamander are expected to be minimal.

45 Habitat enhancement- and management-related activities in protected California tiger  
46 salamander habitats would result in overall improvements to and maintenance of California

1 tiger salamander habitat values over the term of the BDCP. Activities associated with natural  
2 community enhancement and management over the term of the BDCP in protected California  
3 tiger salamander habitat, such as ground disturbance or herbicide use to control nonnative  
4 vegetation, could result in local adverse habitat effects and injury or mortality of California tiger  
5 salamander and disturbance effects if individuals are present in work sites. Implementation of  
6 AMM1–AMM6, AMM10, AMM13, and AMM37 would reduce these effects. Herbicides would only  
7 be used in California tiger salamander habitat in accordance with the written recommendation  
8 of a licensed, registered Pest Control Advisor and in conformance with label precautions and  
9 federal, state, and local regulations in a manner that avoids or minimizes harm to the California  
10 tiger salamander.

- 11 ● *CM18 Conservation Hatcheries*: This activity could result in the permanent removal of  
12 approximately 35 acres of terrestrial cover and aestivation habitat for California tiger  
13 salamander in the Yolo Bypass area (CZ 2). The specifications and operations of this facility have  
14 not been developed, although the facility is expected to be constructed near Rio Vista on  
15 cultivated lands in low-value habitat for the species.
- 16 ● *Critical habitat*: Approximately 1,781 acres of designated Critical Habitat Unit 2, Jepson Prairie  
17 Unit, for California tiger salamander overlap the study area in CZ 1. While this area is located  
18 within the Cache Slough Complex, it is not expected to be affected by BDCP tidal habitat  
19 restoration actions. Tidal habitat would be restored approximately 2 miles east of SR 113, with  
20 some restoration taking place along the Barker and Lindsey Slough channels west to  
21 approximately SR 113 and a small amount (0.4 acre) taking place along the Lindsey Slough  
22 Channel west of SR 113 into Critical Habitat Unit 2.
- 23 ● *Operations and maintenance*: Ongoing facilities operation and maintenance is expected to have  
24 little if any adverse effect on the California tiger salamander. Postconstruction operation and  
25 maintenance of the above-ground water conveyance facilities could result in ongoing but  
26 periodic disturbances that could affect California tiger salamander use of the surrounding  
27 habitat. Operation of maintenance equipment, including vehicle use along transmission  
28 corridors in CZ 8, could also result in injury or mortality of California tiger salamanders if  
29 present in work sites. These effects, however, would be minimized with implementation of the  
30 California tiger salamander measures described in AMM1–AMM6, AMM10, AMM13, and  
31 AMM37.
- 32 ● *Injury and direct mortality*: Construction activities associated with the water conveyance  
33 facilities, vernal pool complex restoration, and habitat and management enhancement-related  
34 activities, including operation of construction equipment, could result in injury or mortality of  
35 California tiger salamanders. Foraging, dispersal, and overwintering behavior may be altered  
36 during construction activities, resulting in injury or mortality of California tiger salamander if  
37 the species is present. Salamanders occupying burrows could be trapped and crushed during  
38 ground-disturbing activities. Degradation and loss of estivation habitat is also anticipated to  
39 result from the removal of vegetative cover and collapsing of burrows. Injury or mortality would  
40 be avoided and minimized through implementation of seasonal constraints and preconstruction  
41 surveys in suitable habitat, collapsing unoccupied burrows, and relocating salamanders outside  
42 of the construction area as described in AMM1–AMM6, AMM10, AMM13, and AMM37.

43 The following paragraphs summarize the combined effects discussed above and describe other  
44 BDCP conservation actions that offset or avoid these effects. NEPA effects and CEQA conclusions are  
45 also included.

1       **Near-Term Timeframe**

2       Because the water conveyance facilities construction is being evaluated at the project level, the near-  
3       term BDCP conservation strategy has been evaluated to determine whether it would provide  
4       sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
5       construction effects would not be adverse under NEPA.

6       Alternative 1C would permanently remove approximately 4 acres of aquatic habitat and 370 acres of  
7       upland terrestrial cover habitat for California tiger salamander. The effects would result from  
8       construction of the water conveyance facilities (CM1, 82 acres), Yolo Bypass improvements (CM2, 42  
9       acres), tidal habitat restoration (CM4, 203 acres), construction of recreational facilities (CM11, 12  
10      acres), and construction of conservation hatcheries (CM18, 35 acres).

11      Typical NEPA project-level mitigation ratios of 1:1 for restored and 2:1 for protected nontidal  
12      wetlands (aquatic habitat) and a ratio of 2:1 for protected grassland habitats would indicate that 4  
13      acres of aquatic habitat should be restored and 8 acres of aquatic habitat should be protected. In  
14      addition, 740 acres of grassland should be protected in the near-term for California tiger salamander  
15      to mitigate the near-term losses.

16      The BDCP has committed to near-term restoration of up to 1,140 acres of upland habitat (Objective  
17      GNC1.2) and 40 acres of aquatic habitat and to protection of at least 520 acres of aquatic  
18      habitat (Objective ASWNC1.1 and Objective VPNC1.1) and 2,000 acres of upland habitat (Objective  
19      GNC1.1). The landscape-scale goals and objectives would inform the near-term protection and  
20      restoration efforts. The natural community restoration and protection activities are expected to be  
21      concluded during the first 10 years of Plan implementation, which is close enough in time to the  
22      occurrence of impacts to constitute adequate mitigation for NEPA purposes.

23      In addition, the plan contains commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
24      *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
25      *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
26      *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
27      *Material*, *AMM10 Restoration of Temporarily Affected Natural Communities*, *AMM13 California Tiger*  
28      *Salamander*, and *AMM37 Recreation*. These AMMs include elements that avoid or minimize the risk  
29      of affecting habitats and species adjacent to work areas and storage sites. The AMMs are described  
30      in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

31      **Late Long-Term Timeframe**

32      Based on the habitat model, the study area supports approximately 8,273 acres of aquatic and  
33      29,459 acres of upland modeled habitat for California tiger salamander. Alternative 1C as a whole  
34      would result in the permanent loss of, and temporary effects on, 4 acres of aquatic habitat and 714  
35      acres of upland habitat for California tiger salamander for the term of the plan (less than 3% of the  
36      total upland habitat in the study area). The location of these losses is described above in the  
37      discussions of CM1, CM2, CM4, CM11, and CM18.

38      The BDCP has committed to long-term protection of 8,000 acres grassland in the Plan Area (Table 3-  
39      4 in Chapter 3). Protection of at least 1,000 acres of grassland in CZ 8 west of Byron Highway would  
40      benefit the California tiger salamander by providing habitat in the portion of the study area with the  
41      highest long-term conservation value for the species based on known species occurrences and large,  
42      contiguous habitat areas (Objective GNC1.1). Consistent with Objective GNC1.3, ponds and other  
43      aquatic features in the grasslands would also be protected to provide aquatic habitat for this species,

1 and the surrounding grassland would provide dispersal and aestivation habitat. Aquatic features in  
2 the protected grasslands in CZ 8 would be maintained and enhanced to provide suitable inundation  
3 depth and duration and suitable composition of vegetative cover to support breeding California tiger  
4 salamanders (Objective GNC2.5). Additionally, livestock exclusion from streams and ponds and  
5 other measures would be implemented as described in CM11 to promote growth of aquatic  
6 vegetation with appropriate cover characteristics favorable to California tiger salamanders. Lands  
7 protected in CZ 8 would connect with lands protected under the *East Contra Costa County HCP/NCCP*  
8 and the extensive Los Vaqueros Watershed lands, including grassland areas supporting this species.  
9 This objective would ensure that California tiger salamander upland and associated aquatic habitats  
10 would be protected and enhanced in the largest possible patch sizes adjacent to occupied habitat  
11 within and adjacent to the study area.

12 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*  
13 *Plant Species*) estimates that the restoration and protection actions discussed above, as well as the  
14 restoration of alkali seasonal wetland complex, vernal pool complex, and grassland that could  
15 overlap with the species model, would result in the restoration of 88 acres of aquatic and 598 acres  
16 of upland modeled habitat for California tiger salamander. In addition, protection of alkali seasonal  
17 wetland complex, vernal pool complex, and grassland that could overlap with the species model,  
18 would result in the protection of 750 acres of aquatic and 5,000 acres of upland California tiger  
19 salamander modeled habitat.

20 **NEPA Effects:** In the near-term, the loss of California tiger salamander habitat under Alternative 1C  
21 would be not be adverse because the BDCP has committed to protecting the acreage required to  
22 meet the typical mitigation ratios described above. In the late long-term, the losses of California tiger  
23 salamander upland habitat associated with Alternative 1C, in the absence of other conservation  
24 actions, would represent an adverse effect as a result of habitat modification and potential direct  
25 mortality of a special-status species. However, with habitat protection and restoration associated  
26 with the conservation components, guided by landscape-scale goals and objectives and by AMM1–  
27 AMM6, AMM10, AMM13, and AMM37, the effects of Alternative 1C as a whole on California tiger  
28 salamander would not be adverse.

29 **CEQA Conclusion:**

30 **Near-Term Timeframe**

31 Because the water conveyance facilities construction is being evaluated at the project level, the near-  
32 term BDCP conservation strategy has been evaluated to determine whether it would provide  
33 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
34 construction effects would be less than significant.

35 Alternative 1C would permanently remove approximately 4 acres of aquatic habitat and 370 acres of  
36 upland terrestrial cover habitat for California tiger salamander. The effects would result from  
37 construction of the water conveyance facilities (CM1, 82 acres), Yolo Bypass improvements (CM2, 42  
38 acres), tidal habitat restoration (CM4, 203 acres), construction of recreational facilities (CM11, 12  
39 acres), and construction of conservation hatcheries (CM18, 35 acres).

40 Typical CEQA project-level mitigation ratios of 1:1 for restored and 2:1 for protected nontidal  
41 wetlands (aquatic habitat) and a ratio of 2:1 for protected grassland habitats would indicate that 4  
42 acres of aquatic habitat should be restored and 8 acres of aquatic habitat should be protected. In

1 addition, 740 acres of grassland should be protected in the near-term for California tiger salamander  
2 to mitigate the near-term losses.

3 The BDCP has committed to near-term restoration of up to 1,140 acres of upland habitat (Objective  
4 GNC1.2) and 40 acres of aquatic habitat and to protection of at least 520 acres of aquatic  
5 habitat (Objective ASWNC1.1 and Objective VPNC1.1) and 2,000 acres of upland habitat (Objective  
6 GNC1.1). The landscape-scale goals and objectives would inform the near-term protection and  
7 restoration efforts. The natural community restoration and protection activities are expected to be  
8 concluded during the first 10 years of Plan implementation, which is close enough in time to the  
9 occurrence of impacts to constitute adequate mitigation.

10 In addition, the plan contains commitments to implement AMM1–AMM6, AMM10, AMM13, and  
11 AMM37 which include elements that avoid or minimize the risk of affecting habitats and species  
12 adjacent to work areas and storage sites. The AMMs are described in detail in BDCP Appendix 3.C,  
13 *Avoidance and Minimization Measures*. These commitments are more than sufficient to support the  
14 conclusion that the near-term impacts of Alternative 1C on California tiger salamander would be less  
15 than significant, because the number of acres required to meet the typical ratios described above  
16 would be only 740 acres of upland communities protected.

#### 17 **Late Long-Term Timeframe**

18 Based on the habitat model, the study area supports approximately 8,273 acres of aquatic and  
19 29,459 acres of upland modeled habitat for California tiger salamander. Alternative 1C as a whole  
20 would result in the permanent loss of, and temporary effects on, 4 acres of aquatic habitat and 714  
21 acres of upland habitat for California tiger salamander for the term of the plan (less than 3% of the  
22 total upland habitat in the study area). The location of these losses is described above in the  
23 discussions of CM1, CM2, CM4, CM11, and CM18.

24 The BDCP has committed to long-term protection of 8,000 acres grassland in the Plan Area (Table 3-  
25 4 in Chapter 3). Protection of at least 1,000 acres of grassland in CZ 8 west of Byron Highway would  
26 benefit the California tiger salamander by providing habitat in the portion of the study area with the  
27 highest long-term conservation value for the species based on known species occurrences and large,  
28 contiguous habitat areas (Objective GNC1.1). Consistent with Objective GNC1.3, ponds and other  
29 aquatic features in the grasslands would also be protected to provide aquatic habitat for this species,  
30 and the surrounding grassland would provide dispersal and aestivation habitat. Aquatic features in  
31 the protected grasslands in CZ 8 would be maintained and enhanced to provide suitable inundation  
32 depth and duration and suitable composition of vegetative cover to support breeding California tiger  
33 salamanders (Objective GNC2.5). Additionally, livestock exclusion from streams and ponds and  
34 other measures would be implemented as described in CM11 to promote growth of aquatic  
35 vegetation with appropriate cover characteristics favorable to California tiger salamanders. Lands  
36 protected in CZ 8 would connect with lands protected under the *East Contra Costa County HCP/NCCP*  
37 and the extensive Los Vaqueros Watershed lands, including grassland areas supporting this species.  
38 This objective would ensure that California tiger salamander upland and associated aquatic habitats  
39 would be protected and enhanced in the largest possible patch sizes adjacent to occupied habitat  
40 within and adjacent to the study area.

41 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*  
42 *Plant Species*) estimates that the restoration and protection actions discussed above, as well as the  
43 restoration of alkali seasonal wetland complex, vernal pool complex, and grassland that could  
44 overlap with the species model, would result in the restoration of 88 acres of aquatic and 598 acres

1 of upland modeled habitat for California tiger salamander. In addition, protection of alkali seasonal  
2 wetland complex, vernal pool complex, and grassland that could overlap with the species model,  
3 would result in the protection of 750 acres of aquatic and 5,000 acres of upland California tiger  
4 salamander modeled habitat.

5 In the absence of other conservation actions, the losses of California tiger salamander upland habitat  
6 associated with Alternative 1C would represent an adverse effect as a result of habitat modification  
7 and potential direct mortality of a special-status species. However, with habitat protection and  
8 restoration associated with the conservation components, guided by landscape-scale goals and  
9 objectives and by AMM1–AMM6, AMM10, AMM13, and AMM37, which would be in place throughout  
10 the construction phase, the impacts of Alternative 1C as a whole on California tiger salamander  
11 would be less than significant.

#### 12 **Impact BIO-47: Indirect Effects of Plan Implementation on California Tiger Salamander**

13 Indirect effects could occur outside of the construction footprint but within 500 feet of California  
14 tiger salamander habitat. Activities associated with conservation component construction and  
15 ongoing habitat enhancement, as well as operation and maintenance of above-ground water  
16 conveyance facilities, including the transmission facilities, could result in ongoing but periodic  
17 postconstruction disturbances with localized effects on California tiger salamander and its habitat,  
18 and temporary noise and visual disturbances over the term of the BDCP. Most of the areas indirectly  
19 affected are associated with the construction of Byron Forebay and its borrow and spoil areas in CZ  
20 8.

21 Maintenance and refueling of heavy equipment could result in the inadvertent release of sediment  
22 and hazardous substances into species habitat. Increased sedimentation could reduce the suitability  
23 of California tiger salamander habitat downstream of the construction area by filling in pools and  
24 smothering eggs. Accidental spills of toxic fluids into the aquatic system could result in the  
25 subsequent loss of California tiger salamander habitat. Hydrocarbon and heavy metal pollutants  
26 associated with roadside runoff also have the potential to enter the aquatic system, affecting water  
27 quality and California tiger salamander.

28 **NEPA Effects:** Implementation of AMM1–AMM6, AMM10, AMM13, and AMM37 under Alternative 1C  
29 would avoid or minimize the potential for substantial adverse effects on California tiger  
30 salamanders, either indirectly or through habitat modifications. These AMMs would also avoid and  
31 minimize effects that could substantially reduce the number of California tiger salamanders or  
32 restrict the species' range. Therefore, the indirect effects of Alternative 1C would not have an  
33 adverse effect on California tiger salamander.

34 **CEQA Conclusion:** Indirect effects from conservation measure operations and maintenance as well  
35 as construction-related noise and visual disturbances could impact California tiger salamander in  
36 aquatic and upland habitats. The use of mechanical equipment during construction could cause the  
37 accidental release of petroleum or other contaminants that could impact California tiger salamander  
38 or its prey. The inadvertent discharge of sediment or excessive dust adjacent to California tiger  
39 salamander habitat could also have a negative impact on the species or its prey. With  
40 implementation of AMM1–AMM6, AMM10, AMM13, and AMM37 as part of Alternative 1C, the BDCP  
41 would avoid the potential for substantial adverse effects on California tiger salamander, either  
42 indirectly or through habitat modifications, and would not result in a substantial reduction in  
43 numbers or a restriction in the range of California tiger salamanders. The indirect effects of  
44 Alternative 1C would have a less-than-significant impact on California tiger salamander.

1 **Impact BIO-48: Periodic Effects of Inundation of California Tiger Salamander Habitat as a**  
2 **Result of Implementation of Conservation Components**

3 *CM2 Yolo Bypass Fisheries Enhancement* is the only conservation measure expected to result in  
4 periodic inundation of California tiger salamander habitat. Periodic inundation of Yolo Bypass could  
5 affect from an estimated 191 acres of terrestrial habitat during a notch flow of 1,000 cfs, to an  
6 estimated 639 acres of terrestrial habitat during a notch flow of 4,000 cfs in CZ 1 (Table 12-1C-21).  
7 This effect would only occur during an estimated maximum of 30% of years and in areas that are  
8 already inundated in more than half of all years; therefore, these areas are expected to provide only  
9 marginal terrestrial habitat for the California tiger salamander under Existing Conditions. No aquatic  
10 breeding habitat would be affected (Table 12-1C-21). The modeled habitat in the Yolo Bypass in the  
11 vicinity of terrestrial habitat is of low value in that there are no California tiger salamander records  
12 in this area and the bypass lacks vernal pool complexes with large, deep pools, or large grassland  
13 areas with stock ponds and similar aquatic features that provide the habitat of highest value for this  
14 species. Therefore, the terrestrial habitat to be affected has a small likelihood of supporting  
15 California tiger salamanders, and Yolo Bypass operations are expected to have a minimal effect on  
16 the species, if any.

17 **NEPA Effects:** The effects of periodic inundation from Alternative 1C would not have an adverse  
18 effect on California tiger salamander.

19 **CEQA Conclusion:** Flooding of the Yolo Bypass from Fremont Weir operations would periodically  
20 increase the frequency and duration of inundation of 191–639 acres of terrestrial habitat for  
21 California tiger salamander. Because this area is considered low-value habitat and there are no  
22 California tiger salamander records in the area, and because of the lack of suitable breeding habitat  
23 in this area, the effects of periodic inundation of California tiger salamander habitat from Alternative  
24 1C would have a less-than-significant impact.

25 **Giant Garter Snake**

26 The habitat model used to assess effects for the giant garter snake is based on aquatic habitat and  
27 upland habitat. Modeled aquatic habitat is composed of tidal perennial aquatic (except in Suisun  
28 Marsh), tidal freshwater perennial emergent wetland, nontidal freshwater emergent wetland, and  
29 nontidal perennial aquatic natural communities; rice fields; and artificial canals and ditches.  
30 Modeled upland habitat is composed of all nonwetland and nonaquatic natural communities  
31 (primarily grassland and cropland) within 200 feet of modeled aquatic habitat features. The  
32 modeled upland habitat is ranked as high-, moderate-, or low-value based on giant garter snake  
33 associations between vegetation and cover types (U.S. Fish and Wildlife Service 2012) and historical  
34 and recent occurrence records (Appendix 12C, *2009 to 2011 Bay Delta Conservation Plan EIR/EIS*  
35 *Environmental Data Report*), and presence of features necessary to fulfill the species' life cycle  
36 requirements. Modeled habitat is expressed in acres for aquatic and upland habitats, and in miles for  
37 linear movement corridors in aquatic habitat. Other factors considered in assessing the value of  
38 affected habitat for the giant garter snake, to the extent that information is available, are proximity  
39 to conserved lands and recorded occurrences of the species, proximity to giant garter snake  
40 subpopulations (Yolo Basin/Willow Slough and Coldani Marsh/White Slough) in the study area that  
41 are identified in the draft recovery plan for this species (U.S. Fish and Wildlife Service 1999b), and  
42 contribution to connectivity between giant garter snake subpopulations.

43 Construction and restoration associated with Alternative 1C conservation measures would result in  
44 both temporary and permanent losses of giant garter snake modeled habitat as indicated in Table

1 12-1C-22. The majority of the losses would take place over an extended period of time as tidal  
2 marsh is restored in the study area. Full implementation of Alternative 1C would also include the  
3 following biological objectives over the term of the BDCP to benefit the giant garter snake (BDCP  
4 Chapter 3, *Conservation Strategy*).

- 5 ● Increase native species diversity and relative cover of native plant species, and reduce the  
6 introduction and proliferation of nonnative species (Objective L2.6, associated with CM11).
- 7 ● Within the 65,000 acres of tidal natural communities (L1.3), restore or create 24,000 acres of  
8 tidal freshwater emergent wetland in CZ 1, CZ 2, CZ 4, CZ 5, CZ 6, and/or CZ 7 (Objective  
9 TFEWNC1.1, associated with CM3 and CM4).
- 10 ● Create at least 1,200 acres of nontidal marsh consisting of a mosaic of nontidal perennial aquatic  
11 and nontidal freshwater emergent wetland natural communities, with suitable habitat  
12 characteristics for giant garter snake and western pond turtle (Objective NFEW/NPANC1.1,  
13 associated with CM3 and CM10).
- 14 ● Protect 48,625 acres of cultivated lands that provide suitable habitat for covered and other  
15 native wildlife species (Objective CLNC1.1, associated with CM3 and CM11).
- 16 ● Target cultivated land conservation to provide connectivity between other conservation lands  
17 (Objective CLNC1.2, associated with CM3).
- 18 ● Maintain and protect the small patches of important wildlife habitats associated with cultivated  
19 lands that occur in cultivated lands within the reserve system, including isolated valley oak  
20 trees, trees and shrubs along field borders and roadsides, remnant groves, riparian corridors,  
21 water conveyance channels, grasslands, ponds, and wetlands (Objective CLNC1.3, associated  
22 with CM3 and CM11).
- 23 ● Of the at least 1,200 acres of nontidal marsh created under (Objective NFEW/NPANC1.1), create  
24 600 acres of aquatic habitat giant garter snake aquatic habitat that is connected to the 1,500  
25 acres of rice land or equivalent-value habitat described below in Objective GGS1.4 (Objective  
26 GGS1.1, associated with CM3, CM4, and CM10).
- 27 ● Of the 8,000 acres of grassland protected under Objective GNC1.1 and 2,000 acres restored  
28 under Objective GNC1.2, create or protect 200 acres of high-value upland giant garter snake  
29 habitat adjacent to the at least 600 acres of nontidal perennial habitat being restored and/or  
30 created in CZ 4 and/or CZ 5 (Objective GGS1.2, associated with CM3 and CM8).
- 31 ● Protect giant garter snakes on restored and protected nontidal marsh and adjacent uplands  
32 (Objectives GGS1.1 and GGS1.2) from incidental injury or mortality by establishing 200-foot  
33 buffers between protected giant garter snake habitat and roads (other than those roads  
34 primarily used to support adjacent cultivated lands and levees). Establish giant garter snake  
35 reserves at least 2,500 feet from urban areas or areas zoned for urban development (Objective  
36 GGS1.3, associated with CM3).
- 37 ● Create connections from the White Slough population to other areas in the giant garter snake's  
38 historical range in the Stone Lakes vicinity by protecting, restoring, and/or creating at least  
39 1,500 acres of rice land or equivalent-value habitat (e.g., perennial wetland) for the giant garter  
40 snake in CZ 4 and/or CZ 5. Any portion of the 1,500 acres may consist of tidal freshwater  
41 emergent wetland and may overlap with the 24,000 acres of tidally restored freshwater  
42 emergent wetland if it meets specific giant garter snake habitat criteria described in CM4. Up to

- 1           500 (33%) of the 1,500 acres may consist of suitable uplands adjacent to protected or restored  
2           aquatic habitat (Objective GGS1.4, associated with CM3 and CM4).
- 3           ● Of the at least 1,200 acres of nontidal marsh created under Objective NFEW/NPANC1.1, create  
4           600 acres of connected aquatic giant garter snake habitat outside the Yolo Bypass in CZ 2  
5           (Objective GGS2.1, associated with CM3 and CM10).
  - 6           ● Of the 8,000 acres of grasslands protected under Objective GNC1.1 and the 2,000 acres restored  
7           under Objective GNC1.2, create or protect 200 acres of high-value upland habitat adjacent to the  
8           600 acres of nontidal marsh created in CZ 2 outside of Yolo Bypass (GGS2.1) (Objective GGS2.2,  
9           associated with CM3 and CM8).
  - 10          ● To expand upon and buffer the newly restored/created nontidal perennial habitat in CZ 2,  
11          protect 700 acres of cultivated lands, with 500 acres consisting of rice land and the remainder  
12          consisting of compatible cultivated land that can support giant garter snakes. The cultivated  
13          lands may be a subset of lands protected for the cultivated lands natural community and other  
14          covered species (Objective GGS2.3, associated with CM3).
  - 15          ● Protect giant garter snakes on created nontidal marsh (Objective GGS2.1) and created or  
16          protected adjacent uplands (Objective GGS2.2) from incidental injury or mortality by  
17          establishing 200-foot buffers between protected giant garter snake habitat and roads, and  
18          establishing giant garter snake reserves at least 2,500 feet from urban areas or areas zoned for  
19          urban development (Objective GGS2.4, associated with CM3).
  - 20          ● Protect, restore, and/or create 2,740 acres of rice land or equivalent-value habitat (e.g.,  
21          perennial wetland) for the giant garter snake in CZ 1, CZ 2, CZ 4, or CZ 5. Up to 500 acres may  
22          consist of tidal freshwater emergent wetland and may overlap with the at least 5,000 acres of  
23          tidally restored freshwater emergent wetland in the Cache Slough ROA if this portion meets  
24          giant garter snake habitat criteria specified in CM4. Up to 1,700 acres may consist of rice fields  
25          in the Yolo Bypass if this portion meets the criteria specified in CM3, *Reserve Design*  
26          *Requirements by Species*. Any remaining acreage will consist of rice land or equivalent-value  
27          habitat outside the Yolo Bypass. Up to 915 (33%) of the 2,740 acres may consist of suitable  
28          uplands adjacent to protected or restored aquatic habitat (Objective GGS3.1, associated with  
29          CM3, CM4, and CM10).

30           As explained below, with the restoration or protection of these amounts of habitat, in addition to the  
31           implementation of AMMs, impacts on giant garter snake would not be adverse for NEPA purposes  
32           and would be less than significant for CEQA purposes.

1 **Table 12-1C-22. Changes in Giant Garter Snake Modeled Habitat Associated with Alternative 1C<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type <sup>c</sup>	Permanent		Temporary		Periodic <sup>e</sup>	
		NT	LLT <sup>d</sup>	NT	LLT <sup>d</sup>	CM2	CM5
CM1	Aquatic (acres)	38	38	66	66	NA	NA
	Upland (acres)	203	203	473	473	NA	NA
	Aquatic (miles)	16	16	22	22	NA	NA
<b>Total Impacts CM1 (acres)</b>		<b>241</b>	<b>241</b>	<b>539</b>	<b>539</b>	<b>NA</b>	<b>NA</b>
CM2–CM18	Aquatic (acres)	179	498	15	38	NA	NA
	Upland (acres)	1,467	2,443	219	261	582–1,402	606
	Aquatic (miles)	49	189	9	10	NA	NA
<b>Total Impacts CM2–CM18 (acres)</b>		<b>1,646</b>	<b>2,941</b>	<b>234</b>	<b>299</b>	<b>582–1,402</b>	<b>606</b>
<b>TOTAL IMPACTS CM1-CM18 (acres)</b>		<b>1,887</b>	<b>3,182</b>	<b>773</b>	<b>838</b>	<b>582–1,402</b>	<b>606</b>

<sup>a</sup> See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> Aquatic acres represent tidal and nontidal habitat combined, and upland acres represent low-, moderate-, and high-value acreages combined.

<sup>d</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>e</sup> Periodic effects were estimated for the late long-term only. CM2 periodic impacts on upland habitats only are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

2

3 **Impact BIO-49: Loss or Conversion of Habitat for and Direct Mortality of Giant Garter Snake**

4 Alternative 1C conservation measures would result in the permanent and temporary loss combined  
5 of up to 640 acres of modeled aquatic habitat (tidal and nontidal combined), up to 3,380 acres of  
6 modeled upland habitat, and up to 237 miles of channels providing aquatic movement habitat for  
7 the giant garter snake (Table 12-1C-22). There are no giant garter snake occurrences that overlap  
8 with the Plan footprint. Conservation measures that would result in these losses are conveyance  
9 facilities and transmission line construction, and establishment and use of RTM, borrow, and spoils  
10 areas (CM1), Fremont Weir/Yolo Bypass improvements (CM2), tidal natural communities  
11 restoration (CM4), floodplain restoration (CM5), and construction of a conservation fish hatchery  
12 (CM18). Habitat enhancement and management activities (CM11), which include ground  
13 disturbance or removal of nonnative vegetation, could result in local adverse habitat effects. In  
14 addition, maintenance activities associated with the long-term operation of the water conveyance  
15 facilities and other BDCP physical facilities could degrade or eliminate giant garter snake habitat.  
16 Each of these individual activities is described below. A summary statement of the combined  
17 impacts and NEPA effects and a CEQA conclusion follow the individual conservation measure  
18 discussions.

- 1       ● *CM1 Water Facilities and Operation:* Construction of Alternative 1C conveyance facilities would  
2 result in the permanent loss of approximately 241 acres of modeled giant garter snake habitat,  
3 composed of 38 acres of aquatic habitat and 203 acres of upland habitat (Table 12-1C-22). The  
4 203 acres of upland habitat that would be removed for the construction of the conveyance  
5 facilities consists of 59 acres of high-, 125 acres of moderate-, and 19 acres of low-value habitat.  
6 In addition, approximately 16 miles of channels providing giant garter snake movement habitat  
7 would be removed as a result of conveyance facilities construction. Development of the water  
8 conveyance facilities would also result in the temporary removal of 539 acres including 66 acres  
9 of giant garter snake aquatic habitat and up to 473 acres of adjacent upland habitat in areas near  
10 construction (see Table 12-1C-22 and Terrestrial Biology Map Book). In addition, approximately  
11 22 miles of channels providing giant garter snake movement habitat would be temporarily  
12 removed as a result of conveyance facilities construction.

13       Most of the habitat that would be lost is located in the central Delta, in CZ 3 (Ryer Island), CZ 5  
14 (Twitchell and Brannan Islands), CZ 6 (Bradford Island, Webb Tract, and Bethel Island), and CZ  
15 8 and 9. Refer to the Terrestrial Biology Map Book for a detailed view of Alternative 1C  
16 construction locations. The aquatic habitat in CZ 6 consists primarily of cultivated lands and  
17 associated irrigation ditches and is considered to have low to moderate potential for adverse  
18 effects on giant garter snake because it is not located near or between subpopulations identified  
19 in the draft recovery plan. Water facilities construction and operation is expected to have little  
20 to no adverse effect on giant garter snake aquatic habitat in the remaining CZs because it is not  
21 near or between subpopulations identified in the draft recovery plan.

- 22       ● *CM2 Yolo Bypass Fisheries Enhancement:* Construction activity associated with fisheries  
23 improvements in the Yolo Bypass would result in the permanent and temporary removal of  
24 approximately 83 acres of aquatic habitat and 458 acres of upland habitat for the giant garter  
25 snake in the late long-term. The upland habitat that would be removed is composed of 336 acres  
26 of high-value, 121 acres of moderate-value, and 1 acre of low-value habitat. Approximately 14  
27 miles (less than 1% of total miles in Plan Area) of channels providing giant garter snake habitat  
28 for movements would be removed as a result of Fremont Weir/Yolo Bypass Improvements.  
29 Approximately 14 miles (less than 1% of total miles in Plan Area) of channels providing giant  
30 garter snake habitat for movements would be removed as a result of Fremont Weir/Yolo  
31 Bypass Improvements. Most of this habitat removal would occur at the north end of the Yolo  
32 Bypass, near Fremont Weir. Construction is expected to have adverse effects on giant garter  
33 snake aquatic habitat in the Yolo Bypass area because it is near the Yolo Basin/Willow Slough  
34 subpopulation.

35       In addition to habitat loss from construction-related activities in Yolo Bypass, late season  
36 flooding in the bypass may result in loss of rice habitat (considered aquatic habitat for giant  
37 garter snake) by precluding the preparation and planting of rice fields. The methods for  
38 estimating loss of rice in the bypass and results are provided in BDCP Appendix 5.J, Attachment  
39 5J.E, *Estimation of BDCP Impact on Giant Garter Snake Summer Foraging Habitat in the Yolo*  
40 *Bypass*. This analysis concludes that the estimated loss of rice is 1,662 acres which was  
41 considered to occur late long-term.

- 42       ● *CM4 Tidal Natural Communities Restoration:* Tidal natural community restoration would result  
43 in the permanent loss of approximately 395 acres of aquatic habitat and 2,123 acres of upland  
44 habitat for the giant garter snake to tidal marsh in the late long-term. The upland habitat  
45 affected by tidal inundation includes 594 acres of high-value, 1,375 acres of moderate-value, and  
46 154 acres of low-value habitat. In addition, approximately 138 miles of channels providing giant

1 garter snake movement habitat would be removed as a result of tidal natural communities  
2 restoration.

3 Most of the effects of tidal natural community restoration would occur in the Cache Slough and  
4 Yolo Bypass areas (CZ 1 and CZ 2). This aquatic habitat is of low to moderate value: it is in and  
5 near Category 1 open space but is not near any giant garter snake occurrences and is not near or  
6 between giant garter snake subpopulations identified in the draft recovery plan. Tidal natural  
7 communities restoration is expected to have little to no adverse effects on giant garter snake  
8 aquatic or upland habitat in the Cache Slough ROA. There are no giant garter snake occurrences  
9 in this area, which is already tidally influenced so it has limited value for the giant garter snake  
10 (giant garter snakes may occur in tidally muted areas but are not likely to use aquatic areas with  
11 a strong tidal influence).

- 12 ● *CM5 Seasonally Inundated Floodplain Restoration*: Levee construction associated with floodplain  
13 restoration in the south Delta (CZ 7) would result in the permanent and temporary removal of  
14 approximately 60 acres of aquatic and 89 acres of upland habitat for giant garter snake. The  
15 upland habitat to be removed is composed of 51 acres of moderate-value and 38 acres of low-  
16 value upland habitat. Approximately 2 miles of channels providing giant garter snake movement  
17 habitat would be removed as a result of floodplain restoration. Seasonally inundated floodplain  
18 restoration is expected to have little to no adverse effects on giant garter snake aquatic habitat  
19 because the site is not located near or between giant garter snake subpopulations identified in  
20 the draft recovery plan. As with CM4, the estimates of the effect of seasonal floodplain levee  
21 construction and inundation are based on projections of where restoration may occur. Actual  
22 effects are expected to be lower because sites would be selected to minimize effects on giant  
23 garter snake habitat. *CM11 Natural Communities Enhancement and Management*: A variety of  
24 habitat management actions included in CM11 that are designed to enhance wildlife values in  
25 BDCP-protected habitats may result in localized ground disturbances that could temporarily  
26 remove small amounts of giant garter snake habitat. Ground-disturbing activities, such as  
27 removal of nonnative vegetation and road and other infrastructure maintenance, are expected  
28 to have minor effects on available giant garter snake habitat and are expected to result in overall  
29 improvements to and maintenance of giant garter snake habitat values over the term of the  
30 BDCP. These effects cannot be quantified, but are expected to be minimal and would be avoided  
31 and minimized by the AMMs listed below.

32 Passive recreation in the reserve system could result in human disturbance of giant garter  
33 snakes basking in upland areas and compaction of upland burrow sites used for brumation.  
34 However, AMM37, described in BDCP Appendix 3.C, *Avoidance and Minimization Measures*,  
35 requires setbacks for trails in giant garter snake habitat. With this measure in place, recreation-  
36 related effects on giant garter snake are expected to be minimal.

- 37 ● *CM18 Conservation Hatcheries*: Construction for conservation hatcheries could result in the  
38 permanent removal of 35 acres of moderate-value upland habitat for the giant garter snake in  
39 the Yolo Bypass area (CZ 2).
- 40 ● *Operations and maintenance*: Postconstruction operation and maintenance of the above-ground  
41 water conveyance facilities and restoration infrastructure could result in ongoing but periodic  
42 disturbances that could affect giant garter snake use of the surrounding habitat in the Yolo  
43 Bypass, the Cache Slough area, and the north and south Delta (CZ 1, CZ 2, CZ 4, CZ 5, CZ 6, CZ 7,  
44 and CZ 8). Maintenance activities would include vegetation management, levee and structure

1 repair, and regrading of roads and permanent work areas. These effects, however, would be  
2 reduced by AMMs and conservation actions as described below.

- 3 • Injury and direct mortality: Construction vehicle activity may cause injury or mortality of the  
4 giant garter snake. If snakes reside where activities take place (most likely in the vicinity of the  
5 two subpopulations: Yolo Basin/Willow Slough [CZ 2] and the Coldani Marsh/White Slough [CZ  
6 4 and 5]), the operation of equipment for land clearing, construction, conveyance facilities  
7 operation and maintenance, and habitat restoration, enhancement, and management could  
8 result in injury or mortality of giant garter snakes. This risk is highest from late fall through  
9 early spring, when the snakes are dormant. Increased vehicular traffic associated with BDCP  
10 actions could contribute to a higher incidence of road kill. However, preconstruction surveys  
11 would be implemented after the project planning phase and prior to any ground-disturbing  
12 activity. Any disturbance to suitable aquatic and upland sites in or near the project footprint  
13 would be avoided to the extent feasible, and the loss of aquatic habitat and grassland vegetation  
14 would be minimized through adjustments to project design, as practicable. Construction  
15 monitoring and other measures would be implemented to avoid and minimize injury or  
16 mortality of this species during construction as described in *AMM16 Giant Garter Snake*.

17 The following paragraphs summarize the combined effects discussed above and describe other  
18 BDCP conservation actions that offset or avoid these effects. NEPA effects and a CEQA conclusion are  
19 also included.

#### 20 ***Near-Term Timeframe***

21 Because the water conveyance facilities construction is being evaluated at the project level, the near-  
22 term BDCP conservation strategy has been evaluated to determine whether it would provide  
23 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the effects of  
24 construction would not be adverse under NEPA.

25 Alternative 1C would permanently and temporarily remove 298 acres of aquatic habitat and 2,362  
26 acres of upland habitat for giant garter snake in the study area during the near-term. These effects  
27 would result from the construction of the water conveyance facilities (CM1, 104 acres of aquatic and  
28 676 acres of upland habitat), Yolo Bypass fisheries improvements (CM2, 83 acres of aquatic and 458  
29 acres of upland habitat), from tidal restoration (CM4, 111 acres of aquatic and 1,193 acres of upland  
30 habitat), and conservation hatcheries (CM18, 35 acres of upland habitat). The aquatic habitat losses  
31 would occur in tidal and nontidal wetland natural communities and rice fields. The upland habitat  
32 losses would occur in cropland and grassland communities. In addition, approximately 96 miles of  
33 channels (irrigation and drainage canals) providing giant garter snake movement habitat would be  
34 removed. The habitat model likely overestimates the relative value of irrigation and drainage  
35 canals in the vicinity of White Slough and south due to its proximity to records that likely represent  
36 single displaced snakes, not viable populations.

37 Typical NEPA project-level mitigation ratios for those natural communities that would be affected  
38 and that are identified in the biological goals and objectives for giant garter snake in Chapter 3 of the  
39 BDCP would be 1:1 for restoration and 1:1 for protection of aquatic habitats and 2:1 for protection  
40 of upland habitats. Using these ratios would indicate that 298 acres of aquatic habitat should be  
41 restored, 298 acres of aquatic habitat should be protected, and 4,724 acres of upland habitat should  
42 be protected for giant garter snake to mitigate the near-term losses.

43 The BDCP has committed to near-term restoration of up to 8,100 acres of aquatic habitat and up to  
44 1,140 acres of upland habitat, and to protection of at least 16,900 acres of upland habitat. Lands to

1 be protected and restored in the near-term specifically for the giant garter snake total 3,900 acres  
2 (400 acres nontidal marsh, 400 acres of grassland, 700 acres of cultivated lands including at least  
3 500 acres of rice in CZ 2, and acres of rice or habitat of equivalent value in CZ 2, CZ 4, and CZ 5.  
4 Additionally, 2,400 acres of rice or habitat equivalent (1,500 acres under Objective GGS1.4 and 900  
5 acres under Objective GGS3.1) would be restored or protected to create connections from the  
6 Coldani Marsh/White Slough population to other areas in the giant garter snake historical range.  
7 Additionally, 900 of the 2,400 acres of rice land or habitat of equivalent value would be protected  
8 and restored for the giant garter snake to achieve a 1:1 ratio of habitat conserved to habitat affected  
9 (habitat affected includes uplands periodically flooded and rice lost due to late season flooding in  
10 Yolo Bypass as a result of CM2) (Objective GGS3.1). An unknown number of irrigation and drainage  
11 ditches located in cultivated lands and suitable for giant garter snake movement would be  
12 maintained and protected within the reserve system, which would include isolated valley oak trees,  
13 trees and shrubs along field borders and roadsides, remnant groves, riparian corridors, water  
14 conveyance channels, grasslands, ponds, and wetlands (Objective CLNC1.3).

15 These habitat protection and restoration measures would benefit the giant garter snake and the  
16 plan's species-specific biological goals and objectives would inform the near-term protection and  
17 restoration efforts. Protecting and expanding existing giant garter snake subpopulations, and  
18 providing connectivity between protected areas, is considered the most effective approach to giant  
19 garter snake conservation in the Plan Area. The Coldani Marsh/White Slough and Yolo Basin/Willow  
20 Slough subpopulations are the only known populations of giant garter snakes in the Plan Area and  
21 are identified as important for the recovery of the species in the draft recovery plan for the species  
22 (U.S. Fish and Wildlife Service 1999b). Implementation actions that target giant garter snake habitat  
23 would focus on these two important subpopulations.

24 The species-specific biological goals and objectives would inform the near-term protection and  
25 restoration efforts. The natural community restoration and protection activities are expected to be  
26 concluded during the first 10 years of Plan implementation, which is close enough in time to the  
27 occurrence of impacts to constitute adequate mitigation for NEPA purposes. These commitments are  
28 more than sufficient to support the conclusion that the near-term effects of Alternative 1C would be  
29 not be adverse under NEPA, because the number of acres required to meet the typical ratios  
30 described above would be only 298 acres of aquatic communities restored, 298 acres of aquatic  
31 communities protected, and 4,724 acres of upland communities protected.

32 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
33 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
34 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
35 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
36 *Material*, *AMM7 Barge Operations Plan*, *AMM10 Restoration of Temporarily Affected Natural*  
37 *Communities*, *AMM16 Giant Garter Snake*, and *AMM37 Recreation*. All of these AMMs include  
38 elements that avoid or minimize the risk of BDCP activities affecting habitats and species adjacent to  
39 work areas and storage sites. The AMMs are described in detail in BDCP Appendix 3.C, *Avoidance*  
40 *and Minimization Measures*.

#### 41 **Late Long-Term Timeframe**

42 The habitat model indicates that the study area supports approximately 31,281 acres of aquatic and  
43 53,285 acres of upland habitat for giant garter snake. Alternative 1C as a whole would result in the  
44 permanent loss of and temporary effects on 640 acres of aquatic habitat and to 3,380 acres of

1 upland habitat for giant garter snake during the term of the plan (2% of the total aquatic habitat and  
2 6% of the total upland habitat in the study area). The locations of these losses are described above in  
3 the analyses of individual conservation measures.

4 The BDCP has committed to protecting 8,000 acres of grassland and 48,625 acres of cultivated lands  
5 in the study area, and restoring 25,100 acres tidal and nontidal wetlands and 2,000 acres of  
6 grasslands in the study area. Lands to be protected and restored specifically for the giant garter  
7 snake total 6,540 acres (1,200 acres nontidal marsh, 400 acres of grassland, 700 acres of cultivated  
8 lands including at least 500 acres of rice in CZ 2, and acres of rice or habitat of equivalent value in CZ  
9 2, CZ 4, and CZ 5. Additionally, 4,240 acres of rice or habitat equivalent (1,500 acres under Objective  
10 GGS1.4 and 2,740 acres under Objective GGS3.1) would be restored or protected to create  
11 connections from the Coldani Marsh/White Slough population to other areas in the giant garter  
12 snake historical range. Additionally, the 2,740 acres of rice land or habitat of equivalent value under  
13 Objective GGS 3.1 would be protected and restored for the giant garter snake to achieve a 1:1 ratio of  
14 habitat conserved to habitat affected (habitat affected includes uplands periodically flooded and rice  
15 lost due to late season flooding in Yolo Bypass as a result of CM2). In addition to the 6,540 acres of  
16 high value habitat targeted specifically for giant garter snake, the protection and restoration of other  
17 natural communities is expected to provide additional restoration of 4,430 acres and protection of  
18 3,733 acres of garter snake habitat.

19 Protection and management of cultivated lands (CM3 and CM11) would also benefit the giant garter  
20 snake by providing connectivity and maintaining irrigation and drainage channels that provide  
21 aquatic habitat for the snake. Assuming the length of canals and ditches providing giant garter snake  
22 movement habitat on the protected cultivated lands is proportional to the modeled habitat on  
23 cultivated lands in the Plan Area, the 48,625 acres of protected cultivated lands would support  
24 approximately 281 miles of movement habitat for the giant garter snake (2,784 miles multiplied by  
25 0.101 [48,625 acres protected of 481,909 acres in Plan Area]).

26 Giant garter snake habitat would be restored and protected specifically, to conserve and expand the  
27 Coldani Marsh/White Slough and Yolo Basin/Willow Slough subpopulations of the giant garter  
28 snake. Protecting and expanding existing giant garter snake subpopulations, and providing  
29 connectivity between protected areas, is considered the most effective approach to giant garter  
30 snake conservation in the Plan Area. The Coldani Marsh/White Slough and Yolo Basin/Willow  
31 Slough subpopulations are the only known subpopulations of giant garter snakes in the Plan Area  
32 and are identified as important for the recovery of the species in the draft recovery plan for the  
33 species (U.S. Fish and Wildlife Service 1999b). Implementation actions that target giant garter snake  
34 habitat would focus on these two important subpopulations. BDCP's beneficial effects analysis  
35 (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and Plant Species*) estimates that the  
36 restoration and protection actions discussed above, as well as the restoration of managed wetland,  
37 nontidal freshwater perennial emergent wetland, nontidal perennial aquatic, tidal freshwater  
38 emergent wetland, alkali seasonal wetland, grassland, and vernal pool complex that could overlap  
39 with the species model, would result in the restoration of 3,450 acres of aquatic and 980 acres of  
40 upland modeled habitat for giant garter snake. In addition, protection of cultivated land, grassland,  
41 alkali seasonal wetland, and vernal pool complex could overlap with the species model and would  
42 result in the protection of 1,547 acres of aquatic and 2,185 acres of upland giant garter snake  
43 modeled habitat.

44 **NEPA Effects:** In the near-term, the loss of giant garter snake habitat under Alternative 1C would not  
45 be adverse because the BDCP has committed to protecting and restoring the acreage required to

1 meet the typical mitigation ratios described above. In the late long-term, the losses of giant garter  
2 snake associated with Alternative 1C, in the absence of other conservation actions, would represent  
3 an adverse effect as a result of habitat modification and potential direct mortality of a special-status  
4 species. However, with habitat protection and restoration associated with the conservation  
5 components, guided by landscape-scale goals and objectives and AMM1–AMM7, AMM10, AMM16,  
6 and AMM37, the effects of Alternative 1C as a whole on giant garter snake would not be adverse.

7 ***CEQA Conclusion:***

8 ***Near-Term Timeframe***

9 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
10 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
11 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
12 impacts of construction would be less than significant under CEQA.

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14 acres of upland habitat for giant garter snake in the study area during the near-term. These effects  
15 would result from the construction of the water conveyance facilities (CM1, 104 acres of aquatic and  
16 676 acres of upland habitat), Yolo Bypass fisheries improvements (CM2, 83 acres of aquatic and 458  
17 acres of upland habitat), from tidal restoration (CM4, 111 acres of aquatic and 1,193 acres of upland  
18 habitat), and conservation hatcheries (CM18, 35 acres of upland habitat). The aquatic habitat losses  
19 would occur in tidal and nontidal wetland natural communities and rice fields. The upland habitat  
20 losses would occur in cropland and grassland communities. In addition, approximately 96 miles of  
21 irrigation and drainage channels providing giant garter snake movement habitat would be removed.  
22 The habitat model likely overestimates the relative value of irrigation and drainage canals in the  
23 vicinity of White Slough and south due to its proximity to records that likely represent single  
24 displaced snakes, not viable populations.

25 Typical CEQA project-level mitigation ratios for those natural communities that would be affected  
26 and that are identified in the biological goals and objectives for giant garter snake in Chapter 3 of the  
27 BDCP would be 1:1 for restoration and 1:1 for protection of aquatic habitats and 2:1 for protection  
28 of upland habitats. Using these ratios would indicate that 298 acres of aquatic habitat should be  
29 restored, 298 acres of aquatic habitat should be protected, and 4,724 acres of upland habitat should  
30 be protected for giant garter snake to mitigate the near-term losses.

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32 1,140 acres of upland habitat, and to protection of at least 16,900 acres of upland habitat. Lands to  
33 be protected and restored in the near term specifically for the giant garter snake total 3,900 acres  
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35 500 acres of rice in CZ 2, and acres of rice or habitat of equivalent value in CZ 2, CZ 4, and CZ 5.  
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37 acres under Objective GGS3.1) would be restored or protected to create connections from the  
38 Coldani Marsh/White Slough population to other areas in the giant garter snake historical range.  
39 Additionally, 900 of the 2,400 acres of rice land or habitat of equivalent value would be protected  
40 and restored for the giant garter snake to achieve a 1:1 ratio of habitat conserved to habitat affected  
41 (habitat affected includes uplands periodically flooded and rice lost due to late season flooding in  
42 Yolo Bypass as a result of CM2) (Objective GGS3.1). An unknown number of irrigation and drainage  
43 ditches located in cultivated lands and suitable for giant garter snake movement would be  
44 maintained and protected within the reserve system, which would include isolated valley oak trees,

1 trees and shrubs along field borders and roadsides, remnant groves, riparian corridors, water  
2 conveyance channels, grasslands, ponds, and wetlands (Objective CLNC1.3).

3 These habitat protection and restoration measures would benefit the giant garter snake and the  
4 plan's species-specific biological goals and objectives would inform the near-term protection and  
5 restoration efforts. Protecting and expanding existing giant garter snake subpopulations, and  
6 providing connectivity between protected areas, is considered the most effective approach to giant  
7 garter snake conservation in the Plan Area. The Coldani Marsh/White Slough and Yolo Basin/Willow  
8 Slough subpopulations are the only known populations of giant garter snakes in the Plan Area and  
9 are identified as important for the recovery of the species in the draft recovery plan for the species  
10 (U.S. Fish and Wildlife Service 1999b). Implementation actions that target giant garter snake habitat  
11 would focus on these two important subpopulations.

12 The species-specific biological goals and objectives would inform the near-term protection and  
13 restoration efforts. The natural community restoration and protection activities are expected to be  
14 concluded during the first 10 years of Plan implementation, which is close enough in time to the  
15 occurrence of impacts to constitute adequate mitigation for CEQA purposes. These commitments are  
16 more than sufficient to support the conclusion that the near-term effects of Alternative 1C would be  
17 not be adverse under CEQA, because the number of acres required to meet the typical ratios  
18 described above would be only 298 acres of aquatic communities restored, 298 acres of aquatic  
19 communities protected, and 4,724 acres of upland communities protected.

20 The Plan also includes commitments to implement AMM1–AMM7, AMM10, AMM16, and AMM37. All  
21 of these AMMs include elements that avoid or minimize the risk of BDCP activities affecting habitats  
22 and species adjacent to work areas and storage sites. The AMMs are described in detail in BDCP  
23 Appendix 3.C, *Avoidance and Minimization Measures*.

#### 24 ***Late Long-Term Timeframe***

25 The habitat model indicates that the study area supports approximately 31,281 acres of aquatic and  
26 53,285 acres of upland habitat for giant garter snake. Alternative 1C as a whole would result in the  
27 permanent loss of and temporary effects on 640 acres of aquatic habitat and to 3,380 acres of  
28 upland habitat for giant garter snake during the term of the plan (2% of the total aquatic habitat and  
29 6% of the total upland habitat in the study area). The locations of these losses are described above in  
30 the analyses of individual conservation measures.

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32 in the study area, and restoring 25,100 acres tidal and nontidal wetlands and 2,000 acres of  
33 grasslands in the study area. Lands to be protected and restored specifically for the giant garter  
34 snake total 6,540 acres (1,200 acres nontidal marsh, 400 acres of grassland, 700 acres of cultivated  
35 lands including at least 500 acres of rice in CZ 2, and acres of rice or habitat of equivalent value in CZ  
36 2, CZ 4, and CZ 5. Additionally, 4,240 acres of rice or habitat equivalent (1,500 acres under Objective  
37 GGS1.4 and 2,740 acres under Objective GGS3.1) would be restored or protected to create  
38 connections from the Coldani Marsh/White Slough population to other areas in the giant garter  
39 snake historical range. Additionally, the 2,740 acres of rice land or habitat of equivalent value under  
40 Objective GGS3.1 would be protected and restored for the giant garter snake to achieve a 1:1 ratio of  
41 habitat conserved to habitat affected (habitat affected includes uplands periodically flooded and rice  
42 lost due to late season flooding in Yolo Bypass as a result of CM2). In addition to the 6,540 acres of  
43 high value habitat targeted specifically for giant garter snake, the protection and restoration of other

1 natural communities is expected to provide additional restoration of 4,430 acres and protection of  
2 3,733 acres of garter snake habitat.

3 Protection and management of cultivated lands (*CM3 and CM11*) would also benefit the giant garter  
4 snake by providing connectivity and maintaining irrigation and drainage channels that provide  
5 aquatic habitat for the snake. Assuming the length of canals and ditches providing giant garter snake  
6 movement habitat on the protected cultivated lands is proportional to the modeled habitat on  
7 cultivated lands in the Plan Area, the 48,625 acres of protected cultivated lands would support  
8 approximately 281 miles of movement habitat for the giant garter snake (2,784 miles multiplied by  
9 0.101 [48,625 acres protected of 481,909 acres in Plan Area]).

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13 connectivity between protected areas, is considered the most effective approach to giant garter  
14 snake conservation in the Plan Area. The Coldani Marsh/White Slough and Yolo Basin/Willow  
15 Slough subpopulations are the only known subpopulations of giant garter snakes in the Plan Area  
16 and are identified as important for the recovery of the species in the draft recovery plan for the  
17 species (U.S. Fish and Wildlife Service 1999b). Implementation actions that target giant garter snake  
18 habitat would focus on these two important subpopulations.

19 BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and Plant*  
20 *Species*) estimates that the restoration and protection actions discussed above, as well as the  
21 restoration of managed wetland, nontidal freshwater perennial emergent wetland, nontidal  
22 perennial aquatic, tidal freshwater emergent wetland, alkali seasonal wetland, grassland, and vernal  
23 pool complex that could overlap with the species model, would result in the restoration of 3,450  
24 acres of aquatic and 980 acres of upland modeled habitat for giant garter snake. In addition,  
25 protection of cultivated land, grassland, alkali seasonal wetland, and vernal pool complex could  
26 overlap with the species model and would result in the protection of 1,547 acres of aquatic and  
27 2,185 acres of upland giant garter snake modeled habitat.

28 The BDCP also includes AMM1-AMM7, AMM10, AMM16, and AMM37, which are directed at  
29 minimizing or avoiding potential impacts on adjacent habitats during construction and operation of  
30 the conservation measures. Considering the protection and restoration provisions, which would  
31 provide acreages of new or enhanced habitat in amounts greater than necessary to compensate for  
32 habitats lost to construction and restoration activities, implementation of Alternative 1C as a whole  
33 would not result in a substantial adverse effect through habitat modifications and would not  
34 substantially reduce the number or restrict the range of the species. Therefore, the loss of giant  
35 garter snake habitat and potential mortality of snakes would have a less-than-significant impact on  
36 giant garter snake under CEQA.

### 37 **Impact BIO-50: Indirect Effects of Plan Implementation on Giant Garter Snake**

38 Construction activities outside the project footprint but within 200 feet of construction associated  
39 with water conveyance facilities, conservation components and ongoing habitat enhancement, as  
40 well as operation and maintenance of above-ground water conveyance facilities, including the  
41 transmission facilities, could result in ongoing periodic postconstruction disturbances with localized  
42 effects on giant garter snake habitat, and temporary noise and visual disturbances over the term of  
43 the BDCP. These potential effects would be minimized or avoided through AMM1-AMM7, AMM10,  
44 AMM16, and AMM37, which would be in effect throughout the plan's construction phase.

1 The use of mechanical equipment during water conveyance facilities construction could cause the  
2 accidental release of petroleum or other contaminants that could affect giant garter snake or its  
3 aquatic prey. The inadvertent discharge of sediment or excessive dust adjacent to giant garter snake  
4 habitat could also have a negative effect on the species or its prey. AMM1–AMM6 would minimize  
5 the likelihood of such spills and would ensure measures are in place to prevent runoff from the  
6 construction area and potential effects of sediment or dust on giant garter snake or its prey.

7 Covered activities have the potential to exacerbate bioaccumulation of mercury in covered species  
8 that feed on aquatic species, including giant garter snake. The operational impacts of new flows  
9 under CM1 were analyzed to assess potential effects on mercury concentration and bioavailability.  
10 Results indicated that changes in total mercury levels in water and fish tissues due to future  
11 operational conditions were insignificant (see BDCP Appendix 5.D, Tables 5D.4-3, 5D.4-4, and  
12 5D.4-5).

13 Marsh (tidal and nontidal) and floodplain restoration also have the potential to increase exposure to  
14 methylmercury. Mercury is transformed into the more bioavailable form of methylmercury in  
15 aquatic systems, especially areas subjected to regular wetting and drying such as tidal marshes and  
16 floodplains. Thus, BDCP restoration activities that create newly inundated areas could increase  
17 bioavailability of mercury. Increased methylmercury associated with natural community and  
18 floodplain restoration may indirectly affect giant garter snake, which feeds on small fishes, tadpoles,  
19 and small frogs, especially introduced species, such as small bullfrogs (*Rana catesbeiana*) and their  
20 larvae, carp (*Cyprinus carpio*), and mosquitofish (*Gambusia affinis*). In general, the highest  
21 methylation rates are associated with high tidal marshes that experience intermittent wetting and  
22 drying and associated anoxic conditions (Alpers et al. 2008). Along with avoidance and minimization  
23 measures and adaptive management and monitoring, *CM12 Methylmercury Management* is expected  
24 to reduce the amount of methylmercury resulting from the restoration of natural communities and  
25 floodplains.

26 Extant populations of giant garter snake within the study area are known only from the upper Yolo  
27 Basin and at the Coldani Marsh/White Slough area. Davis et al. (2007) found mercury  
28 concentrations in fish at White Slough (and the Central Delta in general) to be relatively low  
29 compared to other areas of the Delta. No restoration activities involving flooding (and subsequent  
30 methylation of mercury) are planned within the known range of the Coldani Marsh/White Slough  
31 giant garter snake population. Effects on giant garter snake from increased methylmercury  
32 exposures is more likely in the Yolo Basin, where some of the highest concentrations of mercury and  
33 methylmercury have been documented (Foe et al. 2008). Effects from exposure to methylmercury  
34 may include decreased predator avoidance, reduced success in prey capture, difficulty in shedding,  
35 and reduced ability to move between shelter and foraging or thermoregulation areas (Wylie et al.  
36 2009). Planned floodplain restoration activities in the Yolo Basin are expected to seasonally increase  
37 methylmercury production, although production would be minimized by *CM12 Methylmercury*  
38 *Mitigation*. Further, the periods of production and increased exposure to methylmercury do not  
39 overlap with giant garter snake seasonal activity periods. This seasonal trend should help to  
40 decrease risk to the giant garter snake, although snakes could prey on individuals that have been  
41 exposed to methylmercury during the previous season.

42 The potential mobilization or creation of methylmercury within the study area varies with site-  
43 specific conditions and would need to be assessed at the project level. Measures described in *CM12*  
44 *Methylmercury Management* include provisions for project-specific Mercury Management Plans.  
45 Along with avoidance and minimization measures and adaptive management and monitoring, *CM12*

1 is expected to reduce the effects of methylmercury resulting from BDCP natural communities and  
2 floodplain restoration on giant garter snake.

3 **NEPA Effects:** Implementation of the AMMs listed above as part of implementing Alternative 1C  
4 would avoid the potential for substantial adverse effects on giant garter snakes, either indirectly or  
5 through habitat modifications. These AMMs would also avoid and minimize effects that could  
6 substantially reduce the number of giant garter snakes or restrict the species' range. Therefore, the  
7 indirect effects of Alternative 1C would not have an adverse effect on giant garter snake.

8 **CEQA Conclusion:** Indirect effects from conservation measure operations and maintenance as well  
9 as construction-related noise and visual disturbances could impact giant garter snake in aquatic and  
10 upland habitats. The use of mechanical equipment during construction could cause the accidental  
11 release of petroleum or other contaminants that could impact giant garter snake or its prey. The  
12 inadvertent discharge of sediment or excessive dust adjacent to giant garter snake habitat could also  
13 have a negative impact on the species or its prey. With implementation of AMM1-AMM7, AMM10,  
14 AMM16, and AMM37 as part of Alternative 1C construction, operation and maintenance, the BDCP  
15 would avoid the potential for substantial adverse effects on giant garter snakes, either indirectly or  
16 through habitat modifications. Alternative 1C would not result in a substantial reduction in numbers  
17 or a restriction in the range of giant garter snakes. Therefore, the indirect effects of BDCP  
18 Alternative 1C would have a less-than-significant impact on giant garter snakes. Giant garter snake  
19 could experience indirect effects from increased exposure to methylmercury as a result of tidal  
20 habitat restoration (CM4). With implementation of CM12, the potential indirect effects of  
21 methylmercury would not result in a substantial reduction in numbers or a restriction in the range  
22 of giant garter snakes, and, therefore, would have a less-than-significant impact on giant garter  
23 snakes.

#### 24 **Impact BIO-50a: Loss of Connectivity among Giant Garter Snakes in the Coldani Marsh/White** 25 **Slough Subpopulation, Stone Lakes National Wildlife Refuge, and the Delta**

26 Implementation of Alternative 1C would not introduce a substantial barrier to the movement among  
27 giant garter snakes in the Coldani Marsh/White Slough subpopulation, Stone Lakes National Wildlife  
28 Refuge, and the Delta in the study area.

29 **NEPA Effects:** Alternative 1C would not adversely affect connectivity among giant garter snakes in  
30 the Coldani Marsh/White Slough subpopulation, Stone Lakes National Wildlife Refuge, and the Delta  
31 in the study area.

32 **CEQA Conclusion:** Alternative 1C would have a less-than-significant impact on connectivity between  
33 giant garter snakes in the study area.

#### 34 **Impact BIO-51: Periodic Effects of Inundation of Giant Garter Snake Habitat as a Result of** 35 **Implementation of Conservation Components**

36 *CM2 Yolo Bypass Fisheries Enhancement:* The proposed changes in Fremont Weir operations would  
37 occur intermittently from as early as mid-November through as late as mid-May. The core  
38 operations would occur during the winter/spring period, which corresponds mostly with the giant  
39 garter snake's inactive season. During this time, snakes are overwintering underground. Giant garter  
40 snakes that occur in the bypass during the active season could overwinter in the bypass during the  
41 inactive season: these snakes may be vulnerable to inundation of the bypass and could be drowned  
42 or displaced from overwintering sites. However, most typically, Fremont Weir "notch" operations

1 would occur on the shoulders of time periods in which the Sacramento River raises enough for  
2 Fremont Weir to overtop passively, without the proposed project. Project-associated inundation of  
3 areas that would not otherwise have been inundated is expected to occur in no more than 30% of all  
4 years, since Fremont Weir is expected to overtop the remaining estimated 70% of all years, and  
5 during those years notch operations would not typically affect the maximum extent of inundation.  
6 Currently, in more than half of all years, an area greater than the area that would be inundated as a  
7 result of covered activities is already inundated during the snake's inactive season (Kirkland pers.  
8 comm.). Duration of inundation may also be an important factor determining effects on  
9 overwintering giant garter snakes. Radiotelemetry studies have revealed giant garter snakes  
10 surviving in burrows that had been inundated for 2 to 3 weeks, but it is unknown what duration of  
11 inundation the snakes can survive while overwintering in their burrows.

12 BDCP Appendix 5.J, *Effects on Natural Communities, Wildlife, and Plants*, provides the method used to  
13 estimate periodic inundation effects in the Yolo Bypass. Based on this method, periodic inundation  
14 could affect giant garter snakes overwintering in upland areas ranging from an estimated 582 acres  
15 of upland habitat during notch flow of 1,000 cfs to an estimated 1,402 acres during a 4,000-cfs notch  
16 flow. The 4,000-cfs notch flow would affect an estimated 888 acres of high value habitat and 514  
17 acres of moderate value habitat.

18 As noted above under the discussion of habitat loss from construction-related activities in Yolo  
19 Bypass, late season flooding in the bypass may result in loss of rice habitat (considered aquatic  
20 habitat for giant garter snake) by precluding the preparation and planting of a maximum of 1,662  
21 acres of rice fields (BDCP Appendix 5.J, Attachment 5J.E, *Estimation of BDCP Impact on Giant Garter  
22 Snake Summer Foraging Habitat in the Yolo Bypass*). This analysis concludes that the estimated loss  
23 of rice is 1,662 acres which was considered to occur late long-term. Restoration and protection of  
24 2,740 acres of rice land or habitat of equivalent value for the giant garter snake would achieve a 1:1  
25 ratio of habitat conserved to habitat affected (habitat affected includes uplands periodically flooded  
26 and rice lost due to late season flooding in Yolo Bypass as a result of CM2).

27 *CM5 Seasonally Inundated Floodplain Restoration* would periodically inundate 606 acres of upland  
28 habitat for the giant garter snake in the south Delta (CZ 7). The upland habitat to be inundated  
29 contains 432 acres of moderate-value and 174 acres of low-value habitat. The area between existing  
30 levees would be breached and the newly constructed setback levees would be inundated through  
31 seasonal flooding. The restored floodplain will include a range of elevations from low-lying areas  
32 that flood frequently (e.g., every 1 to 2 years) to high-elevation areas that flood infrequently (e.g.,  
33 every 10 years or more). There are no records of giant garter snakes in the vicinity of where  
34 floodplain restoration is expected to occur.

35 Based on modeled habitat for the giant garter snake, the study area supports approximately 53,285  
36 acres of upland habitat for giant garter snake. Approximately 2,008 acres of giant garter snake  
37 upland habitat (4% of total upland habitat in the study area) may be adversely affected by periodic  
38 flooding as a consequence of floodplain restoration and the operation of the Fremont Weir.

39 **NEPA Effects:** Periodic effects on upland habitat for giant garter snake associated with  
40 implementing Alternative 1C are not expected to result in substantial adverse effects on giant garter  
41 snakes, either directly or through habitat modifications, as it would not result in a substantial  
42 reduction in numbers or a restriction in the range of giant garter snakes. Therefore, Alternative 1C  
43 would not adversely affect the species.

1 **CEQA Conclusion:** Flooding of the Yolo Bypass and creation of seasonally inundated floodplain in  
2 various parts of the study area would periodically affect a total of approximately 2,008 acres of  
3 upland habitat for giant garter snake. The inundation could affect overwintering snakes. Project-  
4 associated inundation of areas that would not otherwise have been inundated is expected to occur in  
5 no more than 30% of all years, since Fremont Weir is expected to overtop the remaining estimated  
6 70% of all years, and during those years notch operations would not typically affect the maximum  
7 extent of inundation. Currently, in more than half of all years, an area greater than the area that will  
8 be inundated as a result of covered activities is already inundated during the snake's inactive season  
9 (Kirkland pers. comm.). Therefore, increased inundation in the Yolo Bypass as a result of BDCP is  
10 expected to have a minimal effect on the Yolo Basin/Willow Slough population.

11 Implementing Alternative 1C, including AMM1–AMM7, AMM10, and AMM16, would not be expected  
12 to result in substantial adverse effects on giant garter snakes, either directly or through habitat  
13 modifications, because it would not result in a substantial reduction in numbers or a restriction in  
14 the range of giant garter snakes. Periodic effects of inundation under Alternative 1C would have a  
15 less-than-significant impact on the species.

### 16 **Western Pond Turtle**

17 The habitat model used to assess effects on the western pond turtle is based on aquatic and upland  
18 nesting and overwintering habitat. Further details regarding the habitat model, including  
19 assumptions on which the model is based, are provided in BDCP Appendix 2A, Section 2A.30,  
20 *Western Pond Turtle*. The model quantified two types of upland nesting and overwintering habitat,  
21 including upland habitat in natural communities as well as upland in agricultural areas adjacent to  
22 aquatic habitats. Both of these upland habitat types are combined for this analysis. Factors  
23 considered in assessing the value of affected aquatic habitat are natural community type and  
24 availability of adjacent nesting and overwintering habitat. The highest value aquatic habitat types in  
25 the study area consist of nontidal freshwater perennial emergent wetlands and ponds adjacent to  
26 suitable nesting and overwintering habitat (Patterson pers. comm.). Less detail is provided on  
27 effects on dispersal habitat because, although dispersal habitat is important for maintaining and  
28 increasing distribution and genetic diversity, turtles have been known to travel over many different  
29 land cover types; therefore, this habitat type is not considered limiting. The value of dispersal  
30 habitat depends less on the habitat type itself than on the proximity of that habitat type to high-  
31 value aquatic and nesting and overwintering habitat.

32 Construction and restoration associated with Alternative 1C conservation measures would result in  
33 both temporary and permanent losses of western pond turtle modeled habitat, as indicated in Table  
34 12-1C-23. The majority of these losses would take place over an extended period of time as tidal  
35 marsh is restored in the study area. Full implementation of Alternative 1C would also include the  
36 following biological objectives over the term of the BDCP to benefit the western pond turtle (BDCP  
37 Chapter 3, *Conservation Strategy*).

- 38 ● Protect or restore 142,200 acres of high-value natural communities and covered species  
39 habitats (Objective L1.1, associated with CM3).
- 40 ● Restore and protect 65,000 acres of tidal natural communities and transitional uplands to  
41 accommodate sea level rise. Minimum restoration targets for tidal natural communities in  
42 each ROA are 7,000 acres in Suisun Marsh ROA, 5,000 acres in Cache Slough ROA, 1,500 acres in  
43 Cosumnes/Mokelumne ROA, 2,100 acres in West Delta ROA, and 5,000 acres in South Delta ROA  
44 (Objective L1.3, associated with CM2, CM3, and CM4).

- 1       ● Within the 65,000 acres of tidal natural communities and transitional uplands (Objective L1.3),  
2       include sufficient transitional uplands along the fringes of restored brackish and freshwater  
3       tidal emergent wetlands to accommodate up to 3 feet of sea level rise where possible and allow  
4       for the future upslope establishment of tidal emergent wetland communities (Objective L1.7,  
5       associated with CM3, CM4, and CM8).
- 6       ● Allow floods to promote fluvial processes, such that bare mineral soils are available for natural  
7       recolonization of vegetation, desirable natural community vegetation is regenerated, and  
8       structural diversity is promoted, or implement management actions that mimic those natural  
9       disturbances (Objective L2.1, associated with CM3, CM5, and CM11).
- 10      ● Allow lateral river channel migration (Objective L2.2, associated with CM3 and CM5).
- 11      ● Within the 65,000 acres of tidal natural communities (L1.3), restore or create 24,000 acres of  
12      tidal freshwater emergent wetland in CZ 1, CZ 2, CZ 4, CZ 5, CZ 6, and/or CZ 7 (Objective  
13      TFEWNC1.1, associated with CM3 and CM4).
- 14      ● Create at least 1,200 acres of nontidal marsh consisting of a mosaic of nontidal perennial aquatic  
15      and nontidal freshwater emergent wetland natural communities, with suitable habitat  
16      characteristics for giant garter snake and western pond turtle (Objective NFEW/NPANC1.1,  
17      associated with CM3 and CM10).
- 18      ● Protect and enhance 8,100 acres of managed wetland, 1,500 acres of which are in the Grizzly  
19      Island Marsh Complex (Objective MWNC1.1, associated with CM3 and CM11).
- 20      ● Protect 8,000 acres of grassland (Objective GNC1.1, associated with CM3).
- 21      ● Protect stock ponds and other aquatic features within protected grasslands to provide aquatic  
22      breeding habitat for native amphibians and aquatic reptiles (Objective GNC1.3, associated with  
23      CM3).
- 24      ● Maintain and protect the small patches of important wildlife habitats associated with cultivated  
25      lands that occur in cultivated lands within the reserve system, including isolated valley oak  
26      trees, trees and shrubs along field borders and roadsides, remnant groves, riparian corridors,  
27      water conveyance channels, grasslands, ponds, and wetlands (Objective CLNC1.3, associated  
28      with CM3 and CM11).

29      As explained below, with the restoration and protection of these amounts of habitat, in addition to  
30      implementation of AMMs, impacts on western pond turtle would not be adverse for NEPA purposes  
31      and would be less than significant for CEQA purposes.

1 **Table 12-1C-23. Changes in Western Pond Turtle Modeled Habitat Associated with Alternative 1C<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	Aquatic (acres)	27	27	86	86	NA	NA
	Upland (acres) <sup>e</sup>	129	129	139	139	NA	NA
	Aquatic (miles)	17	17	24	24		
<b>Total Impacts CM1 (acres)</b>		<b>156</b>	<b>156</b>	<b>225</b>	<b>225</b>		
CM2-CM18	Aquatic (acres)	82	114	23	44	NA	NA
	Upland (acres) <sup>e</sup>	414	1,028	119	136	283-798	331
	Aquatic (miles)	25	109	3	4		
<b>Total Impacts CM2-CM18 (acres)</b>		<b>496</b>	<b>1,142</b>	<b>142</b>	<b>180</b>	<b>283-798</b>	<b>331</b>
<b>TOTAL IMPACTS CM1-CM18 (acres)</b>		<b>652</b>	<b>1,298</b>	<b>367</b>	<b>405</b>	<b>283-798</b>	<b>331</b>

<sup>a</sup> See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

<sup>e</sup> Upland acres represent upland nesting and overwintering habitat acreages combined for both natural communities and agricultural lands adjacent to aquatic habitats.

NT = near-term

LLT = late long-term

NA = not applicable

2

3 **Impact BIO-52: Loss or Conversion of Habitat for and Direct Mortality of Western Pond Turtle**

4 Alternative 1C conservation measures would result in the permanent and temporary loss of up to  
5 271 acres of aquatic habitat and 1,432 acres of upland nesting and overwintering habitat (Table 12-  
6 1C-23). There are 4 western pond turtle occurrences that overlap with the CM1 footprint and a  
7 number of additional occurrences within the vicinity (Figure 12-16). Activities that would result in  
8 the temporary and permanent loss of western pond turtle modeled habitat are conveyance facilities  
9 and transmission line construction, and establishment and use of RTM, borrow, and spoils areas  
10 (CM1), Yolo Bypass improvements (CM2), tidal habitat restoration (CM4), seasonally inundated  
11 floodplain restoration (CM5), and riparian restoration (CM7). Habitat enhancement and  
12 management activities (CM11), such as ground disturbance or removal of nonnative vegetation,  
13 could result in local adverse habitat effects. In addition, maintenance activities associated with the  
14 long-term operation of the water conveyance facilities and other BDCP physical facilities could  
15 degrade or eliminate western pond turtle habitat. The activity accounting for most (80%) of the  
16 habitat loss or conversion would be *CM4 Tidal Natural Communities Restoration*. Each of these  
17 individual activities is described below. A summary statement of the combined impacts and NEPA  
18 effects and a CEQA conclusion follow the individual conservation measure discussions.

- 1       ● *CM1 Water Facilities and Operation*: Construction of Alternative 1C conveyance facilities would  
2 result in the permanent loss of approximately 27 acres of aquatic habitat and 129 acres of  
3 upland nesting and overwintering habitat for the western pond turtle in the study area (Table  
4 12-1C-23). Development of the water conveyance facilities would also result in the temporary  
5 removal of up to 86 acres of aquatic habitat and 139 acres of nesting and overwintering habitat  
6 for the western pond turtle in the study area (see Table 12-1C-23). Approximately 17 miles of  
7 channels providing western pond turtle movement habitat would be removed and 24 miles  
8 would be temporarily disturbed. There are four western pond turtle occurrences that overlap  
9 with the CM1 footprint in CZ 2 around Clifton Court Forebay and in CZ 5 scattered throughout  
10 the Delta. The majority of the permanent loss of aquatic habitat and nesting and overwintering  
11 habitat would be near Clifton Court Forebay in CZ 8. Refer to the Terrestrial Biology Map Book  
12 for a detailed view of Alternative 1C construction locations. The aquatic habitat in the Clifton  
13 Court Forebay area is considered to be of reasonably high value because it consists of  
14 agricultural ditches in or near known species occurrences. The nesting and overwintering and  
15 dispersal habitat that would be lost consists primarily of cultivated lands with some small  
16 portion of ruderal grassland habitat. Except for remnant, uncultivated patches, the cultivated  
17 lands are not suitable for nesting and overwintering unless left fallow. Construction of the water  
18 conveyance facilities would also affect dispersal habitat, which is primarily cultivated lands.  
19 While there are western pond turtle occurrences scattered throughout CZ 3, CZ 4, CZ 5, and CZ 6,  
20 this effect is widely dispersed because of the long, linear nature of the canal footprint.
- 21       ● *CM2 Yolo Bypass Fisheries Enhancement*: Improvements in the Yolo Bypass would result in the  
22 permanent and temporary removal of approximately 60 acres of aquatic habitat and 249 acres of  
23 upland nesting and overwintering habitat for the western pond turtle. Approximately 4 miles of  
24 channels providing western pond turtle movement habitat would be permanently or  
25 temporarily removed as a result of Yolo Bypass improvements. Although there are no CNDDDB  
26 occurrences for western pond turtle in the Yolo Bypass, the species is known to be present in  
27 the Yolo Bypass Wildlife Area (California Department of Fish and Wildlife 2013).
- 28       ● *CM4 Tidal Natural Communities Restoration*: Tidal natural community restoration would result  
29 in the conversion of approximately 45 acres of aquatic habitat and 872 acres of upland nesting  
30 and overwintering habitat for western pond turtle to tidal marsh. Approximately 106 miles of  
31 channels providing western pond turtle movement habitat would be removed as a result of  
32 restoration. Tidal habitat restoration is expected to change existing salinity and flow conditions  
33 rather than lead to complete loss of aquatic habitat. Restoration of tidal flow where habitat  
34 consists of the calm waters of managed freshwater ponds and wetlands could have an adverse  
35 effect on the western pond turtle. Tidal restoration outside Suisun Marsh is likely to create  
36 suitable, slow-moving freshwater slough and marsh habitat.

37 Although the aquatic habitat model includes all tidal perennial aquatic, tidal brackish emergent  
38 wetland, and managed wetland as habitat, most of the Suisun Marsh pond turtle observations  
39 have been in the interior drainage ditches or near water control structures not hydrologically  
40 connected to Suisun Marsh (Patterson pers. comm.). While the model does not include an  
41 aquatic class type called drainage ditches and therefore an effect on this habitat type cannot be  
42 calculated, it is likely that this general type of habitat accounts for a very small portion of the  
43 total modeled aquatic effects; almost certainly less than 5%, or less than 287 acres of the  
44 modeled aquatic habitat affected by tidal restoration. The suitable nesting and overwintering  
45 habitat that would be affected in the interior of Suisun Marsh is limited, because the levees likely  
46 function as the primary nesting and overwintering habitat. The nesting and overwintering

1 habitat of highest value to be affected is on the fringe of the marsh where the aquatic habitat is  
2 adjacent to undeveloped grassland habitat.

3 The habitat affected in the interior Delta (West Delta and South Delta) is of low value, consisting  
4 of levees and intensively farmed cultivated lands, while the Cache Slough and Cosumnes-  
5 Mokelumne ROAs are less intensively farmed and have higher-value habitat for the turtle.  
6 Because the estimates of the effect of tidal inundation are based on projections of where  
7 restoration may occur, actual effects are expected to be lower because sites would be selected to  
8 minimize effects on western pond turtle habitat (see AMM17 in BDCP Appendix 3.C).

- 9 ● *CM5 Seasonally Inundated Floodplain Restoration* Levee construction associated with floodplain  
10 restoration in the south Delta (CZ 7) would result in the permanent and temporary removal of  
11 approximately 53 acres of aquatic habitat 33 acres of upland habitat for western pond turtle.  
12 Approximately 3 miles of channels providing western pond turtle movement habitat would be  
13 removed as a result of floodplain restoration. Although there are no CNDDDB occurrences of the  
14 western pond turtle in the areas where floodplain restoration is likely to occur, the species is  
15 known to occur along the San Joaquin River to the south in the San Joaquin River National  
16 Wildlife Refuge. As with CM4, the estimates of the effect of seasonal floodplain levee  
17 construction and inundation are based on projections of where restoration may occur. Actual  
18 effects are expected to be lower because sites would be selected to minimize effects on western  
19 pond turtle habitat.
- 20 ● *CM7 Riparian Natural Community Restoration*: Riparian restoration that is part of tidal natural  
21 communities restoration in CZ 1 and CZ 2, would result in the permanent removal of 10 acres of  
22 upland nesting and overwintering habitat for western pond turtle.
- 23 ● *CM11 Natural Communities Enhancement and Management*: A variety of habitat management  
24 actions included in CM11 that are designed to enhance wildlife values in BDCP protected  
25 habitats may result in localized ground disturbances that could temporarily remove small  
26 amounts of western pond turtle habitat. Ground-disturbing activities, such as removal of  
27 nonnative vegetation and road and other infrastructure maintenance, are expected to have  
28 minor adverse effects on available western pond turtle habitat and are expected to result in  
29 overall improvements to and maintenance of western pond turtle habitat values over the term  
30 of the BDCP. In addition, effects would be avoided and minimized by the AMMs listed below.
- 31 ● Management of the 6,600 acres of managed wetlands to be protected for waterfowl and  
32 shorebirds is not expected to result in overall adverse effects for the western pond turtle.  
33 Management actions that would improve wetland quality and diversity on managed wetlands  
34 include control and eradication of invasive plants; maintenance of a diversity of vegetation types  
35 and elevations, including upland areas to provide flood refugia; water management and leaching  
36 to reduce salinity; and enhancement of water management infrastructure (improvements to  
37 enhance drainage capacity, levee maintenance). These management actions could benefit the  
38 western pond turtle. The 6,600 acres of protected managed wetlands would be monitored and  
39 adaptively managed to ensure that management options are implemented to avoid adverse  
40 effects on the western pond turtle.
- 41 ● Operations and maintenance: Ongoing maintenance of BDCP facilities is expected to have little if  
42 any adverse effect on the western pond turtle. Postconstruction operation and maintenance of  
43 the above-ground water conveyance facilities and restoration infrastructure could result in  
44 ongoing but periodic disturbances that could affect western pond turtle use where there is  
45 suitable habitat in the study area. Maintenance activities would include vegetation management,

1 levee and structure repair, and regrading of roads and permanent work areas. These effects,  
2 however, would be minimized by AMMs and conservation actions described below.

- 3 • Injury and direct mortality: Construction vehicle activity may cause injury to or mortality of  
4 western pond turtles. If turtles reside where conservation measures are implemented (most  
5 likely in the vicinity of aquatic habitats in the study area), the operation of equipment for land  
6 clearing, construction, conveyance facilities operation and maintenance, and habitat restoration,  
7 enhancement, and management could result in injury or mortality of western pond turtles.  
8 However, to avoid injury or mortality, preconstruction surveys would be conducted in suitable  
9 aquatic and upland habitat for the western pond turtle, and turtles found would be relocated  
10 outside the construction areas, as required by the AMMs listed below.

11 The following paragraphs summarize the combined effects discussed above and describe other  
12 BDCP conservation actions that offset or avoid these effects. NEPA effects and a CEQA conclusion are  
13 also included.

#### 14 ***Near-Term Timeframe***

15 Because the water conveyance facilities construction is being evaluated at the project level, the near-  
16 term BDCP conservation strategy has been evaluated to determine whether it would provide  
17 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the effects of  
18 construction would not be adverse under NEPA.

19 Alternative 1C would permanently or temporarily remove 218 acres of aquatic habitat and 801  
20 acres of upland nesting and overwintering habitat for western pond turtle in the near-term. These  
21 effects would result from water conveyance facilities construction (CM1, 113 acres of aquatic and  
22 268 acres of upland habitat), Yolo Bypass improvements (CM2, 60 acres of aquatic and 249 acres of  
23 upland habitat), tidal habitat restoration (CM4, 45 acres of aquatic and 280 acres of upland habitat),  
24 and riparian restoration (CM7, 4 acres of upland habitat).

25 Typical project-level mitigation ratios for those natural communities that would be affected and that  
26 are identified in the biological goals and objectives for western pond turtle in Chapter 3 of the BDCP  
27 would be 1:1 for restoration and 1:1 for protection of aquatic habitats and 2:1 for protection of  
28 upland habitats. Using these ratios would indicate that 218 acres of aquatic habitat should be  
29 restored, 218 acres of aquatic habitat should be protected, and 1,602 acres of upland habitat should  
30 be protected for western pond turtle to mitigate the near-term losses.

31 The conservation strategy for western pond turtle involves restoration and protection of aquatic  
32 and adjacent upland habitat, and establishment of an interconnected reserve system that provides  
33 for western pond turtle dispersal. The habitat protection and restoration needs for this species are  
34 addressed at the landscape and natural community levels. The BDCP has committed to near-term  
35 restoration and creation of up to 24,350 acres of aquatic habitat (Objective L1.1, Objective L1.3,  
36 Objective NFEW/NPANC1.1, MWNC1.1) and up to 2,000 acres of upland habitat (Objective GNC1.1).  
37 In addition, the protection and management of existing managed wetland habitat in Suisun Marsh  
38 may increase the value of aquatic habitat. The most beneficial restoration would occur in freshwater  
39 emergent wetland consisting of slow-moving slough and marsh adjacent to protected, undisturbed  
40 grassland. Additionally, basking platforms will be installed as needed in restored freshwater marsh  
41 to benefit the western pond turtle.

42 The natural community restoration and protection activities are expected to be concluded in the  
43 first 10 years of Plan implementation, which is close enough in time to the impacts of construction to

1 constitute adequate mitigation. Because the number of acres required to meet the typical ratios  
2 described above would be only 218 acres of aquatic communities protected, 218 acres restored, and  
3 1,602 acres of upland communities protected, the 24,350 acres of aquatic and 2,000 acres of upland  
4 habitats restored or created in the near-term Plan goals, and the additional detail in the biological  
5 goals for western pond turtle, are more than sufficient to support the conclusion that the near-term  
6 impacts of habitat loss and direct mortality under Alternative 1C on western pond turtles would not  
7 be adverse.

8 The plan also contains commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
9 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
10 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
11 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
12 *Material*, *AMM10 Restoration of Temporarily Affected Natural Communities*, and *AMM17 Western*  
13 *Pond Turtle*. These AMMs include elements that would avoid or minimize the risk of affecting  
14 habitats and species adjacent to work areas and storage sites. The AMMs are described in detail in  
15 BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

### 16 **Late Long-Term Timeframe**

17 Based on modeled habitat, the study area supports approximately 81,666 acres of aquatic and  
18 28,864 acres of upland habitat for western pond turtle. Alternative 1C would remove 271 acres of  
19 aquatic habitat and 1,432 acres of upland nesting and overwintering habitat for western pond turtle  
20 in the late long-term.

21 Implementation of Alternative 1C as a whole would increase the extent and distribution of high-  
22 value aquatic and upland nesting and overwintering habitat for western pond turtle in the study  
23 area. While the extent of dispersal habitat is expected to be reduced by approximately 9%, this  
24 habitat is abundant in the study area (composed primarily of cultivated lands), is not believed to be  
25 a factor limiting the turtle, and would be replaced with higher-value habitats for western pond  
26 turtle.

27 The conservation strategy for western pond turtle involves restoration and protection of aquatic  
28 and adjacent upland habitat, and establishment of an interconnected reserve system that provides  
29 for western pond turtle dispersal. The habitat protection and restoration needs for this species are  
30 addressed at the landscape and natural community levels. The BDCP has committed to late long-  
31 term restoration and creation of up to 74,300 acres of aquatic habitat (Objective L1.1, Objective  
32 L1.3, Objective NFEW/NPANC1.1, MWNC1.1) and up to 8,000 acres of upland habitat (Objective  
33 GNC1.1). In addition, the protection and management of existing managed wetland habitat in Suisun  
34 Marsh may increase the value of aquatic habitat. The most beneficial restoration would occur in  
35 freshwater emergent wetland consisting of slow-moving slough and marsh adjacent to protected,  
36 undisturbed grassland. Aquatic features (e.g., ditches and ponds) and adjacent uplands that are  
37 preserved and managed as part of the 48,625 acres of protected cultivated lands described above for  
38 giant garter snake are also expected to benefit the species. Additionally, basking platforms would be  
39 installed as needed in restored freshwater marsh to benefit the western pond turtle.

40 Riparian and floodplain restoration would potentially increase the quantity and value of aquatic and  
41 nesting and overwintering habitat. Where the floodplain is widened and restored, this would allow  
42 oxbows and slow-moving side channels to form, providing suitable aquatic habitat for this species  
43 (Bury and Germano 2008; Ernst and Lovich 2009). Where riparian vegetation is restored adjacent to  
44 slower-moving channels, sloughs, and ponds, downed trees can provide important basking habitat

1 and cover habitat for turtles. Riparian restoration in those more interior portions of Old and Middle  
2 Rivers that would be managed for riparian brush rabbit habitat have potential to benefit resident  
3 western pond turtles as riparian-adjacent grassland is an important habitat characteristic for the  
4 rabbit.

5 The study area represents only a small portion of the range of the western pond turtle in California  
6 (which includes most all the Pacific drainages) and southern Oregon. Effects from permanent and  
7 temporary loss or conversion of habitat for the western pond turtle, and other effects described  
8 above, are not expected to result in an adverse effect on the long-term survival and recovery of  
9 western pond turtle because for the following reasons.

- 10 • The study area represents a small portion of the species' entire range.
- 11 • Only 1% of the habitat in the study area would be removed or converted.

12 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*  
13 *Plant Species*) estimates that the restoration and protection actions discussed above, as well as the  
14 restoration of managed wetland, nontidal freshwater perennial emergent wetland, nontidal  
15 perennial aquatic, tidal brackish emergent wetland, tidal freshwater emergent wetland, grassland,  
16 valley foothill riparian, that could overlap with the species model, would result in the restoration of  
17 29,738 acres of aquatic and 1,421 acres of upland modeled habitat for western pond turtle. In  
18 addition, protection of cultivated land, managed wetland, grassland, and valley/foothill riparian  
19 could overlap with the species model and would result in the protection of 1,281 acres of aquatic  
20 and 4,993 acres of upland western pond turtle modeled habitat.

21 **NEPA Effects:** In the near-term, the loss of western pond turtle habitat under Alternative 1C would  
22 not have an adverse effect because the BDCP has committed to protecting and restoring the acreage  
23 required to meet the typical mitigation ratios described above. In the late long-term, the losses of  
24 western pond turtle habitat associated with Alternative 1C, in the absence of other conservation  
25 actions, would represent an adverse effect as a result of habitat modification and potential direct  
26 mortality of a special-status species. However, with habitat protection and restoration associated  
27 with the conservation components, guided by landscape-scale goals and objectives and by AMM1–  
28 AMM6, AMM10, and AMM17, the effects of Alternative 1C as a whole on western pond turtle would  
29 not be adverse.

### 30 **CEQA Conclusion:**

#### 31 **Near-Term Timeframe**

32 Because the water conveyance facilities construction is being evaluated at the project level, the near-  
33 term BDCP conservation strategy has been evaluated to determine whether it would provide  
34 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the impacts of  
35 construction would be less than significant under CEQA.

36 Alternative 1C would permanently or temporarily remove 218 acres of aquatic habitat and 801  
37 acres of upland nesting and overwintering habitat for western pond turtle in the near-term. These  
38 effects would result from water conveyance facilities construction (CM1, 113 acres of aquatic and  
39 268 acres of upland habitat), Yolo Bypass improvements (CM2, 60 acres of aquatic and 249 acres of  
40 upland habitat), tidal habitat restoration (CM4, 45 acres of aquatic and 280 acres of upland habitat),  
41 and riparian restoration (CM7, 4 acres of upland habitat).

1 Typical CEQA project-level mitigation ratios for those natural communities that would be affected  
2 and that are identified in the biological goals and objectives for western pond turtle in Chapter 3 of  
3 the BDCP would be 1:1 for restoration and 1:1 for protection of aquatic habitats and 2:1 for  
4 protection of upland habitats. Using these ratios would indicate that 218 acres of aquatic habitat  
5 should be restored, 218 acres of aquatic habitat should be protected, and 1,602 acres of upland  
6 habitat should be protected for western pond turtle to mitigate the near-term losses.

7 The conservation strategy for western pond turtle involves restoration and protection of aquatic  
8 and adjacent upland habitat, and establishment of an interconnected reserve system that provides  
9 for western pond turtle dispersal. The habitat protection and restoration needs for this species are  
10 addressed at the landscape and natural community levels. The BDCP has committed to near-term  
11 restoration and creation of up to 24,350 acres of aquatic habitat (Objective L1.1, Objective L1.3,  
12 Objective NFEW/NPANC1.1, and Objective MWNC1.1) and up to 2,000 acres of upland habitat  
13 (Objective GNC1.1). In addition, the protection and management of existing managed wetland  
14 habitat in Suisun Marsh may increase the value of aquatic habitat. The most beneficial restoration  
15 would occur in freshwater emergent wetland consisting of slow-moving slough and marsh adjacent  
16 to protected, undisturbed grassland. Additionally, basking platforms will be installed as needed in  
17 restored freshwater marsh to benefit the western pond turtle.

18 The natural community restoration and protection activities are expected to be concluded in the  
19 first 10 years of Plan implementation, which is close enough in time to the impacts of construction to  
20 constitute adequate mitigation for CEQA purposes. Because the number of acres required to meet  
21 the typical ratios described above would be only 218 acres of aquatic communities protected, 218  
22 acres restored, and 1,602 acres of upland communities protected, the 24,350 acres of aquatic and  
23 2,000 acres of upland habitats restored or created in the near-term Plan goals, and the additional  
24 detail in the biological goals for western pond turtle, are more than sufficient to support the  
25 conclusion that the near-term impacts of habitat loss and direct mortality under Alternative 1C on  
26 western pond turtles would be less than significant.

27 In addition, the plan also contains commitments to implement AMM1-6, AMM10, and AMM17 which  
28 include elements that would avoid or minimize the risk of directly and indirectly affecting habitats  
29 and species habitats adjacent to work areas and storage sites. The AMMs are described in detail in  
30 BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

### 31 ***Late Long-Term Timeframe***

32 Based on modeled habitat, the study area supports approximately 81,666 acres of aquatic and  
33 28,864 acres of upland habitat for western pond turtle. Alternative 1C would remove 271 acres of  
34 aquatic habitat and 1,432 acres of upland nesting and overwintering habitat for western pond turtle  
35 in the late long-term.

36 Implementation of Alternative 1C as a whole would increase the extent and distribution of high-  
37 value aquatic and upland nesting and overwintering habitat for western pond turtle in the study  
38 area. While the extent of dispersal habitat is expected to be reduced by approximately 9%, this  
39 habitat is abundant in the study area (composed primarily of cultivated lands), is not believed to be  
40 a factor limiting the turtle, and would be replaced with higher-value habitats for western pond  
41 turtle.

42 The conservation strategy for western pond turtle involves restoration and protection of aquatic  
43 and adjacent upland habitat, and establishment of an interconnected reserve system that provides

1 for western pond turtle dispersal. The habitat protection and restoration needs for this species are  
2 addressed at the landscape and natural community levels. The BDCP has committed to late long-  
3 term restoration and creation of up to 74,300 acres of aquatic habitat (Objective L1.1, Objective  
4 L1.3, Objective NFEW/NPANC1.1, MWNC1.1) and up to 8,000 acres of upland habitat (Objective  
5 GNC1.1). In addition, the protection and management of existing managed wetland habitat in Suisun  
6 Marsh may increase the value of aquatic habitat. The most beneficial restoration would occur in  
7 freshwater emergent wetland consisting of slow-moving slough and marsh adjacent to protected,  
8 undisturbed grassland. Aquatic features (e.g., ditches and ponds) and adjacent uplands that are  
9 preserved and managed as part of the 48,625 acres of protected cultivated lands described above for  
10 giant garter snake are also expected to benefit the species. Additionally, basking platforms would be  
11 installed as needed in restored freshwater marsh to benefit the western pond turtle.

12 Riparian and floodplain restoration would potentially increase the quantity and value of aquatic and  
13 nesting and overwintering habitat. Where the floodplain is widened and restored, this would allow  
14 oxbows and slow-moving side channels to form, providing suitable aquatic habitat for this species  
15 (Bury and Germano 2008; Ernst and Lovich 2009). Where riparian vegetation is restored adjacent to  
16 slower-moving channels, sloughs, and ponds, downed trees can provide important basking habitat  
17 and cover habitat for turtles. Riparian restoration in those more interior portions of Old and Middle  
18 Rivers that would be managed for riparian brush rabbit habitat have potential to benefit resident  
19 western pond turtles as riparian-adjacent grassland is an important habitat characteristic for the  
20 rabbit.

21 The study area represents only a small portion of the range of the western pond turtle in California  
22 (which includes most all the Pacific drainages) and southern Oregon. Effects from permanent and  
23 temporary loss or conversion of habitat for the western pond turtle, and other effects described  
24 above, are not expected to result in an adverse effect on the long-term survival and recovery of  
25 western pond turtle because for the following reasons.

- 26 ● The study area represents a small portion of the species' entire range.
- 27 ● Only 1% of the habitat in the study area would be removed or converted.

28 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*  
29 *Plant Species*) estimates that the restoration and protection actions discussed above, as well as the  
30 restoration of managed wetland, nontidal freshwater perennial emergent wetland, nontidal  
31 perennial aquatic, tidal brackish emergent wetland, tidal freshwater emergent wetland, grassland,  
32 valley foothill riparian, that could overlap with the species model, would result in the restoration of  
33 29,738 acres of aquatic and 1,421 acres of upland modeled habitat for western pond turtle. In  
34 addition, protection of cultivated land, managed wetland, grassland, and valley/foothill riparian  
35 could overlap with the species model and would result in the protection of 1,281 acres of aquatic  
36 and 4,993 acres of upland western pond turtle modeled habitat.

37 The loss of western pond turtle habitat associated with Alternative 1C as a whole would represent  
38 an adverse effect as a result of special-status species habitat modification and the potential direct  
39 mortality of turtles. However, considering the habitat restoration and protection associated with the  
40 conservation components, guided by landscape-scale goals and objectives and by AMM1-AMM6,  
41 AMM10, and AMM17, which would be in place throughout the construction phase, the loss of habitat  
42 and potential mortality would not have an adverse effect on western pond turtle. Therefore, the loss  
43 of western pond turtle habitat and potential mortality of turtles resulting from Alternative 1C would  
44 have a less-than-significant impact on western pond turtle.

1 **Impact BIO-53: Indirect Effects of Plan Implementation on Western Pond Turtle**

2 Indirect effects on western pond turtle within 200 feet of construction activities could temporarily  
3 affect the use of aquatic habitat and upland nesting, overwintering, and dispersal habitat for the  
4 western pond turtle. Construction activities outside of the construction footprint but within 200 feet  
5 of water conveyance facilities, conservation components and ongoing habitat enhancement, as well  
6 as operation and maintenance of above-ground water conveyance facilities, including the  
7 transmission facilities, could result in ongoing periodic postconstruction disturbances with localized  
8 impacts on western pond turtle habitat, and temporary noise and visual disturbances over the term  
9 of the BDCP.

10 The use of mechanical equipment during water conveyance facilities construction could cause the  
11 accidental release of petroleum or other contaminants that could affect western pond turtle or its  
12 aquatic prey. The inadvertent discharge of sediment or excessive dust adjacent to western pond  
13 turtle aquatic habitat could also have a negative effect on the species or its prey. AMM1–AMM6, and  
14 AMM10 would minimize the likelihood of such spills and would ensure measures are in place to  
15 prevent runoff from the construction area and potential effects of sediment or dust on western pond  
16 turtle or its prey.

17 Water operations would affect salinity gradients in Suisun Marsh. This effect mechanism cannot be  
18 disaggregated from tidal natural community restoration in Suisun Marsh. It is expected that the  
19 salinity of water in Suisun Marsh would generally increase as a result of water operations and  
20 operation of salinity control gates to mimic a more natural water flow. Results of modeling for full  
21 implementation of the BDCP show salinity to double by the late long-term compared with current  
22 conditions during late fall and winter months. Changes in salinity would not be uniform across  
23 Suisun Marsh, as salinity would likely be more pronounced in some tidal channels and sloughs than  
24 others, and most of the salinity increase would occur during the fall and winter. Western pond  
25 turtles are primarily a freshwater species, although they can also be found in brackish marsh, and  
26 could respond negatively to increased salinity in Suisun Marsh. However, most of the Suisun Marsh  
27 pond turtle observations have been in the interior drainage ditches or near water control structures  
28 not connected to tidal channels and sloughs in Suisun Marsh which is where increases in salinity  
29 would occur. Therefore, the potential effects associated with changes in salinity are not expected to  
30 adversely affect western pond turtles.

31 **NEPA Effects:** With implementation of AMM1–AMM6, AMM10, and AMM17 as part of Alternative 1C,  
32 the BDCP would avoid the potential for substantial adverse effects on western pond turtles, either  
33 directly or through habitat modifications. These AMMs would also avoid and minimize effects that  
34 could substantially reduce the number of western pond turtles or restrict the species range.  
35 Therefore, the indirect effects of Alternative 1C would not have an adverse effect on western pond  
36 turtle.

37 **CEQA Conclusion:** Indirect effects resulting from conservation measure operations and maintenance  
38 as well as construction-related noise and visual disturbances could impact western pond turtle in  
39 aquatic and upland habitats. The use of mechanical equipment during construction could cause the  
40 accidental release of petroleum or other contaminants that could affect western pond turtle or its  
41 prey. The inadvertent discharge of sediment or excessive dust adjacent to western pond turtle  
42 habitat could also have a negative effect on the species or its prey. Changes in water salinity would  
43 have a less-than-significant impact on western pond turtles because most of the salinity increases  
44 would occur in areas not used extensively by western pond turtles. With implementation of AMM1–

1 AMM6, AMM10, and AMM17 as part of Alternative 1C construction, operation, and maintenance, the  
2 BDCP would avoid the potential for substantial adverse effects on western pond turtles, either  
3 indirectly or through habitat modifications, and would not result in a substantial reduction in  
4 numbers or a restriction in the range of western pond turtles. The indirect effects of BDCP  
5 Alternative 1C would have a less-than-significant impact on western pond turtles.

6 **Impact BIO-54: Periodic Effects of Inundation of Western Pond Turtle Habitat as a Result of**  
7 **Implementation of Conservation Components**

8 *CM2 Yolo Bypass Fisheries Enhancement* would result in periodic inundation that could affect  
9 western pond turtle and its upland habitat. Appendix 5.J, *Effects on Natural Communities, Wildlife,*  
10 *and Plants*, provides the method used to estimate periodic inundation effects in the Yolo Bypass.  
11 Based on this method, periodic inundation could affect from an estimated 283 acres of habitat  
12 during 1,000 cfs notch flow to an estimated 798 acres of habitat during 4,000 cfs notch flow (Table  
13 12-4-23). This effect would occur during an estimated maximum of 30% of years, in areas that are  
14 already inundated in more than half of all years; therefore, these areas are expected to provide only  
15 marginal overwintering habitat for the western pond turtle under Existing Conditions. Furthermore,  
16 Yolo Bypass inundation is not expected to affect nesting western pond turtles because operations  
17 would not occur during the nesting season (approximately May through October). Therefore, Yolo  
18 Bypass operations are expect to have a minimal effect, if any, on western pond turtles in the Yolo  
19 Bypass.

20 *CM5 Seasonally Inundated Floodplain Restoration* would periodically inundate 331 acres of upland  
21 habitat for the western pond turtle in the south Delta (CZ 7). Seasonal flooding in restored  
22 floodplains is not expected to adversely affect aquatic and dispersal habitat, because these habitat  
23 functions are expected to remain in the seasonally inundated floodplains. Floodplains are not  
24 expected to be inundated during the nesting season, however, turtle hatchlings may overwinter in  
25 the nest and could be affected by flooding. Restored floodplains would transition for areas that flood  
26 frequently (e.g., every 1 to 2 years) to areas that flood infrequently (e.g., every 10 years or more);  
27 adverse effects on turtle hatchlings are most likely at the lower elevations of the restored floodplain,  
28 where frequent flooding occurs.

29 **NEPA Effects:** Periodic effects on upland habitat for western pond turtle from CM2 and CM5  
30 associated with implementing Alternative 1C are not expected to result in substantial adverse  
31 effects either directly or through habitat modifications, as it would not result in a substantial  
32 reduction in numbers or a restriction in the range of western pond turtles. Therefore, Alternative 1C  
33 would not adversely affect the species.

34 **CEQA Conclusion:** Flooding of the Yolo Bypass and creation of seasonally inundated floodplain in  
35 various parts of the study area would periodically affect 283-798 acres from CM2 and approximately  
36 331 acres from CM5 of upland habitat for western pond turtle. These acreages represent only 1% of  
37 the total upland western pond turtle habitat in the study area. Most of the increase in inundation  
38 would occur in the winter and early spring months, when western pond turtles may be in the water  
39 or overwintering and occupying upland habitats. Therefore, implementing Alternative 1C, including  
40 AMM1-AMM6, AMM10, and AMM17, would not be expected to result in substantial adverse effects  
41 on western pond turtle, either directly or through habitat modifications, because it would not result  
42 in a substantial reduction in numbers or a restriction in the range of western pond turtles. Periodic  
43 effects of inundation under Alternative 1C would have a less-than-significant impact on the species.

## 1 **Silvery Legless Lizard, San Joaquin Coachwhip, and Blainville's Horned Lizard**

2 This section describes the effects of Alternative 1C on the silvery legless lizard, San Joaquin  
3 coachwhip and Blainville's horned lizard (special-status reptiles). The habitat types used to assess  
4 effects on silvery legless lizard are limited to inland sand dunes near Antioch (CZ 9 and CZ 10),  
5 which would not be affected by construction or restoration activities. This species is not discussed  
6 any further.

7 The habitat types used to assess effects on the San Joaquin coachwhip are alkali seasonal wetland  
8 complex, grassland, and inland dune scrub west of Byron Highway (CZ 7) and west of Old River and  
9 West Canal (CZ 8). The habitat types used to assess effects on the Blainville's horned lizard are the  
10 same as those for the whipsnake in CZ 7 and CZ 8. There is also potential habitat for the horned  
11 lizard to occur in grassland habitat around Stone Lake (CZ 4) Although the expected range for San  
12 Joaquin coachwhip and Blainville's horned lizard extends into the study area, there are no records  
13 for either of these species within the study area (California Department of Fish and Wildlife 2013).

14 Alternative 1C is expected to result in the temporary and permanent removal of habitat that special-  
15 status reptiles uses for cover and dispersal (Table 12-1C-24). BDCP actions that could affect this  
16 habitat are limited to construction and maintenance of the water conveyance facilities in the vicinity  
17 of Clifton Court Forebay, and grassland restoration, protection and management. Full  
18 implementation of Alternative 1C would also include the following biological objectives over the  
19 term of the BDCP that would also benefit special-status reptiles (BDCP Chapter 3, *Conservation*  
20 *Strategy*).

- 21 ● Increase the size and connectivity of the reserve system by acquiring lands adjacent to and  
22 between existing conservation lands (Objective L1.6, associated with CM3).
- 23 ● Increase native species diversity and relative cover of native plant species, and reduce the  
24 introduction and proliferation of nonnative species (Objective L2.6, associated with CM11).
- 25 ● Protect and improve habitat linkages that allow terrestrial covered and other native species to  
26 move between protected habitats within and adjacent to the Plan Area (Objective L3.1,  
27 associated with CM3, CM8, and CM11).
- 28 ● Protect 8,000 acres of grassland (Objective GNC1.1, associated with CM3).
- 29 ● Restore 2,000 acres of grasslands to connect fragmented patches of protected grassland  
30 (Objective GNC1.2, associated with CM3 and CM8).

31 As explained below, with the restoration or protection of these amounts of habitat, in addition to  
32 implementation of AMMs, impacts on special-status reptiles would not be adverse for NEPA  
33 purposes and would be less than significant for CEQA purposes.

1 **Table 12-1C-24. Changes in Special-Status Reptile Habitat Associated with Alternative 1C (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	Grassland	204	204	146	146	NA	NA
<b>Total Impacts CM1</b>		<b>204</b>	<b>204</b>	<b>146</b>	<b>146</b>	<b>NA</b>	<b>NA</b>
CM2–CM18	Grassland	0	0	0	0	0	0
<b>Total Impacts CM2–CM18</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>TOTAL IMPACTS</b>		<b>204</b>	<b>204</b>	<b>146</b>	<b>146</b>	<b>0</b>	<b>0</b>

<sup>a</sup> See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities. Impact acres represent the maximum reported for both species, however, there were 13 fewer acres of permanent habitat loss and 2 fewer acres of temporary habitat loss for the Blainville’s horned lizard than for the coachwhip.

<sup>d</sup> Periodic effects were estimated for the late long-term only.

NT = near-term

LLT = late long-term

NA = not applicable

2

3 **Impact BIO-55: Loss or Conversion of Habitat for and Direct Mortality of Special-Status**  
4 **Reptiles**

5 Alternative 1C conservation measures would result in the permanent and temporary loss of 350  
6 acres of potential habitat for special-status reptiles in the study area (Table 12-1C-24). Water  
7 conveyance facilities and transmission line construction, including establishment and use of borrow  
8 and spoil areas, (CM1) would cause the loss of special-status reptile habitat. In addition, habitat  
9 enhancement and management activities (CM11), such as ground disturbance or removal of  
10 nonnative vegetation, could result in local adverse habitat effects for special-status reptiles. For  
11 purposes of this analysis, the acres of total effects are considered the same for both San Joaquin  
12 coachwhip and Blainville’s horned lizard, even though there would be slightly more acres (13) of  
13 permanent effects and two more acres of temporary effects on the San Joaquin coachwhip resulting  
14 from activities in CZ 4.

- 15 • In addition to habitat loss and conversion, construction activities, such as grading, the  
16 movement of construction vehicles or heavy equipment, and the installation of water  
17 conveyance facilities components and new transmission lines, may result in the direct mortality,  
18 injury, or harassment of special-status reptiles, including the potential crushing of individuals  
19 and disruption of essential behaviors. Construction of access roads could fragment suitable  
20 habitat, impede upland movements in some areas, and increase the risk of road mortality.  
21 Construction activities related to conservation components could have similar affects. Each of  
22 these individual activities is described below. A summary statement of the combined impacts  
23 and NEPA effects and a CEQA conclusion follow the individual conservation measure  
24 discussions. *CM1 Water Facilities and Operation*: Development of the conveyance facilities would  
25 result in the permanent loss of approximately 204 acres of potential habitat for special-status

1 reptiles in the vicinity of Clifton Court Forebay. Construction-related effects would temporarily  
2 disturb 146 acres of suitable habitat for special-status reptiles in the study area.

- 3 ● *CM11 Natural Communities Enhancement and Management*: A variety of habitat management  
4 actions included in CM11 that are designed to enhance wildlife values in BDCP-protected  
5 habitats may result in localized ground disturbances that could temporarily remove small  
6 amounts of special-status reptile habitat. Ground-disturbing activities, such as removal of  
7 nonnative vegetation and road and other infrastructure maintenance, are expected to have  
8 minor adverse effects on available special-status reptile habitat and are expected to result in  
9 overall improvements to and maintenance of species habitat values over the term of the BDCP.  
10 These effects cannot be quantified, but are expected to be minimal and would be reduced  
11 through implementation of Mitigation Measure BIO-55, *Conduct Preconstruction Surveys for*  
12 *Noncovered Special-Status Reptiles and Implement Applicable CM22 Measures*.
- 13 ● *Operations and maintenance*: Ongoing facilities operation and maintenance is expected to have  
14 little if any adverse effect on special-status reptiles. Postconstruction operation and  
15 maintenance of the above-ground water conveyance facilities could result in ongoing but  
16 periodic disturbances that could affect special-status reptiles' use of suitable habitat in study  
17 area. These effects, however, would be minimized with implementation of Mitigation Measure  
18 BIO-55.
- 19 ● *Injury and direct mortality*: Construction vehicle activity may cause injury to or mortality of  
20 special-status reptiles. The operation of equipment for land clearing, construction, operation  
21 and maintenance, and restoration, enhancement, and management activities could result in  
22 injury or mortality. This risk is highest from late fall through early spring, when special-status  
23 reptiles are not as active. Increased vehicular traffic associated with BDCP actions could  
24 contribute to a higher incidence of road kill. However, conducting construction during the late-  
25 spring through early fall periods when feasible and implementation of Mitigation Measure BIO-  
26 55 would avoid and minimize injury or mortality of special-status reptiles during construction.

27 The following paragraphs summarize the combined effects discussed above and describe other  
28 BDCP conservation actions that offset or avoid these effects. NEPA effects and a CEQA conclusion are  
29 also included.

### 30 ***Near-Term Timeframe***

31 Because the water conveyance facilities construction is being evaluated at the project level, the near-  
32 term BDCP conservation strategy has been evaluated to determine whether it would provide  
33 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
34 construction effects would not be adverse under NEPA.

35 Alternative 1C would remove 350 acres of grassland habitat for special-status reptiles in the study  
36 area. The typical NEPA mitigation ratio (2:1 for protection) for this natural community would  
37 indicate that up to 700 acres should be protected for both species in the near-term to offset CM1  
38 losses.

39 The BDCP has committed to near-term restoration of 1,140 acres of grassland (CM8) and protection  
40 of up to 2,000 acres of grassland in the Plan Area (CM3). These conservation actions are all  
41 associated with CM3 and CM8 and would occur in the same timeframe as CM1 construction and  
42 early restoration losses, thereby avoiding adverse effects on special-status reptiles.

1 Considering the BDCP conservation strategy and the implementation of Mitigation Measure BIO-55,  
2 which would avoid and minimize injury or mortality of special-status reptiles during construction,  
3 the permanent and temporary loss of special-status reptile habitat and the potential mortality of  
4 either species from Alternative 1C would not be an adverse effect.

5 ***Late Long-Term Timeframe***

6 Alternative 1C as a whole would result in the permanent loss of up to 350 acres of special-status  
7 reptile habitat over the life of the plan.

8 Effects of water conveyance facilities construction would be offset through the plan's long-term  
9 commitment to protect 8,000 acres of grassland, and grassland associated with alkali seasonal  
10 wetlands and vernal pool complexes, and to restore 2,000 acres of grassland in the Plan Area.  
11 Grassland protection would focus in particular on acquiring the largest remaining contiguous  
12 patches of unprotected grassland habitat, which are located south of SR 4 in CZ 8 (Objective  
13 GNC1.1). This area connects to more than 620 acres of existing habitat that is protected under the  
14 East Contra Costa County HCP/NCCP.

15 Other effects, specifically injury or mortality of special-status reptiles, would be addressed through  
16 implementation of Mitigation Measure BIO-55. The plan as a whole is expected to benefit special-  
17 status reptiles that could be present by protecting potential habitat from loss or degradation that  
18 otherwise could occur with future changes in existing land use. To the extent that grassland habitat  
19 is restored in CZ 8, restoration would remove unsuitable special-status reptile habitat, such as  
20 cultivated land, and replace it with high-value cover, foraging, and dispersal habitat. The overall  
21 effect would be beneficial because Alternative 1C would result in a net increase in acreage of  
22 grassland habitat in the Plan Area.

23 BDCP's commitment to protect the largest remaining contiguous habitat patches (including  
24 grasslands and the grassland component of alkali seasonal wetland and vernal pool complexes) in  
25 CZ 8 would sufficiently offset the adverse effects resulting from water conveyance facilities  
26 construction.

27 ***NEPA Effects:*** In the near-term and late long-term, the loss of special-status reptile habitat under  
28 Alternative 1C would not be adverse because the BDCP has committed to protecting the acreage  
29 required to meet the typical mitigation ratios described above. However, injury or mortality of  
30 special-status reptiles as a result of Alternative 1C implementation would be an adverse effect.  
31 Mitigation Measure BIO-55 would be available to address this effect.

32 ***CEQA Conclusion:***

33 ***Near-Term Timeframe***

34 Because the water conveyance facilities construction is being evaluated at the project level, the near-  
35 term BDCP conservation strategy has been evaluated to determine whether it would provide  
36 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
37 construction effects would be less than significant under CEQA.

38 Alternative 1C would remove 350 acres of grassland habitat for special-status reptiles in the study  
39 area. The typical CEQA mitigation ratio (2:1 for protection) for this natural community would  
40 indicate that up to 700 acres should be protected for both species in the near-term to offset CM1  
41 losses.

1 The BDCP has committed to near-term restoration of 1,140 acres of grassland (CM8) and protection  
2 of up to 2,000 acres of grassland in the Plan Area (CM3). These conservation actions are all  
3 associated with CM3 and CM8 and would occur in the same timeframe as CM1 construction and  
4 early restoration losses, thereby avoiding adverse effects on special-status reptiles.

5 The natural community restoration and protection activities are expected to be concluded during  
6 the first 10 years of Plan implementation, which is close enough to the timing of construction  
7 impacts to constitute mitigation for CEQA purposes. Considering the BDCP conservation strategy  
8 and the implementation of Mitigation Measure BIO-55, which would reduce the impact of injury or  
9 mortality of special-status reptiles, the permanent and temporary loss of special-status reptile  
10 habitat and the potential mortality of either species would be a less-than-significant impact.

### 11 ***Late Long-Term Timeframe***

12 Alternative 1C as a whole would result in the permanent loss of 350 acres of habitat for special-  
13 status reptiles over the life of the plan.

14 Effects of water conveyance facilities construction would be offset through the plan's long-term  
15 commitment to protect up to 8,000 acres of grassland, and grassland associated with alkali seasonal  
16 wetlands and vernal pool complexes, and to restore 2,000 acres of grassland in the Plan area  
17 (Objective GNC1.1 and Objective GNC1.2). Grassland protection would focus in particular on  
18 acquiring the largest remaining contiguous patches of unprotected grassland habitat, which are  
19 located south of SR 4 in CZ 8 (Objective GNC1.1). This area connects to more than 620 acres of  
20 existing habitat that is protected under the East Contra Costa County HCP/NCCP.

21 Injury or mortality of special-status reptiles would be a significant impact that would be reduced  
22 through implementation of Mitigation Measure BIO-55.

23 The plan as a whole is expected to benefit special-status reptiles that could be present by protecting  
24 potential habitat from loss or degradation that otherwise could occur with future changes in existing  
25 land use. To the extent that grassland habitat is restored in CZ 8, restoration would remove  
26 unsuitable special-status reptile habitat, such as cultivated land, and replace it with high-value  
27 cover, foraging, and dispersal habitat. The overall effect would be beneficial because Alternative 1C  
28 would result in a net increase in acreage of grassland habitat in the study area.

29 BDCP's commitment to protect the largest remaining contiguous habitat patches (including  
30 grasslands and the grassland component of alkali seasonal wetland and vernal pool complexes) in  
31 CZ 8 would sufficiently offset the adverse effects resulting from water conveyance facilities  
32 construction. Considering the BDCP conservation strategy, the permanent and temporary loss of  
33 special-status reptile habitat under Alternative 1C would not result in a significant impact. Injury or  
34 mortality of special-status reptiles as a result of Alternative 1C implementation would have a  
35 significant impact on these species. Implementation of Mitigation Measure BIO-55 would reduce this  
36 impact to a less-than-significant level.

### 37 **Mitigation Measure BIO-55: Conduct Preconstruction Surveys for Noncovered Special- 38 Status Reptiles and Implement Applicable CM22 Measures**

39 DWR will retain a qualified biologist to conduct a habitat assessment in areas that are relatively  
40 undisturbed or have a moderate to high potential to support noncovered special-status reptiles  
41 (Blainville's horned lizard and San Joaquin coachwhip) in CZ 4, CZ 7, and CZ 8. The qualified  
42 biologist will survey for noncovered special-status reptiles in areas of suitable habitat

1 concurrent with the preconstruction surveys for covered species in CZ 4, CZ 7, and CZ 8. If  
2 special-status reptiles are detected, the biologist will passively relocate the species out of the  
3 work area prior to construction if feasible.

4 In addition, *CM22 Avoidance and Minimization Measures*, specifically *AMM1 Worker Awareness*  
5 *Training*, *AMM2 Construction Best Management Practices and Monitoring*, *AMM6 Disposal and*  
6 *Reuse of Spoils*, *Reusable Tunnel Material*, and *Dredged Material*, and *AMM10 Restoration of*  
7 *Temporarily Affected Natural Communities*, would be implemented for all noncovered special-  
8 status reptiles adversely affected by the BDCP to avoid, minimize, or compensate for impact.

### 9 **Impact BIO-56: Indirect Effects of Plan Implementation on Special-Status Reptile Species**

10 Construction activities associated with water conveyance facilities, conservation components and  
11 ongoing habitat enhancement, as well as operations and maintenance of above-ground water  
12 conveyance facilities, including the transmission facilities, could result in ongoing periodic  
13 postconstruction disturbances and noise with localized effects on special-status reptiles and their  
14 habitat over the term of the BDCP. In addition, construction activities could indirectly affect special-  
15 status reptiles if construction resulted in the introduction of invasive weeds that create vegetative  
16 cover that is too dense for the species to navigate. Construction vehicles and equipment can  
17 transport in their tires and various parts under the vehicles invasive weed seeds and vegetative  
18 parts from other regions to construction sites, resulting in habitat degradation. These potential  
19 effects would be reduced through implementation of *AMM10 Restoration of Temporarily Affected*  
20 *Natural Communities*.

21 Water conveyance facilities operations and maintenance activities would include vegetation and  
22 weed control, ground squirrel control, canal maintenance, infrastructure and road maintenance,  
23 levee maintenance, and maintenance and upgrade of electrical systems. While maintenance  
24 activities are not expected to remove special-status reptile habitat, operation of equipment could  
25 disturb small areas of vegetation around maintained structures and could result in injury or  
26 mortality of individual special-status reptiles, if present.

27 **NEPA Effects:** Implementation of the Mitigation Measure BIO-55 would avoid the potential for  
28 substantial adverse effects on these species, either indirectly or through habitat modifications. The  
29 mitigation measure would also avoid and minimize effects that could substantially reduce the  
30 number of special-status reptiles, or restrict either species' range. Therefore, with implementation  
31 of Mitigation Measure BIO-55, the indirect effects of Alternative 1C on special-status reptiles would  
32 not be adverse under NEPA.

33 **CEQA Conclusion:** Indirect effects from conservation measure operations and maintenance as well  
34 as construction-related noise and visual disturbances could impact special-status reptiles. In  
35 addition, construction activities could indirectly affect special-status reptiles if construction resulted  
36 in the introduction of invasive weeds that create vegetative cover that is too dense for the species to  
37 navigate. Water conveyance facilities operations and maintenance activities, such as vegetation and  
38 weed control, and road maintenance, are not expected to remove special-status reptile habitat, but  
39 operation of equipment could disturb small areas of vegetation around maintained structures and  
40 could result in injury or mortality of individual special-status reptiles, if present. Mitigation Measure  
41 BIO-55, *Conduct Preconstruction Surveys for Noncovered Special-Status Reptiles and Implement*  
42 *Applicable CM22 Measures*, would reduce these impacts.

1 With implementation of Mitigation Measure BIO-55 as part of Alternative 1C construction,  
2 operation, and maintenance, the BDCP would avoid the potential for significant effects on special-  
3 status reptile species, either indirectly or through habitat modifications, and would not result in a  
4 substantial reduction in numbers or a restriction in the range of either species. With implementation  
5 of Mitigation Measures BIO-55, the indirect effects of BDCP Alternative 1C would have a less-than-  
6 significant impact on special-status reptiles.

7 **Mitigation Measure BIO-55: Conduct Preconstruction Surveys for Noncovered Special-  
8 Status Reptiles and Implement Applicable CM22 Measures**

9 See description of Mitigation Measure BIO-55 under Impact BIO-55.

10 **California Black Rail**

11 This section describes the effects of Alternative 1C, including water conveyance facilities  
12 construction and implementation of other conservation components, on the California black rail.  
13 The habitat model used to assess effects for the California black rail is based on primary breeding  
14 habitat and secondary habitat. Primary (breeding) habitat for this species within the Delta includes  
15 all *Schoenoplectus* and *Typha*-dominated tidal and nontidal freshwater emergent wetland in patches  
16 greater than 0.55 acre (essentially instream islands of the San Joaquin River and its tributaries and  
17 White Slough Wildlife Area). In Suisun Marsh, primary habitat includes all *Schoenoplectus* and  
18 *Typha*-dominated, and *Salicornia*-dominated patches greater than 0.55 acre, with the exception that  
19 all low marsh habitats dominated by *Schoenoplectus acutus* and *S. californicus* and all managed  
20 wetlands, in general, are considered secondary habitat with lesser ecological value. Upland  
21 transitional zones, providing refugia during high tides, within 150 feet of the tidal wetland edge  
22 were also included as secondary habitat. Secondary habitats generally provide only a few ecological  
23 functions such as foraging (low marsh and managed wetlands) or extreme high tide refuge (upland  
24 transition zones), while primary habitats provide multiple functions, including breeding, effective  
25 predator cover, and value foraging opportunities.

26 Construction and restoration associated with Alternative 1C conservation measures would result in  
27 both temporary and permanent losses of California black rail modeled habitat as indicated in Table  
28 12-1C-25. Full implementation of Alternative 1C would also include the following conservation  
29 actions over the term of the BDCP to benefit the California black rail (BDCP Chapter 3, Section 3.3,  
30 *Biological Goals and Objectives*).

- 31 ● Restore or create at least 6,000 acres of tidal brackish emergent wetland in CZ 11, including at  
32 least 1,500 acres of middle and high marsh (Objectives TBEWNC1.1 and TBEWNC1.2, associated  
33 with CM4).
- 34 ● Restore or create at least 24,000 acres of tidal freshwater emergent wetland in CZs 1, 2, 4, 5, 6,  
35 and/or 7 (Objective TFEWNC1.1, associated with CM4).
- 36 ● Protect and enhance at least 8,100 acres of managed wetland, at least 1,500 acres of which are  
37 in the Grizzly Island Marsh Complex (Objective MWNC1.1, associated with CM3).
- 38 ● Create 1,700 acres of black rail habitat between restored tidal freshwater emergent wetlands  
39 and transitional uplands to provide upland refugia (Objective CBR1.1, associated with CM4).
- 40 ● Create topographic heterogeneity in restored tidal brackish and freshwater emergent wetlands  
41 (Objectives TBEWNC1.4 and TFEWNC2.2, associated with CM4).

- Limit perennial pepperweed to no more than 10% cover in the tidal brackish emergent wetland natural community within the reserve system (Objective TBEWNC2.1, associated with CM11).

As explained below, with the restoration and protection of these amounts of habitat, in addition to natural community enhancement and management commitments (including *CM12 Methylmercury Management*) and the implementation of AMM1–AMM7, AMM18 *California Clapper Rail and California Black Rail*, and AMM27 *Selenium Management*, impacts on the California black rail would not be adverse for NEPA purposes and would be less than significant for CEQA purposes.

**Table 12-1C-25. Changes in California Black Rail Modeled Habitat Associated with Alternative 1C (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	Primary	0	0	5	5	NA	NA
	Secondary	0	0	0	0	NA	NA
<b>Total Impacts CM1</b>		<b>0</b>	<b>0</b>	<b>5</b>	<b>5</b>	<b>NA</b>	<b>NA</b>
CM2–CM18	Primary	76	84	0	0	0	0
	Secondary	986	3,044	0	0	0	0
<b>Total Impacts CM2–CM18</b>		<b>1,062</b>	<b>3,128</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>TOTAL IMPACTS</b>		<b>1,062</b>	<b>3,128</b>	<b>5</b>	<b>5</b>	<b>0</b>	<b>0</b>

<sup>a</sup> See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only.

NT = near-term

LLT = late long-term

NA = not applicable

### Impact BIO-57: Loss or Conversion of Habitat for and Direct Mortality of California Black Rail

Alternative 1C conservation measures would result in the combined permanent and temporary loss of up to permanent loss of and temporary effects on up to 89 acres of primary habitat and 3,044 acres of secondary habitat for California black rail (Table 12-1C-25). Conservation measures that would result in these losses are conveyance facilities and transmission line construction, and establishment and use of borrow and spoil areas (CM1) and tidal natural communities restoration (CM4). Habitat enhancement and management activities (CM11), which include ground disturbance or removal of nonnative vegetation, could result in local adverse habitat effects. In addition, maintenance activities associated with the long-term operation of the water conveyance facilities and other BDCP physical facilities could degrade or eliminate California black rail habitat. Each of these individual activities is described below. A summary statement of the combined impacts, NEPA effects, and a CEQA conclusion follow the individual conservation measure discussions.

- 1       ● *CM1 Water Facilities and Operation*: There would be no permanent loss of California black rail  
2       habitat from the construction of the Alternative 1C conveyance facilities, however 5 acres of  
3       primary habitat would be temporarily impacted (Table 12-1C-25). This loss would be the result  
4       of canal siphon construction across Rock Slough near its junction with the Contra Costa Canal,  
5       and transmission corridor construction along the tunnel alignment in the west and south Delta  
6       (see the Terrestrial Mapbook for details of construction locations). The construction footprint  
7       for CM1 does not overlap with any California black rail occurrences. The implementation of  
8       *AMM19 California Clapper Rail and California Black Rail* (BDCP Appendix 3.C, *Avoidance and*  
9       *Minimization Measures*) would minimize the effects of construction on adjacent rails if present in  
10      the area. Habitat loss from CM1 would occur within the first 10 years of Alternative 1C  
11      implementation.
- 12      ● *CM2 Yolo Bypass Fisheries Enhancement*: Construction or channel modification from fish passage  
13      improvements associated with the Yolo Bypass would result in the permanent removal of  
14      approximately 5 acres of primary California black rail habitat in CZ 2. There are no occurrences  
15      of California black rail that intersect with the CM1 footprint. The loss is expected to occur during  
16      the first 10 years of Alternative 1C implementation.
- 17      ● *CM4 Tidal Natural Communities Restoration*: California black rail modeled habitat would be  
18      affected by tidal marsh restoration. Some California black rail modeled habitat would be  
19      permanently lost such that it no longer serves as habitat, while other modeled habitat would  
20      change value through conversion from one habitat type to another. Tidal habitat restoration site  
21      preparation and inundation would result in the permanent loss of 79 acres of primary habitat  
22      and 3,044 acres of secondary habitat for California black rail. Of the 79 acres of primary habitat  
23      lost, an estimated 76 acres would be converted to low marsh, or secondary habitat, for the  
24      species due to increased water elevations.

25      The majority of the effects of tidal natural communities restoration would occur in Suisun Marsh  
26      (CZ 11). Much of the natural wetland habitat that would be removed occurs in isolated patches  
27      and would be replaced by larger continuous areas of tidal wetlands that are expected to support  
28      higher habitat functions for the rail than the impacted wetlands. As described in the BDCP,  
29      restoration of up to 24,000 acres of tidal freshwater emergent wetland in the Delta and at least  
30      6,000 acres of tidal brackish emergent wetland natural communities in CZ 11 by the late long-  
31      term would benefit California black rail. The primary habitat for the species in the Delta consists  
32      of in channel islands, which are in areas that are most vulnerable to the effects of sea level rise in  
33      the study area. Tidal restoration under CM4 would ensure that land is protected adjacent to  
34      current habitat in the delta with the consideration of sea level rise. Tidal restoration projects  
35      would include an ecotone between wetlands and transitional uplands which would provide  
36      upland refugia for the species.

37      The tidal natural communities restoration would be phased through the course of the BDCP  
38      restoration program to allow for recovery of some areas before the initiation of restoration  
39      actions in other areas. However, California black rails have a greater use of mature tidal marshes  
40      and, therefore, it would be years before the newly restored marshes provided suitable habitat  
41      for the species. In the long-term, tidal natural communities restoration is expected to have little  
42      to no adverse effects on California black rail habitat because the habitat removed would be  
43      replaced by a greater acreage of high-value tidal wetland and, thus, is expected to provide a  
44      benefit for California black rail.

- 1       • *CM11 Natural Communities Enhancement and Management*: A variety of habitat management  
2 actions contained in *CM11 Natural Communities Enhancement and Management* that are  
3 designed to enhance wildlife values in restored and protected tidal wetland habitats may result  
4 in localized ground disturbances that could temporarily remove small amounts of California  
5 black rail habitat. Ground-disturbing activities, such as removal of nonnative vegetation and  
6 road and other infrastructure maintenance activities, are expected to have minor adverse effects  
7 on available California black rail habitat and are expected to result in overall improvements and  
8 maintenance of California black rail habitat values over the term of the BDCP. Noise and visual  
9 disturbances during implementation of habitat management actions could also result in  
10 temporary disturbances that affect California black rail use of the surrounding habitat. These  
11 effects cannot be quantified, but would be avoided and minimized by the AMMs listed below.  
12 Additional actions under CM11 include the control of nonnative predators to reduce nest  
13 predation as needed.
- 14       • *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground  
15 water conveyance facilities and restoration infrastructure could result in ongoing but periodic  
16 disturbances that could affect California black rail use of the surrounding habitat in Suisun and  
17 the central Delta. Maintenance activities would include vegetation management, levee and  
18 structure repair, and re-grading of roads and permanent work areas. These effects, however,  
19 would be reduced by AMMs and conservation actions as described below.
- 20       • *Injury and Direct Mortality*: Construction vehicle activity may cause injury or mortality to  
21 California black rail. If rails are present adjacent to covered activities, the operation of  
22 equipment for land clearing, construction, conveyance facilities operation and maintenance, and  
23 habitat restoration, enhancement, and management could result in injury or mortality of  
24 California black rail. Increased vehicular traffic associated with BDCP actions could contribute to  
25 a higher incidence of road kill. However, conducting construction outside of the breeding season  
26 where feasible (reducing the risk of impacting active nests), construction monitoring, and other  
27 measures would be implemented to avoid and minimize injury or mortality of the species during  
28 construction, as required by AMM1–AMM7 and *AMM19 California Clapper Rail and California*  
29 *Black Rail* listed below.

30       The following paragraphs summarize the combined effects discussed above and describe other  
31 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also  
32 included.

### 33       ***Near-Term Timeframe***

34       Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
35 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
36 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
37 effects of construction would not be adverse under NEPA. With Alternative 1C implementation,  
38 there would be a loss of 1,067 acres of modeled habitat for California black rail in the study area in  
39 the near-term. These effects would result from the construction of the water conveyance facilities  
40 (CM1, 5 acres of temporary loss of primary habitat), and implementing other conservation measures  
41 (CM2 Yolo Bypass Fisheries Enhancement and CM4 Tidal Natural Communities Restoration–76  
42 acres of primary habitat, 986 acres of secondary habitat).

43       The typical NEPA and CEQA project-level mitigation ratio for those natural communities that would  
44 be affected and that are identified in the biological goals and objectives for California black rail in

1 Chapter 3 of the BDCP would be 1:1 for restoration/creation of wetland natural communities such  
2 as tidal freshwater emergent wetland, tidal brackish emergent wetland, and managed wetland.  
3 Using this ratio would indicate that 5 acres of tidal natural communities should be restored/created  
4 to compensate for the CM1 losses of California black rail habitat. The near-term effects of other  
5 conservation actions would remove 1,062 acres of tidal natural communities, therefore requiring  
6 1,062 acres of tidal natural communities restoration using the same typical NEPA and CEQA ratio  
7 (1:1 for restoration).

8 The BDCP has committed to near-term goals of restoring 2,000 acres of tidal brackish emergent  
9 wetland, 8,850 acres of tidal freshwater emergent wetland, and 4,800 acres of managed wetland in  
10 the Plan Area (Table 3-4 in Chapter 3, *Description of Alternatives*). These conservation actions are all  
11 associated with CM4 and would occur in the same timeframe as the construction and early  
12 restoration losses, thereby avoiding adverse effects of habitat loss on California black rail. The tidal  
13 brackish emergent wetland would be restored in CZ 11 among the Western Suisun/Hill Slough  
14 Marsh Complex, the Suisun Slough/Cutoff Slough Marsh Complex, and the Nurse Slough/Denverton  
15 Marsh complex (Objective TBEWNC1.1 in BDCP Chapter 3, *Conservation Strategy*) and the tidal  
16 freshwater emergent wetland would be restored in CZ 1, CZ 2, CZ 4, CZ 5, CZ 6, and/or CZ 7  
17 (Objective TFEWNC1.1). In addition, tidal brackish and tidal freshwater emergent wetlands would  
18 be restored in a way that creates topographic heterogeneity and in areas that increase connectivity  
19 among protected lands (Objectives TBEWNC1.4 and TFEWNC2.2). Portions of the 4,800 acres of  
20 managed wetland protected and enhanced in CZ 11 would benefit the California black rail through  
21 the enhancement of degraded areas (such as areas of bare ground or marsh where the predominant  
22 vegetation consists of invasive species such as perennial pepperweed) to vegetation such as  
23 pickleweed-alkali heath-American bulrush plant associations (Objective MWNC1.1). These Plan  
24 objectives represent performance standards for considering the effectiveness of CM4 restoration  
25 actions. The acres of restoration and protection contained in the near-term Plan goals and the  
26 additional detail in the biological objectives for California black rail satisfy the typical mitigation that  
27 would be applied to the project-level effects of CM1, as well as mitigate the near-term effects of the  
28 other conservation measures.

29 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
30 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
31 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
32 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
33 *Material*, *AMM7 Barge Operations Plan*, and *AMM19 California Clapper Rail and California Black Rail*.  
34 All of these AMMs include elements that would avoid or minimize the risk of affecting individuals  
35 and species habitats adjacent to work areas. The AMMs are described in detail in BDCP Appendix  
36 3.C, *Avoidance and Minimization Measures*.

### 37 **Late Long-Term Timeframe**

38 The study area supports approximately 7,467 acres of primary and 17,915 acres of secondary  
39 habitat for California black rail. Alternative 1C as a whole would result in the permanent loss of and  
40 temporary effects on 89 acres of primary habitat and 3,044 acres of secondary habitat for California  
41 black rail during the term of the Plan (1% of the total primary habitat in the study area and 17% of  
42 the total secondary habitat in the study area). The locations of these losses are described above in  
43 the analyses of individual conservation measures. The Plan includes conservation commitments  
44 through *CM4 Tidal Natural Communities Restoration* to restore or create at least 6,000 acres of tidal  
45 brackish emergent wetland in CZ 11 (Objective TBEWNC1.1) and at least 24,000 acres of tidal

1 freshwater emergent wetland in CZs 1, 2, 4, 5, 6, and/or 7 (Objective TFEWNC1.1). These tidal  
2 wetlands would be restored as a mosaic of large, interconnected and biologically diverse patches,  
3 and at least 1,500 acres of restored marsh would consist of middle-and high-marsh vegetation with  
4 dense, tall stands of pickleweed and bulrush cover serving as primary habitat for California black  
5 rail in Suisun Marsh (Objective TBEWNC1.1). In the Delta, at least 1,700 acres of upland refugia for  
6 California black rail would be created between the restored tidal freshwater emergent wetlands and  
7 transitional uplands to provide cover from predators (Objectives TBEWNC1.4, TFEWNC2.2, and  
8 CBR1.1). Portions of the 8,100 acres of managed wetland protected and enhanced in CZ 11 as part of  
9 *CM3 Natural Communities Protection and Restoration* would benefit the California black rail through  
10 the enhancement of degraded areas (such as areas of bare ground or marsh where the predominant  
11 vegetation consists of invasive species such as perennial pepperweed) to vegetation such as  
12 pickleweed-alkali heath-American bulrush plant associations (Objective MWNC1.1). Additional  
13 pressures on the species such as loss of habitat from invasive species and mortality from nest  
14 predators would also be addressed through the BDCP. Perennial pepperweed, which outcompetes  
15 suitable nesting habitat for California black rail (such as pickleweed) would be reduced to no more  
16 than 10% cover in the tidal brackish emergent wetland natural community within CZ 11 (Objective  
17 TBEWNC2.1). In addition, nonnative predators would be controlled to reduce nest predation if  
18 necessary through *CM11 Natural Communities Enhancement and Management*.

19 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*  
20 *Plant Species*) estimates that the restoration and protection actions discussed above would result in  
21 the restoration of 3,579 acres of primary habitat and 12,115 acres of secondary habitat for  
22 California black rail and the protection of 275 acres of secondary habitat for the species.

23 **NEPA Effects:** The loss of California black rail habitat and potential direct mortality of this special-  
24 status species under Alternative 1C would represent an adverse effect in the absence of other  
25 conservation actions. However, with habitat protection and restoration associated with CM4, guided  
26 by the biological objectives for the species and by *AMM1 Worker Awareness Training, AMM2*  
27 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*  
28 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
29 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
30 *Material, AMM7 Barge Operations Plan, and AMM19 California Clapper Rail and California Black Rail,*  
31 which would be in place throughout the construction period, the effects of Alternative 1C as a whole  
32 on California black rail would not be adverse under NEPA.

### 33 **CEQA Conclusion:**

#### 34 **Near-Term Timeframe**

35 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
36 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
37 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
38 effects of construction would be less than significant under CEQA. With Alternative 1C  
39 implementation, there would be a loss of 1,067 acres of modeled habitat for California black rail in  
40 the study area in the near-term. These effects would result from the construction of the water  
41 conveyance facilities (CM1, 5 acres of temporary loss of primary habitat), and implementing other  
42 conservation measures (CM2 Yolo Bypass Fisheries Enhancement and CM4 Tidal Natural  
43 Communities Restoration—76 acres of primary habitat, 986 acres of secondary habitat).

1 The typical NEPA and CEQA project-level mitigation ratio for those natural communities that would  
2 be affected and that are identified in the biological goals and objectives for California black rail in  
3 Chapter 3 of the BDCP would be 1:1 for restoration/creation of wetland natural communities such  
4 as tidal freshwater emergent wetland, tidal brackish emergent wetland, and managed wetland.  
5 Using this ratio would indicate that 5 acres of tidal natural communities should be restored/created  
6 to compensate for the CM1 losses of California black rail habitat. The near-term effects of other  
7 conservation actions would remove 1,062 acres of tidal natural communities, therefore requiring  
8 1,062 acres of tidal natural communities restoration using the same typical NEPA and CEQA ratio  
9 (1:1 for restoration).

10 The BDCP has committed to near-term goals of restoring 2,000 acres of tidal brackish emergent  
11 wetland, 8,850 acres of tidal freshwater emergent wetland, and 4,800 acres of managed wetland in  
12 the Plan Area (Table 3-4 in Chapter 3, *Description of Alternatives*). These conservation actions are all  
13 associated with CM4 and would occur in the same timeframe as the construction and early  
14 restoration losses, thereby avoiding adverse effects of habitat loss on California black rail. The tidal  
15 brackish emergent wetland would be restored in CZ 11 among the Western Suisun/Hill Slough  
16 Marsh Complex, the Suisun Slough/Cutoff Slough Marsh Complex, and the Nurse Slough/Denverton  
17 Marsh complex (Objective TBEWNC1.1) and the tidal freshwater emergent wetland would be  
18 restored in CZ 1, CZ 2, CZ 4, CZ 5, CZ 6, and/or CZ 7 (Objective TFEWNC1.1). In addition, tidal  
19 brackish and tidal freshwater emergent wetlands would be restored in a way that creates  
20 topographic heterogeneity and in areas that increase connectivity among protected lands  
21 (Objectives TBEWNC1.4 and TFEWNC2.2). Portions of the 4,800 acres of managed wetland  
22 protected and enhanced in CZ 11 would benefit the California black rail through the enhancement of  
23 degraded areas (such as areas of bare ground or marsh where the predominant vegetation consists  
24 of invasive species such as perennial pepperweed) to vegetation such as pickleweed-alkali heath-  
25 American bulrush plant associations (Objective MWNC1.1). These Plan objectives represent  
26 performance standards for considering the effectiveness of CM4 restoration actions.

27 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*  
28 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*  
29 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
30 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
31 *Material, AMM7 Barge Operations Plan, and AMM19 California Clapper Rail and California Black Rail.*  
32 All of these AMMs include elements that would avoid or minimize the risk of affecting individuals  
33 and species habitats adjacent to work areas. The AMMs are described in detail in BDCP Appendix  
34 3.C, *Avoidance and Minimization Measures*.

35 The natural community restoration and protection activities would be concluded in the first 10  
36 years of Alternative 1C implementation, which is close enough in time to the occurrence of impacts  
37 to constitute adequate mitigation for CEQA purposes. In addition, *AMM19 California Clapper Rail and*  
38 *California Black Rail* and AMM1–AMM7 would avoid and minimize potential impacts on the species  
39 from construction-related habitat loss and noise and disturbance. Because the number of acres  
40 required to meet the typical mitigation ratio described above would be only 3,608 acres of  
41 restored/created tidal natural communities, the 10,850 acres of tidal brackish and tidal freshwater  
42 emergent wetland restoration and the 4,100 acres of managed wetland protection and enhancement  
43 contained in the near-term Plan goals, and the additional detail in the biological objectives for  
44 California black rail, are more than sufficient to support the conclusion that the near-term impacts of  
45 habitat loss and direct mortality under Alternative 1C would be less than significant under CEQA.

1 **Late Long-Term Timeframe**

2 The study area supports approximately 7,467 acres of primary and 17,915 acres of secondary  
 3 habitat for California black rail. Alternative 1C as a whole would result in the permanent loss of and  
 4 temporary effects on 89 acres of primary habitat and 3,044 acres of secondary habitat for California  
 5 black rail during the term of the Plan (1% of the total primary habitat in the study area and 17% of  
 6 the total secondary habitat in the study area). The locations of these losses are described above in  
 7 the analyses of individual conservation measures. The Plan includes conservation commitments  
 8 through *CM4 Tidal Natural Communities Restoration* to restore or create at least 6,000 acres of tidal  
 9 brackish emergent wetland in CZ 11 (Objective TBEWNC1.1) and at least 24,000 acres of tidal  
 10 freshwater emergent wetland in CZs 1, 2, 4, 5, 6, and/or 7 (TFEWNC1.1). These tidal wetlands would  
 11 be restored as a mosaic of large, interconnected and biologically diverse patches and much of the  
 12 restored marsh would consist of middle-and high-marsh vegetation with dense, tall stands of  
 13 pickleweed and bulrush cover, serving as primary habitat for California black rail in Suisun Marsh  
 14 (Objective TBEWNC1.1). In the Delta, at least 1,700 acres of upland refugia for California black rail  
 15 would be created between the restored tidal freshwater emergent wetlands and transitional  
 16 uplands to provide cover from predators (Objectives TBEWNC1.4, TFEWNC2.2, and CBR1.1).  
 17 Portions of the 8,100 acres of managed wetland protected and enhanced in CZ 11 as part of *CM3*  
 18 *Natural Communities Protection and Restoration* would benefit the California black rail through the  
 19 enhancement of degraded areas (such as areas of bare ground or marsh where the predominant  
 20 vegetation consists of invasive species such as perennial pepperweed) to vegetation such as  
 21 pickleweed-alkali heath-American bulrush plant associations (Objective MWNC1.1). Additional  
 22 pressures on the species such as loss of habitat from invasive species and mortality from nest  
 23 predators would also be addressed through the BDCP. Perennial pepperweed, which outcompetes  
 24 suitable nesting habitat for California black rail (such as pickleweed) would be reduced to no more  
 25 than 10% cover in the tidal brackish emergent wetland natural community within CZ 11  
 26 (TBEWNC2.1). In addition, nonnative predators would be controlled to reduce nest predation if  
 27 necessary through *CM11 Natural Communities Enhancement and Management*.

28 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
 29 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
 30 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
 31 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
 32 *Material*, *AMM7 Barge Operations Plan*, and *AMM19 California Clapper Rail and California Black Rail*.  
 33 All of these AMMs include elements that would avoid or minimize the risk of affecting individuals  
 34 and species habitats adjacent to work areas. The AMMs are described in detail in BDCP Appendix  
 35 3.C, *Avoidance and Minimization Measures*.

36 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*  
 37 *Plant Species*) estimates that the restoration and protection actions discussed above would result in  
 38 the restoration of 3,579 acres of primary habitat and 12,115 acres of secondary habitat for  
 39 California black rail and the protection of 275 acres of secondary habitat for the species.

40 Considering these protection and restoration provisions, which would provide acreages of new or  
 41 enhanced habitat in amounts greater than necessary to compensate for habitats lost to construction  
 42 and restoration activities, loss of habitat or direct mortality through implementation of Alternative  
 43 1C would not result in a substantial adverse effect through habitat modifications and would not  
 44 substantially reduce the number or restrict the range of the species. Therefore, the alternative  
 45 would have a less-than-significant impact on California black rail.

1 **Impact BIO-58: Effects on California Black Rail Associated with Electrical Transmission**  
2 **Facilities**

3 New transmission lines would increase the risk for bird-power line strikes, which could result in  
4 injury or mortality of California black rail. Black rails are known to suffer mortality from  
5 transmission line collision, likely associated with migration and flights between foraging areas  
6 (Eddleman et al 1994). Due to their wing shape and body size, rails have low to moderate flight  
7 maneuverability (Rayner 1988 and Bevanger 1998), increasing susceptibility to collision mortality.  
8 However, there are relatively few records of California black rail collisions with overhead wires.  
9 California black rails exhibit daytime site fidelity and a lack of long-distance night migration, two  
10 factors which are associated with low collision risk in avian species (Eddleman et al. 1994).  
11 California black rail movements in the study area are likely short, seasonal, and at low altitudes,  
12 typically less than 16 feet (5 meters) (Eddleman et al 1994). While the species may have low to  
13 moderate flight maneuverability, the bird's behavior (e.g., sedentary, nonmigratory, ground-nesting  
14 and foraging, solitary, no flocking, secretive) reduces potential exposure to overhead wires and  
15 vulnerability to collision mortality (BDCP Appendix 5.J, Attachment 5J.C, *Analysis of Potential Bird*  
16 *Collisions at Proposed BDCP Powerlines*).

17 Transmission line poles and towers also provide perching substrate for raptors, which could result  
18 in increased predation pressure on local black rails. Little is currently known about the seasonal  
19 movements of black rails or the potential for increased predation on rails near power poles.  
20 However, transmission facilities are expected to have few adverse effects on the black rail  
21 population.

22 **NEPA Effects:** The construction and presence of new transmission lines would not represent an  
23 adverse effect because the risk of bird strike is considered to be minimal based on the species' flight  
24 behaviors. In addition, *AMM20 Greater Sandhill Crane* contains the commitment to place bird strike  
25 diverters on all new powerlines and select existing powerlines, which would further minimize risk  
26 of bird strike for California black rails in the Delta. Transmission line structures could increase  
27 predation on local black rails by providing perching structures for raptors. However, these impacts  
28 on the California black rail population are not expected to be adverse.

29 **CEQA Conclusion:** The construction and presence of new transmission lines would have a less-than-  
30 significant impact on California black rail because the risk of bird strike is considered to be minimal  
31 based on the species' flight behaviors. In addition, *AMM20 Greater Sandhill Crane* contains the  
32 commitment to place bird strike diverters on all new powerlines and select existing powerlines,  
33 which would further minimize risk of bird strike for California black rails in the Delta. Transmission  
34 line structures could increase predation on local black rails by providing perching structures for  
35 raptors. However, these impacts on the California black rail population are expected to be less than  
36 significant.

37 **Impact BIO-59: Indirect Effects of Plan Implementation on California Black Rail**

38 **Indirect construction-related effects:** Both primary and secondary habitat for California black rail  
39 within the vicinity of proposed construction areas could be indirectly affected by construction  
40 activities. Indirect effects associated with construction include noise, dust, and visual disturbance  
41 caused by grading, filling, contouring, and other ground-disturbing operations outside the project  
42 footprint but within 500 feet from the construction edge. Construction noise above background  
43 noise levels (greater than 50 dBA) could extend 1,900 to 5,250 feet from the edge of construction  
44 activities (BDCP Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of the BDCP*

1 *Conveyance Facility on Sandhill Crane*, Table 4), although there are no available data to determine  
2 the extent to which these noise levels could affect California black rail. The use of mechanical  
3 equipment during water conveyance facilities construction could cause the accidental release of  
4 petroleum or other contaminants that could affect California black rail in the surrounding habitat.  
5 The inadvertent discharge of sediment or excessive dust adjacent to California black rail habitat  
6 could also affect the species.

7 If construction occurs during the nesting season, these indirect effects could result in the loss or  
8 abandonment of nests, and mortality of any eggs and/or nestlings. However, there is a commitment  
9 in AMM19 (as described in BCDP Appendix 3.C, *Avoidance and Minimization Measures*) that  
10 preconstruction surveys of potential breeding habitat would be conducted within 700 feet of project  
11 activities, and a 500-foot no-disturbance buffer would be established around any territorial call-  
12 centers during the breeding season. In addition, construction would be avoided altogether if  
13 breeding territories cannot be accurately delimited.

14 **Salinity:** Water operations under Operational Scenario A would have an effect on salinity gradients  
15 in Suisun Marsh. These effects cannot be disaggregated from tidal habitat restoration, which would  
16 also cause changes in salinity gradients. It is expected that the salinity of water in Suisun Marsh  
17 would generally increase as a result of water operations and operations of salinity-control gates to  
18 mimic a more natural water flow. This would likely encourage the establishment of tidal wetland  
19 plant communities tolerant of more brackish environments, which should be beneficial to California  
20 black rail because its historical natural Suisun Marsh habitat was brackish tidal marsh.

21 **Methylmercury Exposure:** Marsh (tidal and nontidal) and floodplain restoration have the potential  
22 to increase exposure to methylmercury. Mercury is transformed into the more bioavailable form of  
23 methylmercury in aquatic systems, especially areas subjected to regular wetting and drying such as  
24 tidal marshes and flood plains. Thus, BDCP restoration activities that create newly inundated areas  
25 could increase bioavailability of mercury (see BDCP Chapter 3, *Conservation Strategy*, for details of  
26 restoration). Increased methylmercury associated with natural community and floodplain  
27 restoration may indirectly affect California black rail, via uptake in lower trophic levels (as described  
28 in the BDCP, Appendix 5.D, *Contaminants*). In general, the highest methylation rates are associated  
29 with high tidal marshes that experience intermittent wetting and drying and associated anoxic  
30 conditions (Alpers et al. 2008). The potential mobilization or creation of methylmercury within the  
31 study area varies with site-specific conditions and would need to be assessed at the project level.  
32 *CM12 Methylmercury Management* contains provisions for project-specific Mercury Management  
33 Plans. Along with avoidance and minimization measures and adaptive management and monitoring,  
34 CM12 is expected to reduce the effects of methylmercury resulting from BDCP natural communities  
35 and floodplain restoration on California black rail.

36 Concentrations of methylmercury known to cause reproductive effects in birds have been found in  
37 blood and feather samples of San Francisco Bay black rails (Tsao et al. 2009). Because they forage  
38 directly in contaminated sediments, California black rails may be especially prone to methylmercury  
39 contamination. Currently, it is unknown how much of the sediment-derived methylmercury enters  
40 the food chain in Suisun Marsh or what tissue concentrations are actually harmful to the California  
41 black rail. Although tidal habitat restoration might increase methylation of mercury export to other  
42 habitats, it is unlikely to increase the exposure of methylmercury to California black rail, as they  
43 currently reside in tidal marshes in the Delta and the San Francisco Bay, where elevated  
44 methylmercury levels exist. Sites-specific restoration plans that address the creation and

1 mobilization of mercury, as well as monitoring and adaptive management as described in CM12  
2 would address the uncertainty of methylmercury levels in restored tidal marsh.

3 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in  
4 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,  
5 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,  
6 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz  
7 2009). The effect of selenium toxicity differs widely between species and also between age and sex  
8 classes within a species. In addition, the effect of selenium on a species can be confounded by  
9 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith  
10 2009).

11 The primary source of selenium bioaccumulation in birds is through their diet (Ackerman and  
12 Eagles-Smith 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the  
13 trophic level at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At  
14 Kesterson Reservoir in the San Joaquin Valley, selenium concentrations in invertebrates have been  
15 found to be two to six times the levels in rooted plants. Furthermore, bivalves sampled in the San  
16 Francisco Bay contained much higher selenium levels than crustaceans such as copepods (Stewart et  
17 al. 2004). Studies conducted at the Grasslands in Merced County recorded higher selenium levels in  
18 black-necked stilts which feed on aquatic invertebrates than in mallards and pintails, which are  
19 primarily herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which  
20 forage on bivalves) have much higher levels of selenium levels than shorebirds that prey on aquatic  
21 invertebrates (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high  
22 levels of selenium have a higher risk of selenium toxicity.

23 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations  
24 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to  
25 exacerbate bioaccumulation of selenium in avian species, including California black rail. Marsh (tidal  
26 and nontidal) and floodplain restoration have the potential to mobilize selenium, and therefore  
27 increase avian exposure from ingestion of prey items with elevated selenium levels. Thus, BDCP  
28 restoration activities that create newly inundated areas could increase bioavailability of selenium  
29 (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Changes in selenium  
30 concentrations were analyzed in Chapter 8, *Water Quality*, and it was determined that, relative to  
31 Existing Conditions and the No Action Alternative, CM1 would not result in substantial, long-term  
32 increases in selenium concentrations in water in the Delta under any alternative. However, it is  
33 difficult to determine whether the effects of potential increases in selenium bioavailability  
34 associated with restoration-related conservation measures (CM4 and CM5) would lead to adverse  
35 effects on California black rail.

36 Because of the uncertainty that exists at this programmatic level of review, there could be a  
37 substantial effect on California black rail from increases in selenium associated with restoration  
38 activities. This effect would be addressed through the implementation of *AMM27 Selenium*  
39 *Management* (BDCP Appendix 3.C, *Avoidance and Minimization Measures*) which would provide  
40 specific tidal habitat restoration design elements to reduce the potential for bioaccumulation of  
41 selenium and its bioavailability in tidal habitats. Furthermore, the effectiveness of selenium  
42 management to reduce selenium concentrations and/or bioaccumulation would be evaluated  
43 separately for each restoration effort as part of design and implementation. This avoidance and  
44 minimization measure would be implemented as part of the tidal habitat restoration design  
45 schedule.

1 **NEPA Effects:** Potential effects of noise and visual disturbances on California black rail would be  
2 minimized with *AMM19 California Clapper Rail and California Black Rail*. AMM1–AMM7, including  
3 *AMM2 Construction Best Management Practices and Monitoring*, would minimize the likelihood of  
4 spills from occurring and ensure that measures were in place to prevent runoff from the  
5 construction area and to avoid negative effects of dust on the species. Implementation of  
6 Operational Scenario A, including operation of salinity-control gates, and tidal habitat restoration  
7 are expected to increase water salinity in Suisun Marsh, which would be expected to establish tidal  
8 marsh similar to historic conditions. Tidal habitat restoration could result in increased exposure of  
9 California black rail to selenium. This effect would be addressed through the implementation of  
10 *AMM27 Selenium Management* which would provide specific tidal habitat restoration design  
11 elements to reduce the potential for bioaccumulation of selenium and its bioavailability in tidal  
12 habitats. The indirect effects associated with noise and visual disturbances, potential spills of  
13 hazardous material, changes in salinity, and increased exposure to selenium from Alternative 1C  
14 implementation would not have an adverse effect on California black rail. Tidal habitat restoration is  
15 unlikely to have a significant impact on California black rail through increased exposure to  
16 methylmercury, as rails currently reside in tidal marshes where elevated methylmercury levels  
17 exist. However, it is unknown what concentrations of methylmercury are harmful to the species and  
18 the potential for increased exposure varies substantially within the study area. Site-specific  
19 restoration plans in addition to monitoring and adaptive management, described in *CM12*  
20 *Methylmercury Management*, would address the uncertainty of methylmercury levels in restored  
21 tidal marsh. The site-specific planning phase of marsh restoration would be the appropriate place to  
22 assess the potential for risk of methylmercury exposure for California black rail, once site specific  
23 sampling and other information could be developed.

24 **CEQA Conclusion:** Noise and visual disturbances related to construction-related activities and other  
25 conservation measures could disturb primary and secondary California black rail habitat adjacent to  
26 work sites. *AMM19 California Clapper Rail and California Black Rail* would avoid and minimize  
27 impacts on California black rail from noise and visual disturbance. The use of mechanical equipment  
28 during water conveyance facilities construction could cause the accidental release of petroleum or  
29 other contaminants that could affect California black rail in the surrounding habitat. The inadvertent  
30 discharge of sediment or excessive dust adjacent to California black rail habitat could also affect the  
31 species. These impacts on California black rail would be less than significant with the incorporation  
32 of AMM1–AMM7, including *AMM2 Construction Best Management Practices and Monitoring*, into the  
33 BDCP. Implementation of Operational Scenario A, including operation of salinity-control gates, and  
34 tidal habitat restoration are expected to increase water salinity in Suisun Marsh. These salinity  
35 gradient changes should have a beneficial impact on California black rail through the establishment  
36 of tidal marsh similar to historic conditions. Tidal habitat restoration is unlikely to have a significant  
37 impact on California black rail through increased exposure to methylmercury, as rails currently  
38 reside in tidal marshes where elevated methylmercury levels exist. However, it is unknown what  
39 concentrations of methylmercury are harmful to the species. Site-specific restoration plans in  
40 addition to monitoring and adaptive management, described in *CM12 Methylmercury Management*,  
41 would address the uncertainty of methylmercury levels in restored tidal marsh. Tidal habitat  
42 restoration could result in increased exposure of California black rail to selenium. This effect would  
43 be addressed through the implementation of *AMM27 Selenium Management*, which would provide  
44 specific tidal habitat restoration design elements to reduce the potential for bioaccumulation of  
45 selenium and its bioavailability in tidal habitats. Therefore, the indirect effects of plan  
46 implementation would have a less-than-significant impact on California black rail.

1 **Impact BIO-60: Fragmentation of California Black Rail Habitat as a Result of Conservation**  
2 **Component Implementation**

3 Restoration activities may temporarily fragment existing wetlands in Suisun Marsh and could create  
4 temporary barriers to California black rail movements. Grading, filling, contouring and other initial  
5 ground-disturbing activities could remove habitat along movement corridors used by individuals  
6 and potentially temporarily reduce access to adjacent habitat areas. The temporary adverse effects  
7 of fragmentation of tidal brackish emergent wetland habitat for California black rail or restoration  
8 activities resulting in barriers to movement would be minimized through sequencing of *CM4 Tidal*  
9 *Natural Community Restoration* activities. The tidal natural communities restoration would be  
10 phased through the course of the BDCP restoration program to allow for recovery of some areas  
11 before restoration actions are initiated in other areas. In addition, *AMM19 California Clapper Rail*  
12 *and California Black Rail* would avoid and minimize effects on California black rail.

13 **NEPA Effects:** The fragmentation of existing wetlands and creation of temporary barriers to  
14 movement would not represent an adverse effect on California black rail as a result of habitat  
15 modification of a special-status species because *CM4 Tidal Natural Communities Restoration* would  
16 be phased to allow for the recovery of some areas before restoration actions are initiated in other  
17 areas. In addition, *AMM19 California Clapper Rail and California Black Rail* would avoid and  
18 minimize effects on California black rail.

19 **CEQA Conclusion:** The fragmentation of existing wetlands and creation of temporary barriers to  
20 movement would represent a less-than-significant impact on California black rail as a result of  
21 habitat modification of a special-status species because *CM4 Tidal Natural Communities Restoration*  
22 would be phased to allow for the recovery of some areas before restoration actions are initiated in  
23 other areas. In addition, *AMM19 California Clapper Rail and California Black Rail* would avoid and  
24 minimize impacts on California black rail.

25 **Impact BIO-61: Periodic Effects of Inundation of California Black Rail Habitat as a Result of**  
26 **Implementation of Conservation Components**

27 Flooding of the Yolo Bypass from *CM2 Yolo Bypass Fisheries Enhancement* would not result in the  
28 periodic inundation of modeled habitat for California black rail. There are no records for California  
29 black rails in the Yolo Bypass, although the species is highly secretive and the extent to which the  
30 area has been surveyed for California black rails is unknown. Therefore, there is potential for the  
31 species to occur in the Yolo Bypass. In addition, rails may occur in the bypass after restoration  
32 activities are completed. However, periodic inundation would not result in permanent habitat loss  
33 and would not prevent use of the bypass by current or future rail populations.

34 Based on hypothetical floodplain restoration for *CM5 Seasonally Inundated Floodplain Restoration*,  
35 construction of setback levees could result in increased magnitude, frequency and duration of  
36 periodic inundation by up to 6 acres of modeled California black rail habitat in CZ 7. The risk of  
37 changes in inundation frequency, magnitude, and duration through implementation of CM2 and CM5  
38 affecting California black rail are considered to be low, and would not be expected to result in  
39 adverse effects on the species.

40 **NEPA Effects:** Periodic inundation under *CM2 Yolo Bypass Fisheries Enhancement* and *CM5*  
41 *Seasonally Inundated Floodplain Restoration* would not represent an adverse effect on California  
42 black rail as a result of habitat modification of a special-status species because periodic inundation  
43 would not result in permanent habitat loss and would not prevent use of the bypass by current or

1 future rail populations. The risk of changes in inundation frequency and duration through CM2 and  
2 CM5 implementation affecting California black rail is considered to be low.

3 **CEQA Conclusion:** Periodic inundation under *CM2 Yolo Bypass Fisheries Enhancement* and *CM5*  
4 *Seasonally Inundated Floodplain Restoration* would represent a less-than-significant impact on  
5 California black rail because periodic inundation would not result in permanent habitat loss and  
6 would not prevent use of the bypass by current or future rail populations. The risk of changes in  
7 inundation frequency and duration as a result of implementation of CM2 and CM5 affecting  
8 California black rail is considered to be low.

### 9 **California Clapper Rail**

10 This section describes the effects of Alternative 1C, including water conveyance facilities  
11 construction and implementation of other conservation components, on California clapper rail.  
12 California clapper rail habitat includes mostly middle marsh habitat with select emergent wetland  
13 plant alliances. Secondary habitats generally provide only a few ecological functions such as foraging  
14 (low marsh) or high-tide refuge (upland transition zones), while primary habitats provide multiple  
15 functions including breeding, effective predator cover, and forage. Further details regarding the  
16 habitat model, including assumptions on which the model is based, are provided in Appendix 2.A,  
17 *Covered Species Accounts*.

18 Construction and restoration associated with Alternative 1C conservation measures would result in  
19 both temporary and permanent losses of California clapper rail modeled habitat as indicated in  
20 Table 12-1C-26. Full implementation of Alternative 1C would result in both temporary and  
21 permanent losses of California clapper rail modeled habitat as indicated in Table 12-1C-26. Full  
22 implementation of Alternative 1C would also include the following conservation actions over the  
23 term of the BDCP to benefit the California clapper rail (BDCP Chapter 3, Section 3.3, *Biological Goals*  
24 *and Objectives*).

- 25 ● Restore or create at least 6,000 acres of tidal brackish emergent wetland in CZ 11 including at  
26 least 1,500 acres of middle and high marsh (Objectives TBEWNC1.1 and TBEWNC1.2, associated  
27 with CM4).

28 As explained below, with the restoration and protection of these amounts of habitat, in addition to  
29 natural community enhancement and management commitments (including CM12 *Methylmercury*  
30 *Management*) and the implementation of AMM1-AMM7, *AMM18 California Clapper Rail and*  
31 *California Black Rail*, and *AMM27 Selenium Management*, impacts on the California clapper rail  
32 would not be adverse for NEPA purposes and would be less than significant for CEQA purposes.

1 **Table 12-1C-26. Changes to California Clapper Rail Modeled Habitat Associated with Alternative**  
2 **1C (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	Primary	0	0	0	0	NA	NA
	Secondary	0	0	0	0	NA	NA
<b>Total Impacts CM1</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>NA</b>	<b>NA</b>
CM2-CM18	Primary	26	27	0	0	0	0
	Secondary	50	50	0	0	0	0
<b>Total Impacts CM2-CM18</b>		<b>76</b>	<b>77</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>TOTAL IMPACTS</b>		<b>76</b>	<b>77</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

<sup>a</sup> See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only.

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-62: Loss or Conversion of Habitat for and Direct Mortality of California Clapper**  
5 **Rail**

6 Alternative 1C conservation measures would result in the total loss or conversion of up to 35 acres  
7 of modeled clapper rail habitat consisting of 27 acres of primary habitat and 50 acres of secondary  
8 habitat (Table 12-1C-26). The conservation measure that would result in these losses is tidal natural  
9 communities restoration (CM4). Habitat enhancement and management activities (CM11), which  
10 include ground disturbance or removal of nonnative vegetation, could also result in local adverse  
11 habitat effects. Each of these individual activities is described below. A summary statement of the  
12 combined impacts and NEPA and CEQA conclusions follows the individual conservation measure  
13 discussions.

- 14 • *CM4 Tidal Natural Communities Restoration*: Site preparation and inundation would convert  
15 approximately 77 acres of modeled California clapper rail habitat (27 acres of primary habitat,  
16 50 acres of secondary habitat), the majority of which would occur in CZ 11. The tidal marsh  
17 restoration action would not result in the permanent loss of any California clapper rail habitat in  
18 the study area. However, approximately 27 acres of primary habitat would be converted to  
19 secondary low marsh habitat and 50 acres of secondary habitat would be converted to middle or  
20 high marsh. Full implementation of CM4 would restore or create at least 6,000 acres of tidal  
21 brackish emergent wetland in CZ 11. Tidal wetlands would be restored as a mosaic of large,  
22 interconnected, and biologically diverse patches that supported a natural gradient extending  
23 from subtidal to the upland fringe. Much of the restored tidal brackish emergent wetland would  
24 meet the primary habitat requirements of the California clapper rail, including development of  
25 mid- and high-marsh vegetation with dense, tall stands of pickleweed cover. Restoration would

1 be sequenced and spaced in a manner that minimizes any temporary, initial loss of habitat and  
2 habitat fragmentation.

- 3 ● *CM11 Natural Communities Enhancement and Management*: Because the entire California  
4 clapper rail population is restricted to the San Francisco Bay Area estuary, BDCP enhancement  
5 and restoration actions would be expected to benefit the species by creating the potential for  
6 extending its abundance and distribution in Suisun Marsh. Occupied California clapper rail  
7 habitat would be monitored to determine if there is a need for predator control actions. If  
8 implemented, nonnative predators would be controlled as needed to reduce nest predation and  
9 to help maintain species abundance. A variety of habitat management actions included in *CM11*  
10 *Natural Communities Enhancement and Management* that are designed to enhance wildlife  
11 values in restored and protected tidal wetland habitats could result in localized ground  
12 disturbances that could temporarily remove small amounts of California clapper rail habitat.  
13 Ground-disturbing activities, such as removal of nonnative vegetation and road and other  
14 infrastructure maintenance activities, would be expected to have minor adverse effects on  
15 available California clapper rail habitat. These potential effects are currently not quantifiable,  
16 but would be minimized with implementation *AMM19, Clapper Rail and California Black Rail*  
17 (BDCP Appendix 3.C, *Avoidance and Minimization Measures*).
- 18 ● *Operations and Maintenance*: Postconstruction operation and maintenance of the restoration  
19 infrastructure could result in ongoing but periodic disturbances that could affect California  
20 clapper rail use of the surrounding habitat in Suisun. Maintenance activities could include  
21 vegetation management, and levee repair. These effects, however, would be reduced by AMMs  
22 and conservation actions as described below.
- 23 ● *Injury and Direct Mortality*: Construction vehicle activity may cause injury or mortality to  
24 California black rail. If rails are present adjacent to covered activities, the operation of  
25 equipment for land clearing, and habitat restoration, enhancement, and management could  
26 result in injury or mortality of California clapper rail. Operation of construction equipment could  
27 result in injury or mortality of California clapper rails. Risk would be greatest to eggs and  
28 nestlings susceptible to land clearing activities, nest abandonment, or increased exposure to the  
29 elements or to predators. Injury to adults and fledged juveniles is less likely as these individuals  
30 are expected to avoid contact with construction equipment. However, nest sites would be  
31 avoided during the nesting season as required by AMM1–AMM7 and *AMM19 California Clapper*  
32 *Rail and California Black Rail*.

33 The following paragraphs summarize the combined effects discussed above and describe other  
34 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also  
35 included.

### 36 ***Near-Term Timeframe***

37 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
38 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
39 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
40 effects of construction would not be adverse under NEPA. There would be no impacts resulting from  
41 the construction of the water conveyance facilities (CM1). However, there would be a loss of 76  
42 acres of modeled habitat for California clapper rail in the study area in the near-term. These effects  
43 would result from implementing *CM4 Tidal Natural Communities Restoration* (26 acres of primary  
44 and 50 acres of secondary habitat).

1 The typical NEPA and CEQA project-level mitigation ratio for those natural communities affected by  
2 CM4 and that are identified in the biological goals and objectives for California clapper rail in  
3 Chapter 3 of the BDCP would be 1:1 for restoration/creation of tidal brackish emergent habitat.  
4 Using this ratio would indicate that 76 acres of tidal brackish emergent wetland should be  
5 restored/created to compensate for the CM4 losses of California clapper rail habitat.

6 The BDCP has committed to near-term goals of restoring 2,000 acres of tidal brackish emergent  
7 wetland in the Plan Area (Table 3-4 in Chapter 3, *Description of Alternatives*). These conservation  
8 actions are associated with CM4 and would occur in the same timeframe as the early restoration  
9 losses, thereby avoiding adverse effects on California clapper rail. The tidal brackish emergent  
10 wetland would be restored in CZ 11 among the Western Suisun/Hill Slough Marsh Complex, the  
11 Suisun Slough/Cutoff Slough Marsh Complex, and the Nurse Slough/Denverton Marsh complex  
12 (Objective TBEWNC1.1) and would be restored in a way that creates topographic heterogeneity and  
13 in areas that increase connectivity among protected lands (Objectives TBEWNC1.4). These biological  
14 goals and objectives would inform the near-term restoration efforts and represent performance  
15 standards for considering the effectiveness of restoration actions. These Plan objectives represent  
16 performance standards for considering the effectiveness of CM4 restoration actions. The acres of  
17 restoration contained in the near-term Plan goals satisfy the typical mitigation that would be  
18 applied to the near-term effects of tidal restoration.

19 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
20 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
21 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
22 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
23 *Material*, *AMM7 Barge Operations Plan*, and *AMM19 California Clapper Rail and California Black Rail*.  
24 All of these AMMs include elements that would avoid or minimize the risk of affecting individuals  
25 and species habitats adjacent to work areas. The AMMs are described in detail in BDCP Appendix  
26 3.C, *Avoidance and Minimization Measures*.

### 27 ***Late Long-Term Timeframe***

28 The habitat model indicates that the study area supports approximately 296 acres of primary and  
29 6,420 acres of secondary habitat for California clapper rail. Alternative 1C as a whole would result in  
30 the permanent loss of and temporary effects on 27 acres of primary habitat and 50 acres of  
31 secondary habitat for California clapper rail during the term of the Plan (9% of the total primary  
32 habitat in the study area and less than 1% of the total secondary habitat in the study area). The  
33 locations of these losses are described above in the analyses of individual conservation measures.  
34 The Plan includes a commitments through *CM4 Tidal Natural Communities Restoration* to restore or  
35 create at least 6,000 acres of tidal brackish emergent wetlands for California clapper rail in Suisun  
36 Marsh in CZ 11 (Objective TBEWNC1.1). These tidal wetlands would be restored as a mosaic of large,  
37 interconnected and biologically diverse patches and at least 1,500 acres of the restored marsh  
38 would consist of middle-and high-marsh vegetation, serving as primary habitat for California  
39 clapper rail in Suisun Marsh (Objectives TBEWNC1.1 and TBEWNC1.2). Additional pressures on the  
40 species such as loss of habitat from invasive species and mortality from nest predators would also  
41 be addressed through the BDCP. Perennial pepperweed, which outcompetes suitable clapper rail  
42 habitat (such as pickleweed) would be reduced to no more than 10% cover in the tidal brackish  
43 emergent wetland natural community within CZ 11 (Objective TBEWNC2.1). In addition, nonnative  
44 predators would be controlled to reduce nest predation if necessary through *CM11 Natural*  
45 *Communities Enhancement and Management*.

1 The BDCP's beneficial effects analysis (BDCP Chapter 5, *Effects Analysis*) estimates that the  
2 restoration and protection actions discussed above, would result in the restoration of 1,500 acres of  
3 primary habitat and 4,500 acres of secondary habitat for California clapper rail.

4 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
5 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
6 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
7 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
8 *Material*, *AMM7 Barge Operations Plan*, and *AMM19 California Clapper Rail and California Black Rail*.  
9 All of these AMMs include elements that would avoid or minimize the risk of affecting individuals  
10 and species habitats adjacent to work areas. The AMMs are described in detail in BDCP Appendix  
11 3.C, *Avoidance and Minimization Measures*.

12 **NEPA Effects:** The loss of California clapper rail habitat associated with Alternative 1C would  
13 represent an adverse effect as a result of habitat modification of a special-status species and  
14 potential for direct mortality in the absence of other conservation actions. However, with habitat  
15 protection and restoration associated with CM4, guided by biological goals and objectives and by  
16 *AMM1 Worker Awareness Training*, *AMM2 Construction Best Management Practices and Monitoring*,  
17 *AMM3 Stormwater Pollution Prevention Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill*  
18 *Prevention, Containment, and Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable*  
19 *Tunnel Material, and Dredged Material*, *AMM7 Barge Operations Plan*, and *AMM19 California Clapper*  
20 *Rail and California Black Rail*, which would be in place throughout the construction period, the  
21 effects of Alternative 1C as a whole on clapper rail would not be adverse under NEPA.

## 22 **CEQA Conclusion:**

### 23 **Near-Term Timeframe**

24 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
25 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
26 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
27 effects of construction would be less than significant under CEQA. There would be no impacts  
28 resulting from the construction of the water conveyance facilities (CM1). However, there would be a  
29 loss of 76 acres of modeled habitat for California clapper rail in the study area in the near-term from  
30 the implementation of *CM4 Tidal Natural Communities Restoration* (26 acres of primary and 50 acres  
31 of secondary habitat).

32 The typical NEPA and CEQA project-level mitigation ratio for those natural communities affected by  
33 CM4 and that are identified in the biological goals and objectives for California clapper rail in  
34 Chapter 3 of the BDCP would be 1:1 for restoration/creation of tidal brackish emergent habitat.  
35 Using this ratio would indicate that 76 acres of tidal brackish emergent wetland should be  
36 restored/created to mitigate the CM4 losses of California clapper rail habitat.

37 The BDCP has committed to near-term goals of restoring 2,000 acres of tidal brackish emergent  
38 wetland in the study area. These conservation actions are associated with CM4 and would occur in  
39 the same timeframe as the early restoration losses, thereby avoiding adverse effects on California  
40 clapper rail. The tidal brackish emergent wetland would be restored in CZ 11 among the Western  
41 Suisun/Hill Slough Marsh Complex, the Suisun Slough/Cutoff Slough Marsh Complex, and the Nurse  
42 Slough/Denverton Marsh complex (Objective TBEWNC1.1) and would be restored in a way that

1 creates topographic heterogeneity and in areas that increase connectivity among protected lands  
2 (Objectives TBEWNC1.4).

3 These biological goals and objectives would inform the near-term restoration efforts and represent  
4 performance standards for considering the effectiveness of restoration actions. These Plan  
5 objectives represent performance standards for considering the effectiveness of CM4 restoration  
6 actions.

7 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*  
8 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*  
9 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
10 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
11 *Material, AMM7 Barge Operations Plan, and AMM19 California Clapper Rail and California Black Rail.*  
12 All of these AMMs include elements that would avoid or minimize the risk of affecting individuals  
13 and species habitats adjacent to work areas. The AMMs are described in detail in BDCP Appendix  
14 3.C, *Avoidance and Minimization Measures*.

15 The natural community restoration and protection activities would be concluded in the first 10  
16 years of Plan implementation, which is close enough in time to the occurrence of restoration impacts  
17 to constitute adequate mitigation for CEQA purposes. In addition, *AMM19 California Clapper Rail and*  
18 *California Black Rail* and AMM1–AMM7 would avoid and minimize potential impacts on the species  
19 from construction-related habitat loss and noise and disturbance. Because the number of acres  
20 required to meet the typical mitigation ratio described above would be only 76 acres of restored  
21 tidal natural communities, the 2,000 acres of tidal brackish emergent wetland restoration contained  
22 in the near-term Plan goals, and the additional detail in the biological objectives for California  
23 clapper rail, are more than sufficient to support the conclusion that the near-term impacts of habitat  
24 loss and direct mortality under Alternative 1C would be less than significant under CEQA.

### 25 ***Late Long-Term Timeframe***

26 The habitat model indicates that the study area supports approximately 296 acres of primary and  
27 6,420 acres of secondary habitat for California clapper rail. Alternative 1C as a whole would result in  
28 the permanent loss of and temporary effects on 27 acres of primary habitat and 8 acres of secondary  
29 habitat for California clapper rail during the term of the Plan (9% of the total primary habitat in the  
30 study area and less than 1% of the total secondary habitat in the study area). The locations of these  
31 losses are described above in the analyses of individual conservation measures. The Plan includes a  
32 commitment to restore or create at least 6,000 acres of tidal brackish emergent wetlands for  
33 California clapper rail in Suisun Marsh in CZ 11 (Objective TBEWNC1.1). These tidal wetlands would  
34 be restored as a mosaic of large, interconnected and biologically diverse patches and much of the  
35 restored marsh would consist of middle-and high-marsh vegetation with dense, tall stands of  
36 pickleweed, serving as primary habitat for clapper rail in Suisun Marsh (Objective TBEWNC1.1).  
37 Additional pressures on the species such as loss of habitat from invasive species and mortality from  
38 nest predators would also be addressed through the BDCP. Perennial pepperweed, which  
39 outcompetes suitable clapper rail habitat (such as pickleweed) would be reduced to no more than  
40 10% cover in the tidal brackish emergent wetland natural community within CZ 11 (Objective  
41 TBEWNC2.1). In addition, nonnative predators would be controlled to reduce nest predation if  
42 necessary through *CM11 Natural Communities Enhancement and Management*.

43 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*  
44 *Plant Species*) estimates that the restoration and protection actions discussed above, would result in

1 the restoration of 1,500 acres of primary habitat and 4,500 acres of secondary habitat for California  
2 clapper rail.

3 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
4 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
5 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
6 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
7 *Material*, *AMM7 Barge Operations Plan*, and *AMM19 California Clapper Rail and California Black Rail*.  
8 All of these AMMs include elements that would avoid or minimize the risk of affecting individuals  
9 and species habitats adjacent to work areas. The AMMs are described in detail in BDCP Appendix  
10 3.C, *Avoidance and Minimization Measures*. Considering Alternative 1C's protection and restoration  
11 provisions, which would provide acreages of new or enhanced habitat in amounts greater than  
12 necessary to compensate for habitats lost to construction and restoration activities, loss of habitat or  
13 direct mortality through implementation of Alternative 1C would not result in a substantial adverse  
14 effect through habitat modifications and would not substantially reduce the number or restrict the  
15 range of California clapper rail. Therefore, the alternative would have a less-than-significant impact  
16 on California clapper rail.

### 17 **Impact BIO-63: Indirect Effects of Plan Implementation on California Clapper Rail**

18 **Indirect construction-related effects:** California clapper rail habitat within the vicinity of  
19 proposed restoration areas could be indirectly affected by construction activities. Indirect effects  
20 associated with construction include noise, dust, and visual disturbance caused by grading, filling,  
21 contouring, and other ground-disturbing operations outside the project footprint but within 500  
22 feet from the construction edge. Construction noise above background noise levels (greater than 50  
23 dBA) could extend 1,900 to 5,250 feet from the edge of construction activities (BDCP Appendix 5.J,  
24 Attachment 5J.D, *Indirect Effects of the Construction of the BDCP Conveyance Facility on Sandhill*  
25 *Crane*, Table 4), although there are no available data to determine the extent to which these noise  
26 levels could affect California clapper rail. The use of mechanical equipment during construction-  
27 related restoration activities could cause the accidental release of petroleum or other contaminants  
28 that could affect clapper rail in the surrounding habitat. The inadvertent discharge of sediment or  
29 excessive dust adjacent to California clapper rail habitat could also affect the species. If construction  
30 occurs during the nesting season, these indirect effects could result in the loss or abandonment of  
31 nests, and mortality of any eggs and/or nestlings. However, there is a commitment in *AMM19*  
32 *California Clapper Rail and California Black Rail* (as described in BDCP Appendix 3.C, *Avoidance and*  
33 *Minimization Measures*) that preconstruction surveys of potential breeding habitat would be  
34 conducted within 500 feet of project activities, and a 500-foot no-disturbance buffer would be  
35 established around any territorial call-centers during the breeding season. In addition, construction  
36 would be avoided altogether if breeding territories cannot be accurately delimited.

37 Preconstruction surveys conducted under *AMM19 California Clapper Rail and California Black Rail*  
38 would ensure construction-related noise and visual disturbances would not have an adverse effect  
39 on California clapper rail. AMM1–AMM7, including *AMM2 Construction Best Management Practices*  
40 *and Monitoring*, would minimize the likelihood of such spills from occurring and ensure measures  
41 were in place to prevent runoff from the construction area and to avoid negative effects of dust on  
42 the species. Therefore, with the implementation of AMM1–AMM7 and *AMM19 California Clapper Rail*  
43 *and California Black Rail*, there would be no adverse effect on California black rail.

1 **Salinity:** Water operations under Operational Scenario A would have an effect on salinity gradients  
2 in Suisun Marsh. These effects cannot be disaggregated from tidal habitat restoration, which would  
3 also cause changes in salinity gradients. It is expected that the salinity of water in Suisun Marsh  
4 would generally increase as a result of water operations and operations of salinity-control gates to  
5 mimic a more natural water flow. This would likely encourage the establishment of tidal wetland  
6 plant communities tolerant of more brackish environments, which would be beneficial to California  
7 clapper rail because its historical natural Suisun Marsh habitat was brackish tidal marsh.

8 **Methylmercury Exposure:** Marsh (tidal and nontidal) and floodplain restoration also have the  
9 potential to increase exposure to methylmercury. Mercury is transformed into the more bioavailable  
10 form of methylmercury in aquatic systems, especially areas subjected to regular wetting and drying  
11 such as tidal marshes and flood plains. Thus, BDCP restoration activities that create newly  
12 inundated areas could increase bioavailability of mercury (see BDCP Chapter 3, *Conservation*  
13 *Strategy*, for details of restoration). Concentrations of methylmercury known to be toxic to bird  
14 embryos have been found in the eggs of San Francisco Bay clapper rails (Schwarzbach and  
15 Adelsbach 2003). In general, the highest methylation rates are associated with high tidal marshes  
16 that experience intermittent wetting and drying and associated anoxic conditions (Alpers et al.  
17 2008). Currently, it is unknown how much of the sediment-derived methylmercury enters the food  
18 chain in Suisun Marsh or what tissue concentrations are actually harmful to the California clapper  
19 rail. However, although tidal habitat restoration might increase methylation of mercury export to  
20 other habitats, it is unlikely to significantly increase the exposure of methylmercury to California  
21 clapper rails, as they currently reside in tidal marshes where elevated methylmercury levels exist.  
22 *CM12 Methylmercury Management* includes project-specific management plans including monitoring  
23 and adaptive management to address the uncertainty of methylmercury levels in restored tidal  
24 marsh.

25 **Selenium Exposure: Selenium:** Selenium is an essential nutrient for avian species and has a  
26 beneficial effect in low doses. However, higher concentrations can be toxic (Ackerman and Eagles-  
27 Smith 2009, Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks,  
28 and adults, and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf  
29 and Heinz 2009). The effect of selenium toxicity differs widely between species and also between  
30 age and sex classes within a species. In addition, the effect of selenium on a species can be  
31 confounded by interactions with the effects of other contaminants such as mercury (Ackerman and  
32 Eagles-Smith 2009).

33 The primary source of selenium bioaccumulation in birds is through their diet (Ackerman and  
34 Eagles-Smith 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the  
35 trophic level at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At  
36 Kesterson Reservoir in the San Joaquin Valley, selenium concentrations in invertebrates have been  
37 found to be two to six times the levels in rooted plants. Furthermore, bivalves sampled in the San  
38 Francisco Bay contained much higher selenium levels than crustaceans such as copepods (Stewart et  
39 al. 2004). Studies conducted at the Grasslands in Merced County recorded higher selenium levels in  
40 black-necked stilts which feed on aquatic invertebrates than in mallards and pintails, which are  
41 primarily herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which  
42 forage on bivalves) have much higher levels of selenium levels than shorebirds that prey on aquatic  
43 invertebrates (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high  
44 levels of selenium have a higher risk of selenium toxicity.

1 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations  
2 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to  
3 exacerbate bioaccumulation of selenium in avian species, including California clapper rail. Marsh  
4 (tidal and nontidal) and floodplain restoration have the potential to mobilize selenium, and  
5 therefore increase avian exposure from ingestion of prey items with elevated selenium levels. Thus,  
6 BDCP restoration activities that create newly inundated areas could increase bioavailability of  
7 selenium (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Changes in  
8 selenium concentrations were analyzed in Chapter 8, *Water Quality*, and it was determined that,  
9 relative to Existing Conditions and the No Action Alternative, CM1 would not result in substantial,  
10 long-term increases in selenium concentrations in water in the Delta under any alternative.  
11 However, it is difficult to determine whether the effects of potential increases in selenium  
12 bioavailability associated with restoration-related conservation measures (CM4 and CM5) would  
13 lead to adverse effects on California clapper rail.

14 Because of the uncertainty that exists at this programmatic level of review, there could be a  
15 substantial effect on California clapper rail from increases in selenium associated with restoration  
16 activities. This effect would be addressed through the implementation of *AMM27 Selenium*  
17 *Management* (BDCP Appendix 3.C, *Avoidance and Minimization Measures*) which would provide  
18 specific tidal habitat restoration design elements to reduce the potential for bioaccumulation of  
19 selenium and its bioavailability in tidal habitats. Furthermore, the effectiveness of selenium  
20 management to reduce selenium concentrations and/or bioaccumulation would be evaluated  
21 separately for each restoration effort as part of design and implementation. This avoidance and  
22 minimization measure would be implemented as part of the tidal habitat restoration design  
23 schedule.

24 **NEPA Effects:** Potential effects of noise and visual disturbances on California clapper rail would be  
25 minimized with *AMM19 California Clapper Rail and California Black Rail*. *AMM1–AMM7*, including  
26 *AMM2 Construction Best Management Practices and Monitoring*, would minimize the likelihood of  
27 spills from occurring and ensure that measures were in place to prevent runoff from the  
28 construction area and to avoid negative effects of dust on the species. Implementation of  
29 Operational Scenario A, including operation of salinity-control gates, and tidal habitat restoration  
30 are expected to increase water salinity in Suisun Marsh, which would be expected to establish tidal  
31 marsh similar to historic conditions. Tidal habitat restoration could result in increased exposure of  
32 California clapper rail to selenium. This effect would be addressed through the implementation of  
33 *AMM27 Selenium Management*, which would provide specific tidal habitat restoration design  
34 elements to reduce the potential for bioaccumulation of selenium and its bioavailability in tidal  
35 habitats. The indirect effects associated with noise and visual disturbances, potential spills of  
36 hazardous material, changes in salinity, and increased exposure to selenium from Alternative 1C  
37 implementation would not have an adverse effect on California clapper rail. Tidal habitat restoration  
38 is unlikely to have an adverse effect on California clapper rail through increased exposure to  
39 methylmercury, as rails currently reside in tidal marshes where elevated methylmercury levels  
40 exist. However, it is unknown what concentrations of methylmercury are harmful to the species and  
41 the potential for increased exposure varies substantially within the study area. Site-specific  
42 restoration plans in addition to monitoring and adaptive management, described in *CM12*  
43 *Methylmercury Management*, would address the uncertainty of methylmercury levels in restored  
44 tidal marsh. The site-specific planning phase of marsh restoration would be the appropriate place to  
45 assess the potential for risk of methylmercury exposure for California clapper rail, once site specific  
46 sampling and other information could be developed.

1 **CEQA Conclusion:** Noise and visual disturbances related to construction-related activities from the  
2 CMs could disturb California clapper rail habitat adjacent to work sites. *AMM19 California Clapper*  
3 *Rail and California Black Rail* would avoid and minimize impacts on California clapper rail from  
4 noise and visual disturbance. The use of mechanical equipment during water conveyance facilities  
5 construction could cause the accidental release of petroleum or other contaminants that could affect  
6 California clapper rail in the surrounding habitat. The inadvertent discharge of sediment or  
7 excessive dust adjacent to California clapper rail habitat could also affect the species. These impacts  
8 on California clapper rail would be less than significant with the incorporation of AMM1–AMM7 into  
9 the BDCP. Implementation of Operational Scenario A, including operation of salinity-control gates,  
10 and tidal habitat restoration are expected to increase water salinity in Suisun Marsh. These salinity  
11 gradient changes should have a beneficial impact on California clapper rail through the  
12 establishment of tidal marsh similar to historic conditions. Although tidal habitat restoration might  
13 increase methylation of mercury export to other habitats, it is unlikely to significantly increase the  
14 exposure of methylmercury to California clapper rail, as they currently reside in tidal marshes in the  
15 San Francisco Bay, where elevated methylmercury levels exist. It is unknown what concentrations of  
16 methylmercury are harmful to the species. *CM12 Methylmercury Management* includes project-  
17 specific management plans including monitoring and adaptive management to address the  
18 uncertainty of methylmercury levels in restored tidal marsh. Tidal habitat restoration could result in  
19 increased exposure of California clapper rail to selenium. This effect would be addressed through  
20 the implementation of *AMM27 Selenium Management* which would provide specific tidal habitat  
21 restoration design elements to reduce the potential for bioaccumulation of selenium and its  
22 bioavailability in tidal habitats. Therefore, the indirect effects of plan implementation would have a  
23 less-than-significant impact on California clapper rail.

24 **CEQA Conclusion:** Noise and visual disturbances related to construction-related activities from the  
25 CMs could disturb California clapper rail habitat adjacent to work sites. *AMM19 California Clapper*  
26 *Rail and California Black Rail* would avoid and minimize impacts on California clapper rail from  
27 noise and visual disturbance. The use of mechanical equipment during water conveyance facilities  
28 construction could cause the accidental release of petroleum or other contaminants that could affect  
29 California clapper rail in the surrounding habitat. The inadvertent discharge of sediment or  
30 excessive dust adjacent to California clapper rail habitat could also affect the species. These impacts  
31 on California clapper rail would be less than significant with the incorporation of AMM1–AMM7 into  
32 the BDCP. Implementation of Operational Scenario A, including operation of salinity-control gates,  
33 and tidal habitat restoration are expected to increase water salinity in Suisun Marsh. These salinity  
34 gradient changes should have a beneficial impact on California clapper rail through the  
35 establishment of tidal marsh similar to historic conditions. Although tidal habitat restoration might  
36 increase methylation of mercury export to other habitats, it is unlikely to significantly increase the  
37 exposure of California clapper rails to methylmercury, as they currently reside in tidal marshes in  
38 the San Francisco Bay, where elevated methylmercury levels exist. It is unknown what  
39 concentrations of methylmercury are harmful to the species. *CM12 Methylmercury Management*  
40 includes project-specific management plans including monitoring and adaptive management to  
41 address the uncertainty of methylmercury levels in restored tidal marsh.

#### 42 **Impact BIO-64: Effects on California Clapper Rail Associated with Electrical Transmission** 43 **Facilities**

44 Isolated patches of suitable California clapper rail habitat may occur in the study area as far east as  
45 (but not including) Sherman Island. Home range and territory of the California clapper rail is not

1 known, but in locations outside of California, clapper rail territory ranges 0.3 acre to 8 acres (0.1 to  
2 3.2 hectares) (Rush et al. 2012), indicating that known occurrences are not likely to intersect with  
3 the proposed lines (BDCP Attachment5J.C, *Analysis of Potential Bird Collisions at Proposed BDCP*  
4 *Transmission Lines*). The location of the current population and suitable habitat for the species make  
5 collision with the proposed transmission lines highly unlikely.

6 **NEPA Effects:** The construction and presence of new transmission lines would not have an adverse  
7 effect on California clapper rail because the location of the current population and suitable habitat  
8 for the species would make collision with the proposed transmission lines highly unlikely.

9 **CEQA Conclusion:** The construction and presence of new transmission lines would have a less-than-  
10 significant impact on California clapper rail because the location of the current population and  
11 suitable habitat for the species would make collision with the proposed transmission lines highly  
12 unlikely.

### 13 **Impact BIO-65: Fragmentation of California Clapper Rail Habitat as a Result of Conservation** 14 **Component Implementation**

15 Restoration activities may temporarily fragment existing wetlands in Suisun Marsh and could create  
16 temporary barriers to movements of California clapper rail. Grading, filling, contouring and other  
17 initial ground-disturbing activities could remove habitat along movement corridors used by  
18 individuals and, thus, temporarily reduce access to adjacent habitat areas. The temporary adverse  
19 effects of fragmentation of tidal brackish emergent wetland habitat for California clapper rail or  
20 restoration activities resulting in barriers to movement would be minimized through sequencing of  
21 restoration activities to minimize effects of temporary habitat loss. The tidal natural communities  
22 restoration would be phased through the course of the BDCP restoration program to allow for  
23 recovery of some areas before restoration actions are initiated in other areas. In addition, *AMM19*  
24 *California Clapper Rail and California Black Rail* would avoid and minimize effects on California  
25 clapper rail.

26 **NEPA Effects:** The fragmentation of existing wetlands and creation of temporary barriers to  
27 movement would not represent an adverse effect on California clapper rail as a result of special-  
28 status species habitat modification because *CM4 Tidal Natural Communities Restoration* would be  
29 phased to allow for the recovery of some areas before restoration actions are initiated in other  
30 areas. In addition, *AMM19 California Clapper Rail and California Black Rail* would avoid and  
31 minimize effects on California clapper rail.

32 **CEQA Conclusion:** The fragmentation of existing wetlands and creation of temporary barriers to  
33 movement would represent a less-than-significant impact on California clapper rail as a result of  
34 habitat modification of a special status species because Tidal Natural Communities Restoration  
35 (CM4) would be phased to allow for the recovery of some areas before initiating restoration actions  
36 in other areas. In addition, *AMM19 California Clapper Rail and California Black Rail*  
37 would avoid and minimize effects on California clapper rail.

### 38 **California Least Tern**

39 This section describe the effects of Alternative 1C, including water conveyance facilities construction  
40 and implementation of other conservation components on California least tern. California least tern  
41 modeled habitat identifies foraging habitat as all tidal perennial aquatic natural community in the

1 study area. Breeding habitat is not included in the model because most of the natural shoreline in  
2 the study area that historically provided nesting sites has been modified or removed.

3 Construction and restoration associated with Alternative 1C conservation measures would result in  
4 both temporary and permanent losses of California least tern modeled habitat as indicated in Table  
5 12-1C-27. Full implementation of Alternative 1C also include the following conservation actions  
6 over the term of the BDCP to benefit California least tern (BDCP Chapter 3, Section 3.3, *Biological*  
7 *Goals and Objectives*).

- 8 ● Restore and protect at least 65,000 acres of tidal natural communities and transitional uplands  
9 to accommodate sea level rise (Objective L1.3, associated with CM4).
- 10 ● Within the at least 65,000 acres of tidal natural communities and transitional uplands, restore or  
11 create tidal perennial aquatic natural community as necessary when creating tidal emergent  
12 wetland (Objective TPANC1.1, associated with CM4).
- 13 ● Control invasive aquatic vegetation that adversely affects native fish habitat (Objective  
14 TPANC2.1, associated with CM13).

15 Least terns currently nest on artificial fill adjacent to tidal perennial aquatic habitat in the vicinity of  
16 Suisun Marsh and west Delta, and additional nesting could occur at the edge of tidal perennial  
17 waters whenever disturbed or artificial sites mimic habitat conditions sought for nesting (i.e., sandy  
18 or gravelly substrates with sparse vegetation).

19 As explained below, with the restoration and protection of tidal perennial aquatic foraging habitat,  
20 in addition to natural community enhancement and management commitments (including CM12  
21 *Methylmercury Management*) and the implementation of AMM1–AMM7, *AMM27 Selenium*  
22 *Management*, and Mitigation Measure BIO-66, impacts on the California least tern would not be  
23 adverse for NEPA purposes and would be less than significant for CEQA purposes.

24 **Table 12-1C-27. Changes in California Least Tern Modeled Habitat Associated with Alternative 1C**  
25 **(acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	Foraging	25	25	117	117	NA	NA
<b>Total Impacts CM1</b>		<b>25</b>	<b>25</b>	<b>117</b>	<b>117</b>	<b>NA</b>	<b>NA</b>
CM2–CM18	Foraging	38	46	11	16	NA	NA
<b>Total Impacts CM2–CM18</b>		<b>38</b>	<b>46</b>	<b>11</b>	<b>16</b>	<b>NA</b>	<b>NA</b>
<b>TOTAL IMPACTS</b>		<b>63</b>	<b>71</b>	<b>128</b>	<b>133</b>	<b>NA</b>	<b>NA</b>

<sup>a</sup> See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only.

NT = near-term

LLT = late long-term

NA = not applicable

1 **Impact BIO-66: Loss or Conversion of Habitat for and Direct Mortality of California Least Tern**

2 Alternative 1C conservation measures would result in the combined permanent and temporary loss  
3 of up to 204 acres of modeled foraging habitat for California least tern (Table 12-1C-27). The  
4 conservation measures that would result in these losses are construction of water conveyance  
5 facilities and operation (CM1), *CM2 Yolo Bypass Fisheries Enhancement*, *CM4 Tidal Natural*  
6 *Communities Restoration*, and *CM5 Seasonally Inundated Floodplain Restoration*. Habitat  
7 enhancement and management activities (CM11), which include ground disturbance or removal of  
8 nonnative vegetation, could also result in local adverse habitat effects. In addition, maintenance  
9 activities associated with the long-term operation of the water conveyance facilities and other BDCP  
10 physical facilities could degrade or eliminate California least tern foraging habitat. Each of these  
11 individual activities is described below. A summary statement of the combined impacts, NEPA  
12 effects, and a CEQA conclusion follow the individual conservation measure discussions.

- 13 • *CM1 Water Facilities and Operation*: Construction of Alternative 1C conveyance facilities would  
14 result in the combined permanent and temporary loss of up to 142 acres of modeled California  
15 least tern aquatic foraging habitat (Table 12-1C-27). Of the 142 acres of modeled habitat that  
16 would be removed for the construction of the conveyance facilities, 117 acres would be a  
17 temporary loss. Most of the permanent loss would occur where Intakes 1-5 encroach on the  
18 Sacramento River's west bank between north of Clarksburg and Courtland. The temporary  
19 effects on tidal perennial aquatic habitats would occur at numerous locations, including in the  
20 Sacramento River at Intakes W1-5, and at temporary siphon, barge unloading and tunnel work  
21 areas along the western tunnel and canal alignment. The CM1 construction footprint would not  
22 overlap with any occurrences of California least tern. Mitigation Measure BIO-66, *California*  
23 *Least Tern Nesting Colonies Shall Be Avoided and Indirect Effects on Colonies Will Be Minimized*  
24 (described below) would require preconstruction surveys and the establishment of no-  
25 disturbance buffers and would be available to address potential effects on terns were they to  
26 nest in the vicinity of the construction footprint. Refer to the Terrestrial Biology Map Book for a  
27 detailed view of Alternative 1C construction locations. Impacts from CM1 would occur within  
28 the first 10 years of Alternative 1C implementation.
- 29 • *CM2 Yolo Bypass Fisheries Enhancement*: Construction of Yolo Bypass fisheries enhancement  
30 would result in the permanent loss of 8 acres and the temporary loss of 11 acres of modeled  
31 aquatic foraging habitat for California least tern in CZ 2. Activities from Fremont and  
32 Sacramento Weir improvements, Putah Creek realignment, and Lisbon Weir modification could  
33 involve excavation and grading in tidal perennial aquatic areas to improve passage of fish  
34 through the bypasses. The loss is expected to occur during the first 10 years of Alternative 1C  
35 implementation.
- 36 • *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration actions would result in the  
37 permanent loss of 36 acres of modeled aquatic foraging habitat for California least tern. An  
38 estimated 65,000 acres of tidal wetlands would be restored during tidal habitat restoration,  
39 consistent with BDCP Objective L1.3. Of these acres, an estimated 27,000 acres of tidal perennial  
40 aquatic would be restored, based on modeling conducted by ESAPWA (refer to Table 5 in BDCP  
41 Appendix 3.B, *BDCP Tidal Habitat Evolution Assessment*). This restoration is consistent with  
42 BDCP Objective TPANC1.1. Tidal perennial aquatic restoration would be expected to  
43 substantially increase the primary productivity of fish, increasing the prey base for California  
44 least tern. Approximately 3,400 acres of the restoration would happen during the first 10 years  
45 of BDCP implementation, which would coincide with the timeframe of water conveyance  
46 facilities construction. The remaining restoration would be phased over the following 30 years.

1 Some of the restoration would occur in the lower Yolo Bypass, but restoration would also be  
2 spread among the Suisun Marsh, South Delta, Cosumnes/Mokelumne and West Delta ROAs.

- 3 ● *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore  
4 seasonally inundated floodplain would result in the permanent loss of 2 acres and the  
5 temporary loss of 5 acres of modeled aquatic foraging habitat for California least tern. This  
6 activity is scheduled to start following construction of water conveyance facilities, which is  
7 expected to take 10 years. Specific locations for the floodplain restoration have not been  
8 identified, but it is expected that much of the activity would occur in the south Delta along the  
9 major rivers.
- 10 ● *CM11 Natural Communities Enhancement and Management*: Noise and visual disturbances  
11 during implementation of habitat management actions could result in temporary disturbances  
12 that affect California least tern use of the surrounding habitat. These effects cannot be  
13 quantified, but are expected to be minimal because few management activities would be  
14 implemented in aquatic habitat and because terns are not expected to nest on protected lands.  
15 Surveys would be conducted prior to ground disturbance in any areas that have suitable nesting  
16 substrate for California least tern (flat, unvegetated areas near aquatic foraging habitat) and  
17 injury mortality and noise and visual disturbance of nesting terns would be avoided and  
18 minimized by the AMMs and Mitigation Measure BIO-66, *California Least Tern Nesting Colonies  
19 Shall Be Avoided and Indirect Effects on Colonies Will Be Minimized*, described below.
- 20 ● *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground  
21 water conveyance facilities and restoration infrastructure could result in ongoing but periodic  
22 postconstruction disturbances, localized impacts on California least tern foraging habitat, and  
23 temporary noise and disturbances over the term of the BDCP. Maintenance activities would  
24 include vegetation management, levee and structure repair, and re-grading of roads and  
25 permanent work areas which could be adjacent to California least tern foraging habitat. These  
26 effects, however, would be reduced by AMMs described below.
- 27 ● *Injury and Direct Mortality*: California least terns currently nest in the vicinity of potential  
28 restoration sites in Suisun Marsh and west Delta area (CZ 10 and CZ 11). New nesting colonies  
29 could establish if suitable nesting habitat is created during restoration activities (e.g., placement  
30 of unvegetated fill to raise surface elevations prior to breaching levees during restoration  
31 efforts). If nesting occurs where covered activities are undertaken, the operation of equipment  
32 for land clearing, construction, conveyance facilities operation and maintenance, and habitat  
33 restoration, enhancement, and management could result in injury or mortality of California least  
34 tern. Risk of injury or disturbance would be greatest to eggs and nestlings susceptible to land-  
35 clearing activities, abandonment of nests and nesting colonies, or increased exposure to the  
36 elements or to predators. Injury to adults or fledged juveniles is less likely as these individuals  
37 would be expected to avoid contact with construction equipment. However, injury or mortality  
38 would be avoided through planning and preconstruction surveys to identify nesting colonies,  
39 the design of projects to avoid locations with least tern colonies, and the provision for 500-foot  
40 buffers as required by Mitigation Measure BIO-66, *California Least Tern Nesting Colonies Shall Be  
41 Avoided and Indirect Effects on Colonies Will Be Minimized*.

42 The following paragraphs summarize the combined effects discussed above and describe other  
43 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also  
44 included.

1       **Near-Term Timeframe**

2       Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
3       the near-term BDCP conservation strategy has been evaluated to determine whether it would  
4       provide sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that  
5       the effects of construction would not be adverse under NEPA. With Alternative 1C implementation,  
6       there would be a loss of 191 acres of modeled foraging habitat for California least tern in the study  
7       area in the near-term. These effects would result from the construction of the water conveyance  
8       facilities (CM1, 142 acres), and implementing other conservation measures (Yolo Bypass fisheries  
9       improvements [CM2], and tidal habitat restoration [CM4] - 49 acres). All modeled foraging habitat  
10      impacts would occur in tidal perennial aquatic natural communities.

11      The typical NEPA and CEQA project-level mitigation ratio for those natural communities affected by  
12      CM1 would be 1:1 for restoration/creation of tidal perennial aquatic habitat. Using this ratio would  
13      indicate that 191 acres of the tidal perennial aquatic natural community should be restored/created  
14      to compensate for the CM1 losses of California least tern foraging habitat. The near-term effects of  
15      other conservation actions would remove 49 acres of tidal perennial aquatic habitat, and therefore  
16      require 49 acres of tidal perennial aquatic natural community restoration using the same typical  
17      NEPA and CEQA ratio (1:1 for restoration).

18      The BDCP has committed to near-term goals of restoring 19,150 acres of tidal natural communities  
19      in the Plan Area through *CM4 Tidal Natural Communities Restoration* (Table 3-4 in Chapter 3). This  
20      conservation action would result in the creation of approximately 3,400 acres of high quality tidal  
21      perennial aquatic natural community, based on modeling conducted by ESAPWA (refer to Table 5 in  
22      BDCP Appendix 3.B, *BDCP Tidal Habitat Evolution Assessment*). Tidal perennial aquatic restoration  
23      would occur in the same timeframe as the construction and early restoration losses, thereby  
24      avoiding adverse effects on California least tern from loss of foraging habitat.

25      The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*  
26      *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*  
27      *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
28      *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
29      *Material, and AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
30      minimize the risk of affecting individuals and species habitats at or adjacent to work areas and  
31      storage sites. The AMMs are described in detail in BDCP Appendix 3.C, *Avoidance and Minimization*  
32      *Measures*.

33      The California least tern is not a species that is covered under the BDCP. Although nesting by  
34      California least tern is not expected to occur, restoration sites could attract individuals wherever  
35      disturbed or artificial sites mimic habitat conditions sought for nesting (i.e., sandy or gravelly  
36      substrates with sparse vegetation). If nesting were to occur, construction activities could have an  
37      adverse effect on California least tern. Mitigation Measure BIO-66, *California Least Tern Nesting*  
38      *Colonies Shall be Avoided and Indirect Effects on Colonies*, would be available to address this effect on  
39      nesting California least terns.

40      **Late Long-Term Timeframe**

41      The habitat model indicates that the study area supports approximately 86,263 acres of foraging  
42      habitat for California least tern. Alternative 1C as a whole would result in the permanent loss of and  
43      temporary effects on 204 acres of foraging habitat during the term of the Plan (less than 1% of the

1 total habitat in the study area). The locations of these losses are described above in the analyses of  
2 individual conservation measures. The Plan includes conservation commitments through *CM4 Tidal*  
3 *Natural Communities Restoration* would restore an estimated 27,000 acres of high quality tidal  
4 perennial aquatic natural community would be restored (estimated from Table 5 in BDCP Appendix  
5 3.B, *BDCP Tidal Habitat Evolution Assessment*). The restoration would occur over a wide region of  
6 the study area, including within the Suisun Marsh, Cosumnes/Mokelumne, Cache Creek, and South  
7 Delta ROAs (see Figure 12-1).

8 **NEPA Effects:** The loss of California least tern foraging habitat and potential direct mortality  
9 associated with Alternative 1C would represent an adverse effect in the absence of other  
10 conservation actions. Although nesting by California least tern is not expected to occur, restoration  
11 sites could attract individuals wherever disturbed or artificial sites mimic habitat conditions sought  
12 for nesting (i.e., sandy or gravelly substrates with sparse vegetation). If nesting were to occur,  
13 construction activities could have an adverse effect on California least tern. Mitigation Measure BIO-  
14 66, *California Least Tern Nesting Colonies Shall be Avoided and Indirect Effects on Colonies will be*  
15 *Minimized*, would be available to address this effect on nesting California least terns. With habitat  
16 restoration associated with CM4 and guided by *AMM1 Worker Awareness Training, AMM2*  
17 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*  
18 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
19 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
20 *Material*, and *AMM7 Barge Operations Plan*, would be in place throughout the construction period,  
21 the effects of Alternative 1C as a whole on California least tern would not be adverse.

## 22 **CEQA Conclusion:**

### 23 **Near-Term Timeframe**

24 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
25 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
26 provide sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that  
27 the effects of construction would be less than significant under CEQA. With Alternative 1C  
28 implementation, there would be a loss of 191 acres of modeled foraging habitat for California least  
29 tern in the study area in the near-term. These effects would result from the construction of the  
30 water conveyance facilities (CM1, 142 acres), and implementing other conservation measures (Yolo  
31 Bypass fisheries improvements [CM2], and tidal habitat restoration [CM4] - 49 acres). All modeled  
32 foraging habitat impacts would occur in tidal perennial aquatic natural communities.

33 The typical NEPA and CEQA project-level mitigation ratio for those natural communities affected by  
34 CM1 would be 1:1 for restoration/creation of tidal perennial aquatic habitat. Using this ratio would  
35 indicate that 191 acres of the tidal perennial aquatic natural community should be restored/created  
36 to compensate for the CM1 losses of California least tern foraging habitat. The near-term effects of  
37 other conservation actions would remove 49 acres of tidal perennial aquatic habitat, and therefore  
38 require 49 acres of tidal perennial aquatic natural community restoration using the same typical  
39 NEPA and CEQA ratio (1:1 for restoration).

40 The BDCP has committed to near-term goals of restoring 19,150 acres of tidal natural communities  
41 in the Plan Area through *CM4 Tidal Natural Communities Restoration* (Table 3-4 in Chapter 3).  
42 Modeling conducted by ESA PWA indicates that this conservation action would result in the creation  
43 of approximately 3,400 acres of high-value tidal perennial aquatic natural community (refer to Table  
44 5 in BDCP Appendix 3.B, *BDCP Tidal Habitat Evolution Assessment*). Tidal perennial aquatic

1 restoration would occur in the same timeframe as the construction and early restoration losses,  
2 thereby avoiding adverse effects on California least tern.

3 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*  
4 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*  
5 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
6 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
7 *Material, and AMM7 Barge Operations Plan. All of these AMMs include elements that would avoid or*  
8 *minimize the risk of affecting individuals and species habitats at or adjacent to work areas and*  
9 *storage sites. The AMMs are described in detail in BDCP Appendix 3.C, Avoidance and Minimization*  
10 *Measures.*

11 Although nesting by California least tern is not expected to occur, restoration sites could attract  
12 individuals wherever disturbed or artificial sites mimic habitat conditions sought for nesting (i.e.,  
13 sandy or gravelly substrates with sparse vegetation). If nesting were to occur, construction activities  
14 could have an adverse effect on California least tern. Implementation of Mitigation Measure BIO-66,  
15 *California Least Tern Nesting Colonies Shall be Avoided and Indirect Effects on Colonies will be*  
16 *Minimized*, would reduce the impact on nesting California least terns to a less-than-significant level.

17 The natural community restoration and protection activities would be concluded in the first 10  
18 years of Plan implementation, which is close enough in time to the occurrence of impacts to  
19 constitute adequate mitigation for CEQA purposes. In addition, AMM1-AMM7 and Mitigation  
20 Measure BIO-66, *California Least Tern Nesting Colonies Shall be Avoided and Indirect Effects on*  
21 *Colonies will be Minimized*, would avoid and minimize potential impacts on the species from  
22 construction-related habitat loss and noise and disturbance. Because the number of acres required  
23 to meet the typical mitigation ratio described above would be only 191 acres of restored tidal  
24 perennial aquatic habitat, the 3,400 acres of tidal perennial aquatic restoration estimated in the  
25 near-term, are more than sufficient to support the conclusion that the near-term impacts of habitat  
26 loss and direct mortality under Alternative 1C would be less than significant under CEQA.

### 27 **Late Long-Term Timeframe**

28 The habitat model indicates that the study area supports approximately 86,263 acres of foraging  
29 habitat for California least tern. Alternative 1C as a whole would result in the permanent loss of and  
30 temporary effects on 204 acres of foraging habitat during the term of the Plan (less than 1% of the  
31 total habitat in the study area). The locations of these losses are described above in the analyses of  
32 individual conservation measures. The Plan includes conservation commitments through *CM4 Tidal*  
33 *Natural Communities Restoration* to restore an estimated 27,000 acres of high-value tidal perennial  
34 aquatic natural community (estimated from Table 5 in BDCP Appendix 3.B, *BDCP Tidal Habitat*  
35 *Evolution Assessment*). The restoration would occur over a wide region of the study area, including  
36 within the Suisun Marsh, Cosumnes/Mokelumne, Cache Creek, and South Delta ROAs (see Figure  
37 12-1).

38 The loss of California least tern foraging habitat and potential direct mortality associated with  
39 Alternative 1C would represent a significant impact in the absence of other conservation actions.  
40 However, with habitat restoration associated with CM4 and guided by *AMM1 Worker Awareness*  
41 *Training, AMM2 Construction Best Management Practices and Monitoring, AMM3 Stormwater*  
42 *Pollution Prevention Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention,*  
43 *Containment, and Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel*  
44 *Material, and Dredged Material, AMM7 Barge Operations Plan, and implementation of Mitigation*

1 Measure BIO-66, *California Least Tern Nesting Colonies Shall Be Avoided and Indirect Effects on*  
2 *Colonies Will Be Minimized*, the loss of habitat or mortality under this alternative would have a less-  
3 than-significant impact on California least tern.

4 **Mitigation Measure BIO-66: California Least Tern Nesting Colonies Shall Be Avoided and**  
5 **Indirect Effects on Colonies Will Be Minimized**

6 If suitable nesting habitat for California least tern (flat unvegetated areas near aquatic foraging  
7 habitat) is identified during planning level surveys, DWR will ensure that a qualified biologist  
8 with experience observing the species and its nests conducts at least three preconstruction  
9 surveys for this species during the nesting season. DWR will design projects to avoid the loss of  
10 California least tern nesting colonies. No construction will take place within 500 feet of  
11 California least tern nests during the nesting season (April 15 to August 15 or as determined  
12 through surveys). Only inspection, maintenance, research, or monitoring activities may be  
13 performed during the least tern breeding season in areas within or adjacent to least tern  
14 breeding habitat with USFWS and CDFW approval under the supervision of a qualified biologist.

15 **Impact BIO-67: Indirect Effects of Plan Implementation on California Least Tern**

16 **Indirect construction- and operation-related effects:** Indirect effects associated with  
17 construction that could affect California least tern include noise, dust, and visual disturbance caused  
18 by grading, filling, contouring, and other ground-disturbing operations outside the project footprint  
19 but within 500 feet from the construction edge. Construction noise above background noise levels  
20 (greater than 50 dBA) could extend 1,900 to 5,250 feet from the edge of construction activities  
21 (BDCP Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of the BDCP Conveyance*  
22 *Facility on Sandhill Crane*, Table 4), although there are no available data to determine the extent to  
23 which these noise levels could affect California least tern. The use of mechanical equipment during  
24 water conveyance facilities construction could cause the accidental release of petroleum or other  
25 contaminants that could affect California least tern or their prey species in the surrounding habitat.  
26 The inadvertent discharge of sediment or excessive dust adjacent to foraging habitat could also  
27 affect the species. Noise and visual disturbance is not expected to have an adverse effect on  
28 California least tern foraging behavior. As described in Mitigation Measure BIO-66, *California Least*  
29 *Tern Nesting Colonies Shall Be Avoided and Indirect Effects on Colonies Will Be Minimized*, if least tern  
30 nests were found during planning or preconstruction surveys, no construction would take place  
31 within 500 feet of active nests. In addition, AMM1–AMM7, including construction best management  
32 practices, would minimize the likelihood of spills from occurring or excessive dust being created  
33 during construction. Should a spill occur, implementation of these AMMs would greatly reduce the  
34 likelihood of individuals being affected.

35 **Methylmercury Exposure:** Covered activities have the potential to exacerbate the bioaccumulation  
36 of mercury in avian species including the California least tern. The operational impacts of new flows  
37 under CM1 were analyzed using a DSM-2 based model to assess potential effects on mercury  
38 concentration and bioavailability. Subsequently, a regression model was used to estimate fish-tissue  
39 concentrations under these future operational conditions (evaluated starting operations or ESO).  
40 Results indicated that changes in total mercury levels in water and fish tissues due to ESO were  
41 insignificant (see BDCP Appendix 5.D, Tables 5D.4-3, 5D.4-4, and 5D.4-5).

42 Marsh (tidal and nontidal) and floodplain restoration also have the potential to increase exposure to  
43 methylmercury. Mercury is transformed into the more bioavailable form of methylmercury in

1 aquatic systems, especially areas subjected to regular wetting and drying such as tidal marshes and  
2 flood plains. Thus, BDCP restoration activities that create newly inundated areas could increase  
3 bioavailability of mercury (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration).  
4 Increased methylmercury associated with natural community and floodplain restoration may  
5 indirectly affect California least tern, via uptake in lower trophic levels (as described in the BDCP,  
6 Appendix 5.D, *Contaminants*). In general, the highest methylation rates are associated with high tidal  
7 marshes that experience intermittent wetting and drying and associated anoxic conditions (Alpers  
8 et al. 2008). The potential mobilization or creation of methylmercury within the study area varies  
9 with site-specific conditions and would need to be assessed at the project level.

10 Schwarzbach and Adelsbach (2003) investigated mercury exposure in 15 species of birds inhabiting  
11 the Bay-Delta ecosystem. Among the species studied, the highest concentrations of mercury were  
12 found in the eggs of piscivorous birds (terns and cormorants) that bioaccumulate mercury from  
13 their fish prey. The very highest concentrations were found in Caspian and Forster's terns, especially  
14 those inhabiting South San Francisco Bay. Based on three California least tern eggs collected from  
15 Alameda Naval Air Station in the San Francisco Central Bay, concentrations in California least tern  
16 eggs were a third (0.3 ppm) those of the eggs of the other two terns. Because of the small sample  
17 size, there is a high degree of uncertainty regarding the levels of mercury that may be present in  
18 California least tern eggs. If the mercury levels measured at Alameda Naval Air Station are  
19 representative of the population in the San Francisco Bay, they would not be expected to result in  
20 adverse effects on tern hatchlings. Hatching and fledging success were not reduced in common tern  
21 eggs in Germany with mercury concentrations of 6.7 ppm (Hothem and Powell 2000).

22 *CM12 Methylmercury Management* includes provisions for project-specific Mercury Management  
23 Plans. Site-specific restoration plans that address the creation and mobilization of mercury, as well  
24 as monitoring and adaptive management as described in CM12 would be available to address the  
25 uncertainty of methylmercury levels in restored tidal marsh and potential impacts on California  
26 least tern.

27 **Selenium:** Selenium is an essential nutrient for avian species and has a beneficial effect in low  
28 doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009, Ohlendorf  
29 and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults, and can also  
30 result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz 2009). The  
31 effect of selenium toxicity differs widely between species and also between age and sex classes  
32 within a species. In addition, the effect of selenium on a species can be confounded by interactions  
33 with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith 2009).

34 The primary source of selenium bioaccumulation in birds is through their diet (Ackerman and  
35 Eagles-Smith 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the  
36 trophic level at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At  
37 Kesterson Reservoir in the San Joaquin Valley, selenium concentrations in invertebrates have been  
38 found to be two to six times the levels in rooted plants. Furthermore, bivalves sampled in the San  
39 Francisco Bay contained much higher selenium levels than crustaceans such as copepods (Stewart et  
40 al. 2004). Studies conducted at the Grasslands in Merced County recorded higher selenium levels in  
41 black-necked stilts which feed on aquatic invertebrates than in mallards and pintails, which are  
42 primarily herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which  
43 forage on bivalves) have much higher levels of selenium levels than shorebirds that prey on aquatic  
44 invertebrates (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high  
45 levels of selenium have a higher risk of selenium toxicity.

1 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations  
2 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to  
3 exacerbate bioaccumulation of selenium in avian species, including California least tern. Marsh (tidal  
4 and nontidal) and floodplain restoration have the potential to mobilize selenium, and therefore  
5 increase avian exposure from ingestion of prey items with elevated selenium levels. Thus, BDCP  
6 restoration activities that create newly inundated areas could increase bioavailability of selenium  
7 (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Changes in selenium  
8 concentrations were analyzed in Chapter 8, *Water Quality*, and it was determined that, relative to  
9 Existing Conditions and the No Action Alternative, CM1 would not result in substantial, long-term  
10 increases in selenium concentrations in water in the Delta under any alternative. However, it is  
11 difficult to determine whether the effects of potential increases in selenium bioavailability  
12 associated with restoration-related conservation measures (CM4 and CM5) would lead to adverse  
13 effects on California least tern.

14 Because of the uncertainty that exists at this programmatic level of review, there could be a  
15 substantial effect on California least tern from increases in selenium associated with restoration  
16 activities. This effect would be addressed through the implementation of *AMM27 Selenium*  
17 *Management* (BDCP Appendix 3.C, *Avoidance and Minimization Measures*) which would provide  
18 specific tidal habitat restoration design elements to reduce the potential for bioaccumulation of  
19 selenium and its bioavailability in tidal habitats. Furthermore, the effectiveness of selenium  
20 management to reduce selenium concentrations and/or bioaccumulation would be evaluated  
21 separately for each restoration effort as part of design and implementation. This avoidance and  
22 minimization measure would be implemented as part of the tidal habitat restoration design  
23 schedule.

24 **NEPA Effects:** Noise and visual disturbances within 500 feet of construction-related activities from  
25 the CMs could disturb California least tern foraging habitat adjacent to work sites. Mitigation  
26 Measure BIO-66, *California Least Tern Nesting Colonies Shall Be Avoided and Indirect Effects on*  
27 *Colonies Will Be Minimized*, would be available to address this adverse effect. AMM1-AMM7,  
28 including *AMM2 Construction Best Management Practices and Monitoring*, would minimize the  
29 likelihood of spills from occurring and ensure that measures were in place to prevent runoff from  
30 the construction area and to avoid negative effects of dust on the species. Tidal habitat restoration  
31 could result in increased exposure of California least tern to selenium. This effect would be  
32 addressed through the implementation of *AMM27 Selenium Management* which would provide  
33 specific tidal habitat restoration design elements to reduce the potential for bioaccumulation of  
34 selenium and its bioavailability in tidal habitats. The indirect effects associated with noise and visual  
35 disturbances, potential spills of hazardous material, and increased exposure to selenium from  
36 Alternative 1C implementation would not have an adverse effect on California least tern. Tidal  
37 habitat restoration could result in increased exposure of California least tern to methylmercury.  
38 However, it is unknown what concentrations of methylmercury are harmful to the species, and the  
39 potential for increased exposure varies substantially within the study area. Site-specific restoration  
40 plans that address the creation and mobilization of mercury, as well as monitoring and adaptive  
41 management as described in *CM12 Methylmercury Management*, would be available to address the  
42 uncertainty of methylmercury levels in restored tidal marsh and potential impacts on California  
43 least tern. The site-specific planning phase of marsh restoration would be the appropriate place to  
44 assess the potential for risk of methylmercury exposure for California least tern, once site specific  
45 sampling and other information could be developed.

1 **CEQA Conclusion:** Noise and visual disturbances within 500 feet of construction-related activities  
2 from the CMs could disturb California least tern foraging habitat adjacent to work sites. Mitigation  
3 Measure BIO-66, *California Least Tern Nesting Colonies Shall Be Avoided and Indirect Effects on*  
4 *Colonies Will Be Minimized*, would avoid and minimize impacts on potential nesting California least  
5 terns from noise and visual disturbance. The use of mechanical equipment during water conveyance  
6 facilities construction could cause the accidental release of petroleum or other contaminants that  
7 could affect California least tern if present in the surrounding habitat. The inadvertent discharge of  
8 sediment or excessive dust adjacent to California least tern habitat could also affect the species.  
9 These impacts on California least tern would be less than significant with the incorporation of  
10 AMM1–AMM7 into the BDCP. Tidal habitat restoration could result in increased exposure of  
11 California least tern to methylmercury. However, it is unknown what concentrations of  
12 methylmercury are harmful to the species. Sites-specific restoration plans that address the creation  
13 and mobilization of mercury, as well as monitoring and adaptive management as described in *CM12*  
14 *Methylmercury Management*, would be available to address the uncertainty of methylmercury levels  
15 in restored tidal marsh and potential impacts on California least tern. This effect would be  
16 addressed through the implementation of *AMM27 Selenium Management*, which would provide  
17 specific tidal habitat restoration design elements to reduce the potential for bioaccumulation of  
18 selenium and its bioavailability in tidal habitats. Therefore, the indirect effects of Alternative 1C  
19 implementation would not have an adverse effect on California least tern.

20 **Mitigation Measure BIO-66, California Least Tern Nesting Colonies Shall Be Avoided and**  
21 **Indirect Effects on Colonies Will Be Minimized**

22 See Mitigation Measure BIO-66 under Impact BIO-66.

23 **Impact BIO-68: Effects on California Least Tern Associated with Electrical Transmission**  
24 **Facilities**

25 New transmission lines would increase the risk for bird-power line strikes, which could result in  
26 injury or mortality of California least tern. This risk is considered to be minimal based on tern flight  
27 behaviors and its unlikely use of habitats near the transmission line corridors.

28 **NEPA Effects:** The construction and presence of new transmission lines would not represent an  
29 adverse effect on California least tern as a result of direct mortality of a special-status species  
30 because they are not known to be present in areas of disturbance and because the probability of  
31 bird-powerline strikes is unlikely due to tern flight behaviors.

32 **CEQA Conclusion:** The construction and presence of new transmission lines would represent a less-  
33 than-significant impact on California least tern as a result of direct mortality of a special-status  
34 species because they are not known to be present in areas of disturbance and because the  
35 probability of bird-powerline strikes is unlikely due to tern flight behaviors.

36 **Greater Sandhill Crane**

37 This section describes the effects of Alternative 1C, including water conveyance facilities  
38 construction and implementation of other conservation components, on greater sandhill crane.  
39 Greater sandhill cranes in the study area are almost entirely dependent on privately owned  
40 agricultural lands for foraging. Long-term sustainability of the species is thus dependent on  
41 providing a matrix of compatible crop types that afford suitable foraging habitat and maintaining  
42 compatible agricultural practices, while sustaining and increasing the extent of other essential

1 habitat elements such as night roosting habitat. The habitat model for greater sandhill crane  
2 includes “roosting and foraging” and “foraging” habitat. These habitat types include certain  
3 agricultural types, specific grassland types, irrigated pastures and hay crops, managed seasonal  
4 wetland, and other natural seasonal wetland. Roosting and foraging habitat includes known,  
5 traditional roost sites that also provide foraging habitat (BDCP Appendix 2.A *Covered Species*  
6 *Accounts*). Both temporary and permanent roost sites were identified for greater Sandhill crane.  
7 Permanent roosting and foraging sites are those used regularly, year after year, while temporary  
8 roosting and foraging sites are those used in some years. Factors included in assessing the loss of  
9 foraging habitat for the greater sandhill crane includes the relative habitat value of specific crop or  
10 land cover types, and proximity to known roost sites. Foraging habitat for greater sandhill crane  
11 included crop types and natural communities up to 4 miles from known roost sites, within the  
12 boundary of the winter crane use area (BDCP Appendix 2A, *Covered Species Accounts*).

13 Construction and restoration associated with Alternative 1C conservation measures would result in  
14 both temporary and permanent losses of foraging and roosting habitat for greater sandhill crane as  
15 indicated in Table 12-1C -28. Full implementation of Alternative 1C would also include the following  
16 conservation actions over the term of the BDCP to benefit the greater sandhill crane (BDCP Chapter  
17 3, Section 3.3, *Biological Goals and Objectives*).

- 18 ● Protect at least 7,300 acres of high- to very high-value habitat for greater sandhill crane, with at  
19 least 80% maintained in very high-value types in any given year. This protected habitat will be  
20 within 2 miles of known roosting sites in CZs 3, 4, 5, and/or 6 and will consider sea level rise and  
21 local seasonal flood events, greater sandhill crane population levels, and the location of foraging  
22 habitat loss. Patch size of protected cultivated lands will be at least 160 acres (Objective  
23 GSHC1.1, associated with CM3).
- 24 ● To create additional high-value greater sandhill crane winter foraging habitat, 10% of the  
25 habitat protected under Objective GSHC1.1 will involve acquiring low-value habitat or  
26 nonhabitat areas and converting it to high- or very high-value habitat. Created habitat will be  
27 within 2 miles of known roosting sites in CZs 3, 4, 5, and/or 6 and will consider sea level rise and  
28 local seasonal flood events, greater sandhill crane population levels, and the location of foraging  
29 habitat loss (Objective GSHC1.2, associated with CM3).
- 30 ● Create at least 320 acres of managed wetlands in minimum patch sizes of 40 acres within the  
31 Greater Sandhill Crane Winter Use Area in CZs 3, 4, 5, or 6, with consideration of sea level rise  
32 and local seasonal flood events. The wetlands will be located within 2 miles of existing  
33 permanent roost sites and protected in association with other protected natural community  
34 types (excluding nonhabitat cultivated lands) at a ratio of 2:1 upland to wetland to provide  
35 buffers around the wetlands (Objective GSHC1.3, associated with CM3).
- 36 ● Create at least two 90-acre wetland complexes within the Stone Lakes National Wildlife Refuge  
37 project boundary. The complexes will be no more than 2 miles apart and will help provide  
38 connectivity between the Stone Lakes and Cosumnes greater sandhill crane populations. Each  
39 complex will consist of at least three wetlands totaling at least 90 acres of greater sandhill crane  
40 roosting habitat, and will be protected in association with other protected natural community  
41 types (excluding nonhabitat cultivated lands) at a ratio of at least 2:1 uplands to wetlands (i.e.,  
42 two sites with at least 90 acres of wetlands each). One of the 90-acre wetland complexes may be  
43 replaced by 180 acres of cultivated lands (e.g., cornfields) that are flooded following harvest to  
44 support roosting cranes and provide highest-value foraging habitat, provided such substitution

1 is consistent with the long-term conservation goals of Stone Lakes National Wildlife Refuge for  
2 greater sandhill crane. (Objective GSHC1.4, associated with CM10).

- 3 ● Create an additional 95 acres of roosting habitat within 2 miles of existing permanent roost  
4 sites. The habitat will consist of active cornfields that are flooded following harvest to support  
5 roosting cranes and that provide highest-value foraging habitat. Individual fields will be at least  
6 40 acres and can shift locations throughout the Greater Sandhill Crane Winter Use Area, but will  
7 be sited with consideration of the location of roosting habitat loss and will be in place prior to  
8 roosting habitat loss (Objective GSCH1.5, associated with CM3).
- 9 ● Protect at least 48,625 acres of cultivated lands that provide suitable habitat for covered and  
10 other native wildlife species (Objective CLNC1.1, associated with CM3).
- 11 ● Target cultivated land conservation to provide connectivity between other conservation lands  
12 (Objective CLNC1.2, associated with CM3).
- 13 ● Maintain and protect the small patches of important wildlife habitats associated with cultivated  
14 lands that occur in cultivated lands within the reserve system, including, water conveyance  
15 channels, grasslands, ponds, and wetlands (Objective CLNC1.3, associated with CM3).

16 As explained below, with the restoration and protection of these amounts of habitat, in addition to  
17 natural community enhancement and management commitments (including *CM12 Methylmercury*  
18 *Management*) and the implementation of AMM1–AMM7, AMM20 *Greater Sandhill Crane*, AMM27  
19 *Selenium Management*, and AMM30 *Transmission Line Design and Alignment Guidelines*, impacts on  
20 the greater sandhill crane would be less than significant for CEQA purposes.

1 **Table 12-1C-28. Changes in Greater Sandhill Crane Modeled Habitat Associated with Alternative**  
2 **1C (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	Roosting and Foraging - Permanent	0	0	0	0	NA	NA
	Roosting and Foraging - Temporary	0	0	1	1	NA	NA
	Foraging	1,445	1,445	2,259	2,259	NA	NA
<b>Total Impacts CM1</b>		<b>1,445</b>	<b>1,445</b>	<b>2,260</b>	<b>2,260</b>		
CM2-CM18	Roosting and Foraging - Permanent	0	0	0	0	0	0
	Roosting and Foraging - Temporary	0	41	0	0	0	0
	Foraging	2,776	4,367	0	0	0	0
<b>Total Impacts CM2-CM18</b>		<b>2,776</b>	<b>4,408</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>Roosting and Foraging - Permanent</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>Roosting and Foraging - Temporary</b>		<b>0</b>	<b>41</b>	<b>1</b>	<b>1</b>	<b>0</b>	<b>0</b>
<b>Total Foraging</b>		<b>4,221</b>	<b>5,812</b>	<b>2,259</b>	<b>2,259</b>	<b>0</b>	<b>0</b>
<b>TOTAL IMPACTS</b>		<b>4,221</b>	<b>5,853</b>	<b>2,260</b>	<b>2,260</b>	<b>0</b>	<b>0</b>

<sup>a</sup> See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.  
<sup>b</sup> See discussion below for a description of applicable CMs.  
<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.  
<sup>d</sup> Periodic effects were estimated for the late long-term only.  
NT = near-term  
LLT = late long-term  
NA = not applicable

3  
4 **Impact BIO-69: Loss or Conversion of Habitat for and Direct Mortality of Greater Sandhill**  
5 **Crane**

6 Alternative 1C conservation measures would result in the temporary loss of up to 42 acres of  
7 temporary roosting and foraging habitat and 8,071 acres of foraging habitat for greater sandhill  
8 crane (5,812 acres of permanent loss, 2,259 acres of temporary loss, Table 12-1C-28). Conservation  
9 measures that would result in these losses are conveyance facilities and transmission line  
10 construction, and establishment and use of borrow and spoil areas from *CM1 Water Facilities and*  
11 *Operation, CM4 Tidal Natural Communities Restoration, CM8 Grassland Natural Community*  
12 *Restoration, and CM10 Nontidal Marsh Restoration, and CM11 Natural Communities Enhancement and*  
13 *Management*. The majority of habitat loss would result from conversion to tidal natural communities  
14 through CM4. Habitat enhancement and management activities (CM11), which include ground  
15 disturbance or removal of nonnative vegetation, could result in local adverse habitat effects. In  
16 addition, maintenance activities associated with the long-term operation of the water conveyance

1 facilities and other BDCP physical facilities could degrade or eliminate greater sandhill crane  
2 modeled habitat. Each of these individual activities is described below. A summary statement of the  
3 combined impacts, NEPA effects and a CEQA conclusion follow the individual conservation measure  
4 discussions.

- 5 • *CM1 Water Facilities and Operation*: Construction of Alternative 1C conveyance facilities as they  
6 are currently designed would result in the combined permanent and temporary loss of up to  
7 3,705 acres of modeled greater sandhill crane habitat. This would consist of the permanent  
8 removal of 1,445 acres of foraging habitat (Table 12-1C-28). Foraging habitat that would be  
9 permanently impacted by CM1 would consist of 525 acres of very high-value, 663 acres of high-  
10 value, and 146 acres of medium-value foraging habitat (Table 12-1C-29). In addition, 1 acre of  
11 temporary roosting and foraging habitat and 2,259 acres of foraging habitat would be  
12 temporarily affected due to construction. The temporarily removed foraging habitat would  
13 consist primarily of cultivated lands and it would be restored within one year following  
14 construction. However, it would not necessarily be restored to its original topography and it  
15 could be restored as grasslands in the place of cultivated lands. Approximately half of the acres  
16 of foraging habitat that would be impacted would be a result of borrow and spoil areas  
17 associated with the construction of the intakes and the canal.

18 The acre of temporary roosting and foraging habitat that would be temporarily impacted is  
19 located on Webb Tract, east of Bradford Island and the loss would be a result of the installation  
20 of a temporary transmission line along the southern border of the roost site. However, the  
21 implementation of AMM20 Greater Sandhill Crane would require that CM1 activities be  
22 designed to avoid direct loss of crane roost sites. Avoidance of crane roost sites would be  
23 accomplished either by siting activities outside of identified roost sites or by relocating the roost  
24 site if it consisted of cultivated lands. Relocated roost sites would be established prior to  
25 construction activities affecting the original roost site (as described in *AMM20 Greater Sandhill  
26 Crane*, BDCP Appendix 3C, *Avoidance and Minimization Measures*). Therefore there would be no  
27 loss of crane roosting and foraging habitat as a result of water conveyance facility construction  
28 once the facilities were fully designed.

29 Approximately 617 acres of the permanent loss of foraging habitat would be from the storage of  
30 reusable tunnel material on Brannan Island and northeast of Knightsen. This material would  
31 likely be moved to other sites for use in levee build-up and restoration, and the affected area  
32 would likely eventually be restored. While this effect is categorized as permanent because there  
33 is no assurance that the material would eventually be moved, the effect would likely be  
34 temporary. The actual footprint of the storage areas required for reusable tunnel material is  
35 flexible, and the actual acreage of habitat affected by this activity could be reduced based on the  
36 height of the storage piles in addition to other considerations. The implementation of *AMM6  
37 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged Material*, would require that  
38 the areas used for reusable tunnel material storage be minimized in crane foraging habitat and  
39 completely avoid crane roost sites. Conveyance construction impacts would primarily occur  
40 west of the highest crane use areas in the central Delta. Refer to the Terrestrial Biology Map  
41 Book for a detailed view of Alternative 1C construction locations. Impacts from CM1 would  
42 occur within the first 10 years of Plan implementation.

1

**Table 12-1C-29. Total Amount of Affected Greater Sandhill Crane Foraging Habitat**

Foraging Habitat Value Class	Land Cover Type	Acres Affected by CM1 permanent (temporary)	Acres Affected by CM2–CM18 permanent (temporary)
Very high	Corn, rice	525 (350)	525 (0)
High	Alfalfa and alfalfa mixtures, mixed pasture, native pasture, wheat, other pasture, irrigated pasture, managed wetlands, native vegetation	663 (1,144)	1,732 (0)
Medium	Grain and hay crops, miscellaneous grain and hay, mixed grain and hay, nonirrigated mixed grain and hay, other grain crops, miscellaneous grasses, grassland, alkali seasonal wetlands, vernal pool complex	146 (165)	1,018 (0)
Low	Other irrigated crops, idle cropland, blueberries, asparagus, clover, cropped within the last 3 years, grain sorghum, green beans, miscellaneous truck, miscellaneous field, new lands being prepped for crop production, nonirrigated mixed pasture, nonirrigated native pasture, onions, garlic, peppers, potatoes, safflower, sudan, sugar beets, tomatoes (processing), melons squash and cucumbers all types, artichokes, beans (dry)	111 (599)	1,069 (0)
None	Vineyards, orchards	0 (0)	23 (0)

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- CM4 Tidal Natural Communities Restoration:* Based on the hypothetical tidal restoration footprint, this activity would result in the permanent loss or conversion of approximately 2,754 acres of greater sandhill crane habitat, consisting of 41 acres of temporary roosting and foraging habitat and 2,713 acres of foraging habitat. Loss of foraging habitat from CM4 would consist of 78 acres of very high-value, 1,199 acres of high value, 855 acres of medium-value, and 558 acres of low-value foraging habitat (Table 12-1C-29). This loss would occur in the Cosumnes-Mokelumne River and West Delta ROAs. Tidal wetland restoration in CZ 4 could occur between the high crane use areas of the central Delta and the Cosumnes River Preserve. However, the conversion of grasslands and cultivated lands to tidal wetlands would not prohibit crane movement or reduce use of these areas. In CZ 5, loss of modeled habitat would occur along the western edge of the greater sandhill crane winter use area and therefore would not result in fragmentation of traditional crane habitats. Therefore fragmentation of habitat from tidal restoration activities would be expected to be minimal. Approximately 1,951 acres of foraging habitat would be impacted within the first 10 years of Alternative 1C implementation.
- CM8 Grassland Natural Community Restoration:* Approximately 300 acres of cultivated lands that provide foraging habitat for greater sandhill crane would be converted to grassland by the late long-term timeframe. No roosting/foraging habitat would be impacted by grassland restoration activities. The restored grasslands would continue to provide foraging habitat value for the greater sandhill crane. Approximately 257 acres would be impacted within the first 10 years of Plan implementation.
- CM10 Nontidal Marsh Restoration:* Nontidal marsh restoration would result in the permanent conversion of approximately 1,350 acres of modeled foraging habitat for the greater sandhill

1 crane. A portion of the restored nontidal marsh would be expected to continue to provide  
2 roosting and foraging habitat value for the greater sandhill crane. However, some of this  
3 restored marsh would be unsuitable as it would lack emergent vegetation and consist of open  
4 water that would be too deep to provide suitable roosting or foraging habitat. Approximately  
5 567 acres of habitat would be converted to nontidal marsh within the first 10 years of  
6 Alternative 1C implementation.

- 7 ● *CM11 Natural Communities Enhancement and Management*: A variety of habitat management  
8 actions included in CM11 that are designed to enhance wildlife values in restored or protected  
9 habitats could result in localized ground disturbances that could temporarily remove small  
10 amounts of modeled habitat. Ground-disturbing activities, such as removal of nonnative  
11 vegetation and road and other infrastructure maintenance activities, would be expected to have  
12 minor adverse effects on available habitat and would be expected to result in overall  
13 improvements to and maintenance of habitat values over the term of the BDCP. The potential for  
14 these activities to result in direct mortality of greater sandhill crane would be minimized with  
15 the implementation of *AMM20 Greater Sandhill Crane*. CM11 would also include the construction  
16 of recreational-related facilities including trails, interpretive signs, and picnic tables (BDCP  
17 Chapter 4, *Covered Activities and Associated Federal Actions*). The construction of trailhead  
18 facilities, signs, staging areas, picnic areas, bathrooms, etc. would be placed on existing,  
19 disturbed areas when and where possible. If new ground disturbance was necessary, greater  
20 sandhill crane habitat would be avoided, with the exception of a permanent loss of 4 acres of  
21 grassland foraging habitat (1 acre of which would be impacted within the first 10 years of plan  
22 implementation).
- 23 ● *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground  
24 water conveyance facilities and restoration infrastructure could result in ongoing but periodic  
25 disturbances that could affect greater sandhill crane use of the surrounding habitat.  
26 Maintenance activities would include vegetation management, levee and structure repair, and  
27 re-grading of roads and permanent work areas. These effects, could be adverse as sandhill  
28 cranes are sensitive to disturbance. However, potential effects would be reduced by AMMs and  
29 conservation actions as described below.
- 30 ● *Injury and Direct Mortality*: Construction-related activities would not be expected to result in  
31 direct mortality of greater sandhill crane if they were present in the study area, because they  
32 would be expected to avoid contact with construction and other equipment. Potential effects  
33 would be avoided and minimized with the implementation of *AMM20 Greater Sandhill Crane*.  
34 The potential for injury and direct mortality from electrical transmission facilities is discussed  
35 below under Impact BIO-70.

36 The following paragraphs summarize the combined effects discussed above and describe other  
37 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also  
38 included.

### 39 ***Near-Term Timeframe***

40 Because the water conveyance facilities construction is being evaluated at the project level, the near-  
41 term BDCP conservation strategy has been evaluated to determine whether it would provide  
42 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the effects of  
43 construction would not be adverse under NEPA. Based on current design footprints, the Plan would  
44 remove 1 acre of roosting and foraging habitat in the study area in the near-term as a result of the

1 construction of the water conveyance facilities (CM1). In addition, 6,480 acres of foraging habitat  
2 would be removed or converted in the near-term (CM1, 3,704 acres; *CM4 Tidal Natural Communities*  
3 *Restoration*, *CM8 Grassland Natural Community Restoration*, and *CM11 Natural Communities*  
4 *Enhancement and Management*—2,776 acres). Of these near-term acres of foraging habitat impact,  
5 4,920 acres would be moderate- to very high-value habitat (CM1, 2,993 acres, CM4-11, 1,927 acres).  
6 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by  
7 CM1 and that are identified in the biological goals and objectives for greater sandhill crane in  
8 Chapter 3 of the BDCP would be 1:1 protection and 1:1 restoration for loss of roost sites and 1:1  
9 protection of high- to very high-value foraging habitat for loss of moderate- to very high-value  
10 foraging habitat. Using these ratios would indicate that 1 acres of greater roosting habitat should be  
11 restored/created and 1 acres should be protected to compensate for the CM1 losses of greater  
12 sandhill crane roosting and foraging habitat. In addition, 2,993 acres of high- to very high-value  
13 foraging habitat should be protected to mitigate the CM1 losses of greater sandhill crane moderate-  
14 to very high-value foraging habitat. The near-term effects of other conservation actions would  
15 remove 1,927 acres of moderate- to very high-value foraging habitat, and therefore require 1,927  
16 acres of protection of high- to very high-value foraging habitat using the same typical NEPA and  
17 CEQA ratios (1:1 restoration and 1:1 protection for the loss of roosting and foraging habitat; 1:1  
18 protection for the loss of foraging habitat).

19 The implementation of *AMM20 Greater Sandhill Crane* would require that no greater sandhill crane  
20 roost sites were directly impacted by CM1 covered activities (including transmission lines and their  
21 associated footprints). Therefore there would be no loss of crane roosting and foraging habitat as a  
22 result of water conveyance facility construction once the facilities were fully designed, which would  
23 avoid the CM1 impact on the acre of roosting and foraging habitat once the project design was final.  
24 Methods to avoid direct impacts on crane roost sites are described in *AMM20 Greater Sandhill Crane*.

25 The BDCP has committed to near-term goals of creating 500 acres of managed wetlands and  
26 protecting 15,600 acres of cultivated lands in the Plan Area (Table 3-4 in Chapter 3, *Description of*  
27 *Alternatives*). These conservation actions are associated with CM3 and CM10 and would occur in the  
28 same timeframe as the construction and early restoration losses.

29 Up to 95 acres of roosting habitat would be created within 2 miles of existing permanent roost sites  
30 (Objective GSHC1.5). These roosts would consist of active cornfields that are flooded following  
31 harvest to support roosting cranes and also provide the highest-value foraging habitat for the  
32 species. Individual fields would be at least 40 acres could shift locations throughout the Greater  
33 Sandhill Crane Winter Use Area, and would be in place prior to construction. Of the 500 acres of  
34 managed wetlands to be created for roosting habitat, 320 acres would be created in minimum patch  
35 sizes of 40 acres within the Greater Sandhill Crane Winter Use Area in CZs 3, 4, 5, or 6 (Objective  
36 GSHC1.3). Restoration sites would be identified with consideration of sea level rise and local  
37 seasonal flood events. These wetlands would be created within 2 miles of existing permanent roost  
38 sites and protected in association with other protected natural community types at a ratio of 2:1  
39 upland to wetland habitat to provide buffers that will protect cranes from the types of disturbances  
40 that would otherwise result from adjacent roads and developed areas (e.g., roads, noise, visual  
41 disturbance, lighting). The remaining 180 acres of crane roosting habitat would be constructed  
42 within the Stone Lakes NWR project boundary (BDCP Chapter 3, Figure 3.3-6) and would be  
43 designed to provide connectivity between the Stone Lakes and Cosumnes greater sandhill crane  
44 populations (Objective GSHC1.4). The large patch sizes of these wetland complexes would provide  
45 additional conservation to address the threats of vineyard conversion, urbanization to the east, and  
46 sea level rise to the west of greater sandhill crane wintering habitat.

1 At least 15,600 acres of cultivated lands that provide habitat for covered and other native wildlife  
2 species would be protected in the near-term time period (Objective CLNC1.1). Mitigation Measure  
3 BIO-69a, *Compensate for the Loss of Medium- to Very High-Value Greater Sandhill Crane Foraging*  
4 *Habitat*, would be available to guide the near-term protection of cultivated lands to ensure that the  
5 near-term impacts of moderate- to very high-value habitat for greater sandhill crane were  
6 compensated for with appropriate crop types and natural communities.

7 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
8 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
9 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
10 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
11 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
12 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
13 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

#### 14 **Late Long-Term Timeframe**

15 The study area supports approximately 23,919 acres of roosting and foraging habitat and 164,676  
16 acres of foraging habitat for greater sandhill crane. Alternative 1C as a whole would result in the  
17 permanent loss of and temporary effects on 42 acres of roosting and foraging habitat (less than 1%  
18 of the total habitat in the study area) and 8,071 acres of foraging habitat (5% of the total habitat in  
19 the study area) for the greater sandhill crane during the term of the Plan. The foraging habitat lost  
20 by the late long-term timeframe would consist of 6,268 acres of medium- to very high-value foraging  
21 habitat. The locations of these losses are described above in the analyses of individual conservation  
22 measures. The implementation of *AMM20 Greater Sandhill Crane* would require that no roost sites  
23 were directly affected by water conveyance facilities including transmission lines and associated  
24 footprints. In addition, temporarily removed habitat would be restored within 1 year following  
25 construction. However, it would not necessarily be restored to its original topography and it could  
26 result in the conversion of cultivated lands to grasslands.

27 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*  
28 *Restoration* and *CM10 Nontidal Marsh Restoration* to restore or create at least 595 acres of greater  
29 Sandhill crane roost habitat (Objectives GSHC1.3, GSHC1.4, and GSHC1.5) and to protect at least  
30 7,300 acres of high- to very high-value foraging habitat for greater Sandhill crane (Objective  
31 GSHC1.1).

32 Of the 500 acres of managed wetlands to be created for roosting habitat, 320 acres would be created  
33 in minimum patch sizes of 40 acres within the Greater Sandhill Crane Winter Use Area in CZs 3, 4, 5,  
34 or 6 (Objective GSHC1.3). Restoration sites would be identified with consideration of sea level rise  
35 and local seasonal flood events. These wetlands would be created within 2 miles of existing  
36 permanent roost sites and protected in association with other protected natural community types at  
37 a ratio of 2:1 upland to wetland habitat to provide buffers that will protect cranes from the types of  
38 disturbances that would otherwise result from adjacent roads and developed areas (e.g., roads,  
39 noise, visual disturbance, lighting). The remaining 180 acres of crane roosting habitat would be  
40 constructed within the Stone Lakes NWR project boundary (BDCP Chapter 3, Figure 3.3-6) and  
41 would be designed to provide connectivity between the Stone Lakes and Cosumnes greater sandhill  
42 crane populations (Objective GSHC1.4). These wetlands would consist of two 90-acre wetland  
43 complexes each consisting of at least three wetlands and would be no more than 2 miles apart. The  
44 large patch sizes of these wetland complexes would provide additional conservation to address the

1 threats of vineyard conversion, urbanization to the east, and sea level rise to the west of greater  
2 sandhill crane wintering habitat. Approximately 95 acres of roosting habitat would be created  
3 within 2 miles of existing permanent roost sites (Objective GSHC1.5). These roosts would consist of  
4 active cornfields that are flooded following harvest to support roosting cranes and also provide the  
5 highest-value foraging habitat for the species. Individual fields would be at least 40 acres could shift  
6 locations throughout the Greater Sandhill Crane Winter Use Area, but would be sited with  
7 consideration of the location of roosting habitat loss and would be in place prior to roosting habitat  
8 loss.

9 The BDCP has committed to protecting 7,300 acres of high- to very high-value greater sandhill crane  
10 foraging habitat by the late long-term timeframe with at least 80% maintained in very-high value  
11 types in any given year (Objective GSHC1.1). These acres of protected foraging habitat would be  
12 located within 2 miles of known roosting sites in CZs 3, 4, 5, and/or 6 and would consider sea level  
13 rise and local seasonal flood events, greater Sandhill crane population levels, and the location of  
14 foraging habitat loss. The patch size of these protected lands would be at least 160 acres (Objectives  
15 GSHC1.1 and GSHC1.2). Because agricultural habitat values change over time based largely on  
16 economically driven agricultural practices, protecting crane habitat would provide enhanced  
17 stability to agricultural habitat value within the crane use area that does not currently exist.

18 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
19 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
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21 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
22 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
23 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
24 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

## 25 **CEQA Conclusion:**

### 26 ***Near-Term Timeframe***

27 Because the water conveyance facilities construction is being evaluated at the project level, the near-  
28 term BDCP conservation strategy has been evaluated to determine whether it would provide  
29 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the effects of  
30 construction would be less than significant under CEQA. Based on current design footprints, the Plan  
31 would remove 1 acre of roosting and foraging habitat in the study area in the near-term as a result  
32 of the construction of the water conveyance facilities (CM1). In addition, 6,480 acres of foraging  
33 habitat would be removed or converted in the near-term (CM1, 3,704 acres; *CM4 Tidal Natural*  
34 *Communities Restoration*, *CM8 Grassland Natural Community Restoration*, and *CM11 Natural*  
35 *Communities Enhancement and Management—2,776 acres*). Of these near-term acres of foraging  
36 habitat impact, 4,920 acres would be moderate- to very high-value habitat (CM1, 2,993 acres, CM4-  
37 11, 1,927 acres). Typical NEPA and CEQA project-level mitigation ratios for those natural  
38 communities affected by CM1 and that are identified in the biological goals and objectives for  
39 greater sandhill crane in Chapter 3 of the BDCP would be 1:1 protection and 1:1 restoration for loss  
40 of roost sites and 1:1 protection of high- to very high-value foraging habitat for loss of moderate- to  
41 very high-value foraging habitat. Using these ratios would indicate that 1 acres of greater roosting  
42 habitat should be restored/created and 1 acres should be protected to compensate for the CM1  
43 losses of greater sandhill crane roosting and foraging habitat. In addition, 2,993 acres of high- to  
44 very high-value foraging habitat should be protected to mitigate the CM1 losses of greater sandhill

1 crane moderate- to very high-value foraging habitat. The near-term effects of other conservation  
2 actions would remove 1,927 acres of moderate- to very high-value foraging habitat, and therefore  
3 require 1,927 acres of protection of high- to very high-value foraging habitat using the same typical  
4 NEPA and CEQA ratios (1:1 restoration and 1:1 protection for the loss of roosting and foraging  
5 habitat; 1:1 protection for the loss of foraging habitat).

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31 populations (Objective GSHC1.4). The large patch sizes of these wetland complexes would provide  
32 additional conservation to address the threats of vineyard conversion, urbanization to the east, and  
33 sea level rise to the west of greater sandhill crane wintering habitat.

34 At least 15,600 acres of cultivated lands that provide habitat for covered and other native wildlife  
35 species would be protected in the near-term time period (Objective CLNC1.1). Mitigation Measure  
36 BIO-69a would be available to guide the near-term protection of cultivated lands to ensure that the  
37 near-term impacts of moderate- to very high-value habitat for greater sandhill crane were  
38 compensated for with appropriate crop types and natural communities.

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42 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
43 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or

1 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
2 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

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19 7,300 acres of high- to very high-value foraging habitat for greater Sandhill crane (Objective  
20 GSHC1.1).

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33 large patch sizes of these wetland complexes would provide additional conservation to address the  
34 threats of vineyard conversion, urbanization to the east, and sea level rise to the west of greater  
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38 highest-value foraging habitat for the species. Individual fields would be at least 40 acres could shift  
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42 The BDCP has committed to protecting 7,300 acres of high- to very high-value greater sandhill crane  
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1 located within 2 miles of known roosting sites in CZs 3, 4, 5, and/or 6 and would consider sea level  
2 rise and local seasonal flood events, greater Sandhill crane population levels, and the location of  
3 foraging habitat loss. The patch size of these protected lands would be at least 160 acres (Objectives  
4 GSHC1.1 and GSHC1.2). Because agricultural habitat values change over time based largely on  
5 economically driven agricultural practices, protecting crane habitat would provide enhanced  
6 stability to agricultural habitat value within the crane use area that does not currently exist.

7 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
8 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
9 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
10 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
11 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
12 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
13 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

14 Considering Alternative 1C's protection and restoration provisions, in addition to Mitigation  
15 Measure BIO-69a, which would compensate for the loss of medium- to very high-value foraging  
16 habitat at a ratio of 1:1 prior to or concurrent with impacts, loss of habitat and direct mortality  
17 through implementation of Alternative 1C would not result in a substantial adverse effect through  
18 habitat modifications and would not substantially reduce the number or restrict the range of the  
19 species. Therefore, the alternative would have a less-than-significant impact on greater sandhill  
20 crane.

#### 21 **Mitigation Measure BIO-69a: Compensate for the Loss of Medium to Very High-Value** 22 **Greater Sandhill Crane Foraging Habitat**

23 DWR will compensate for the loss of greater sandhill crane medium- to very high-value foraging  
24 habitat at a ratio of 1:1 by protecting or managing high- to very high-value habitat in the Plan  
25 Area. Compensation must occur prior to or concurrent within the impacts to minimize the  
26 effects of habitat loss. The crop types and natural communities that are included in foraging  
27 habitat value categories are listed in Table 12-1C-29. Foraging habitat conservation must occur  
28 within the greater sandhill crane winter use area and the location of protected habitat or  
29 conservation easements must be preapproved by USFWS and CDFW.

#### 30 **Impact BIO-70: Effects on Greater Sandhill Crane Associated with Electrical Transmission** 31 **Facilities**

32 Greater sandhill cranes are susceptible to collision with power lines and other structures during  
33 periods of inclement weather and low visibility (Avian Power Line Interaction Committee 1994,  
34 Brown and Drewien 1995, Manville 2005). New transmission lines installed in the study area would  
35 increase the risk for bird-power line strikes, which could result in injury or mortality of greater  
36 sandhill cranes. Both permanent and temporary electrical transmission lines would be constructed  
37 to supply construction and operational power to BDCP facilities. Typically, higher-voltage (230-  
38 kilovolt [kV]) lines vary in height from 90 to 110 feet, while "sub" transmission (69-kV) lines vary  
39 from 50 to 70 feet (Avian Power Line Interaction Committee 2006). The Alternative 1C alignment  
40 would require the installation of approximately 36 miles of permanent transmission line (18 miles  
41 of 230-kV lines and 18 miles of 69-kV lines) extending north and south, to the west of the high-use  
42 crane areas. The temporary transmission lines would total approximately 71 miles (14 miles of 69-

1 kV line and 57 miles of 12-kV line). Temporary lines would be removed after construction of the  
2 water conveyance facilities, within 10 years.

3 Existing transmission lines in the sandhill crane winter use area include a network of distribution  
4 lines that are between 11- and 22-kV. In addition, there are two 115-kV lines (one that overlaps with  
5 the winter use area between Antioch and I-5 east of Hood, and one that crosses the northern tip of  
6 the crane winter use area north of Clarksburg); and 69-kV lines that parallel Twin Cities Road,  
7 Herzog Road, Lambert Road, and the Southern Pacific Dredge Cut in the vicinity of Stone Lakes  
8 National Wildlife Refuge. At the south end of the winter use area, there are three 230-kV  
9 transmission lines that follow I-5, and then cut southwest through Holt, and two 500-kV lines cross  
10 the southwestern corner of the winter use area. This existing network of power lines in the study  
11 currently poses a risk for sandhill cranes, as both distribution and transmission lines cross over or  
12 surround sandhill crane roost sites in the study area. New transmission lines would increase this  
13 risk and have an adverse effect on the species in the absence of other conservation actions.

14 The potential mortality of greater sandhill crane in the area of the proposed transmission lines  
15 under Alternative 1C was estimated using collision mortality rates by Brown and Drewien (1995)  
16 and an estimate of potential crossings along the proposed lines (methods are described in BDCP  
17 Appendix 5.J, Attachment 5J.C, *Analysis of Potential Bird Collisions at Proposed BDCP Powerlines*).  
18 Results indicate that in the absence of any line marking to increase visibility and reduce collision  
19 risk (i.e., without minimization measures), the average annual mortality of greater sandhill crane at  
20 permanent lines would be up to 4 fatalities per year and would be 5 fatalities per year at temporary  
21 lines.

22 Marking transmission lines with devices that make the lines more visible to birds has been shown to  
23 dramatically reduce the incidence of bird mortality, including for sandhill cranes. Brown and  
24 Drewien (1995) estimated that marking devices in the Central Valley would reduce crane mortality  
25 by 66%. Using this assumption, by incorporating line-marking devices into the designs the annual  
26 mortality rate would be estimated to decrease to 3 fatalities per year for the permanent lines and 3  
27 fatalities per year for the temporary lines.

28 The current proposed transmission line alignment under Alternative 1C is not fully designed, and  
29 line locations are not final. The implementation of *AMM20 Greater Sandhill Crane* would require that  
30 the final transmission line alignment would not result in a net increase in bird strike risk to greater  
31 sandhill cranes in the Plan Area. This would be achieved by implementing any combination of the  
32 following: (1) siting new transmission lines in lower bird strike risk zones; (2) removing, relocating  
33 or undergrounding existing lines; (3) installing flight diverters on existing lines in the crane winter  
34 use area; and/or (4) for areas outside of the Stone Lakes National Wildlife Refuge project boundary,  
35 shifting locations of flooded areas that provide crane roosts to lower risk areas. This would be  
36 expected to reduce existing mortality and thus fully offset the overall population effects of new  
37 transmission lines. Designing the alignment to minimize risk and removing, relocating, or  
38 undergrounding existing lines would be given priority out of the above methods. With these  
39 measures and the proposed mitigation, and considering that the temporary lines would be removed  
40 within the first 10 years of plan implementation, the risk of greater sandhill crane mortality from  
41 transmission lines would be reduced substantially.

42 **CEQA Conclusion:** Sandhill cranes are known to be susceptible to collision with overhead wires. The  
43 existing network of power lines in the study area currently poses a risk for sandhill cranes. New  
44 transmission lines would increase the risk for bird-power line strikes, which could result in injury or

1 mortality of greater sandhill crane. By incorporating line-marking devices on new transmission lines  
2 the estimated mortality rate would be 3 fatalities per year from permanent transmission lines and 3  
3 fatalities per year from temporary transmission lines. The current proposed transmission line  
4 alignment under Alternative 1C is not fully designed, and line locations are not final. The  
5 implementation of *AMM20 Greater Sandhill Crane* would require that the final transmission line  
6 alignment avoided crane roost sites and achieved no net increase of greater sandhill crane strike  
7 risk in the Plan Area. With *AMM20 Greater Sandhill Crane* and the proposed mitigation, and  
8 considering that the temporary lines would be removed within the first 10 years of Plan  
9 implementation, the risk of mortality from collision with transmission lines would result in a less-  
10 than-significant impact on the greater sandhill crane population.

### 11 **Impact BIO-71: Indirect Effects of Plan Implementation on Greater Sandhill Crane**

12 **Indirect construction-and operation-related effects:** Sandhill cranes are sensitive to disturbance.  
13 Noise and visual disturbances from the construction of water conveyance facilities and other  
14 conservation measures could reduce greater sandhill crane use of modeled habitat adjacent to work  
15 areas. Indirect effects associated with construction include noise, dust, and visual disturbance  
16 caused by grading, filling, contouring, and other ground-disturbing operations outside the project  
17 footprint but within 1,300 feet of the construction edge. Furthermore, maintenance of the  
18 aboveground water conveyance facilities could result in ongoing but periodic postconstruction noise  
19 and visual disturbances that could affect greater sandhill crane use of surrounding habitat. These  
20 effects could result from periodic vehicle use along the conveyance corridor, inspection and  
21 maintenance of aboveground facilities, and similar activities. These potential effects would be  
22 minimized with implementation of *AMM20 Greater Sandhill Crane* described in Appendix 3.C,  
23 *Avoidance and Minimization Measures*.

24 The BDCP includes an analysis of the indirect effects of noise and visual disturbance that would  
25 result from the construction of the Alternative 4 water conveyance facilities on greater sandhill  
26 crane (BDCP Appendix 5J.D, *Indirect Effects of the Construction of the BDCP Conveyance Facility on*  
27 *Sandhill Crane*). The same methods were employed to addresses the potential noise effects on  
28 cranes from Alternative 1C and to determine that as much as 3,186-10,204 acres of crane foraging  
29 habitat could potentially be affected by general construction noise above baseline level (50–60 dBA).  
30 In addition, 1,720 – 7,382 acres of crane foraging habitat could be affected by noise from pile driving  
31 that would be above baseline level (50–60 dBA, Table 12-1C-30). The analysis was conducted based  
32 on the assumption that there would be direct line-of-sight from sandhill crane habitat areas to the  
33 construction site, and, therefore, provides a worst-case estimate of effects. In many areas the  
34 existing levees would partially or completely block the line-of-sight and would function as effective  
35 noise barriers, substantially reducing noise transmission. However, there is insufficient data to  
36 assess the effects that increased noise levels would have on sandhill crane behavior.

**Table 12-1C-30. Greater Sandhill Crane Habitat Affected By General Construction and Pile Driving Noise Under Alternative 1C (acres)**

Habitat Type	General Construction		Pile Driving	
	Above 60 dBA	Above 50 dBA	Above 60 dBA	Above 50 dBA
Permanent Roosting	0	0	0	0
Temporary Roosting	0	0	0	0
Foraging	3,186	10,204	1,720	7,382
<b>Total Habitat</b>	<b>3,186</b>	<b>10,204</b>	<b>1,720</b>	<b>7,382</b>

Evening and nighttime construction activities would require the use of extremely bright lights. Nighttime construction could also result in headlights flashing into roost sites when construction vehicles are turning onto or off of construction access routes. Proposed surge towers would require the use of safety lights that would alert low-flying aircraft to the presence of these structures because of their height. Little data is available on the effects of impact of artificial lighting on roosting birds. Direct light from automobile headlights has been observed to cause roosting cranes to flush and it is thought that they may avoid roosting in areas where lighting is bright (BDCP Chapter 5, *Effects Analysis*). If the birds were to roost in a brightly lit site, they may be vulnerable to sleep-wake cycle shifts and reproductive cycle shifts. Potential risks of visual impacts from lighting include a reduction in the cranes' quality of nocturnal rest, and effects on their sense of photo-period which might cause them to shift their physiology towards earlier migration and breeding (BDCP Chapter 5, *Effects Analysis*). Effects such as these could prove detrimental to the cranes' overall fitness and reproductive success (which could in turn have population-level impacts). A change in photo-period interpretation could also cause cranes to fly out earlier from roost sites to forage and might increase their risk of power line collisions if they were to leave roosts before dawn (BDCP Chapter 5, *Effects Analysis*).

The effects of noise and visual disturbance on greater sandhill crane would be minimized through the implementation of *AMM20 Greater Sandhill Crane* (Appendix 3.C, *Avoidance and Minimization Measures*). Activities within 0.75 mile of crane roosting habitat would reduce construction noise during night time hours (from one hour before sunset to one hour after sunrise) such that construction noise levels do not exceed 50 dBA  $L_{eq}$  (1 hour) at the nearest temporary or permanent roosts during periods when the roost sites are available (flooded). In addition, the area of crane foraging habitat that would be affected during the day (from one hour after sunrise to one hour before sunset) by construction noise exceeding 50 dBA  $L_{eq}$  (1 hour) would also be minimized. Unavoidable noise related effects would be compensated for by the enhancement of 0.1 acre of foraging habitat for every acre indirectly affected within the 50 dBA  $L_{eq}$  (1 hour) construction noise contour. With these measures in place, indirect effects of noise and visual disturbance from construction activities are not expected to reduce the greater sandhill crane population in the study area.

The use of mechanical equipment during water conveyance facilities construction could cause the accidental release of petroleum or other contaminants that could affect greater sandhill crane in the surrounding habitat. The inadvertent discharge of sediment or excessive dust adjacent to greater sandhill crane habitat could also affect the species. AMM1-AMM7, including *AMM2 Construction Best Management Practices and Monitoring*, would minimize the likelihood of such spills and ensure that

1 measures were in place to prevent runoff from the construction area and negative effects of dust on  
2 foraging habitat.

3 **Methylmercury Exposure:** Covered activities have the potential to exacerbate bioaccumulation of  
4 mercury in covered species, including greater sandhill crane. Marsh (tidal and nontidal) and  
5 floodplain restoration also have the potential to increase exposure to methylmercury. Mercury is  
6 transformed into the more bioavailable form of methylmercury in aquatic systems, especially areas  
7 subjected to regular wetting and drying such as tidal marshes and flood plains. Thus, BDCP  
8 restoration activities that create newly inundated areas could increase bioavailability of mercury  
9 (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Increased methylmercury  
10 associated with natural community and floodplain restoration may indirectly affect greater sandhill  
11 crane via uptake in lower trophic levels (BDCP Appendix 5.D, *Contaminants*). In general, the highest  
12 methylation rates are associated with high tidal marshes that experience intermittent wetting and  
13 drying and associated anoxic conditions (Alpers et al. 2008). The potential mobilization or creation  
14 of methylmercury within the study area varies with site-specific conditions and would need to be  
15 assessed at the project level. *CM12 Methylmercury Management* includes provisions for project-  
16 specific Mercury Management Plans. Along with avoidance and minimization measures and adaptive  
17 management and monitoring, *CM12 Methylmercury Management* would be available to address the  
18 uncertainty of methylmercury levels in restored tidal marsh and potential impacts on greater  
19 sandhill crane. The potential indirect effects of increased mercury exposure is likely low for greater  
20 sandhill crane for the following reasons: 1) greater sandhill cranes occur in the study area only  
21 during the nonbreeding winter months, 2) their primary foraging habitats in the study area are  
22 cultivated crops, and 3) the use of restored tidal wetlands by cranes is likely to be limited compared  
23 to seasonal managed wetlands.

24 **Selenium:** Selenium is an essential nutrient for avian species and has a beneficial effect in low  
25 doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009, Ohlendorf  
26 and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults, and can also  
27 result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz 2009). The  
28 effect of selenium toxicity differs widely between species and also between age and sex classes  
29 within a species. In addition, the effect of selenium on a species can be confounded by interactions  
30 with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith 2009).

31 The primary source of selenium bioaccumulation in birds is through their diet (Ackerman and  
32 Eagles-Smith 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the  
33 trophic level at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At  
34 Kesterson Reservoir in the San Joaquin Valley, selenium concentrations in invertebrates have been  
35 found to be two to six times the levels in rooted plants. Furthermore, bivalves sampled in the San  
36 Francisco Bay contained much higher selenium levels than crustaceans such as copepods (Stewart et  
37 al. 2004). Studies conducted at the Grasslands in Merced County recorded higher selenium levels in  
38 black-necked stilts which feed on aquatic invertebrates than in mallards and pintails, which are  
39 primarily herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which  
40 forage on bivalves) have much higher levels of selenium levels than shorebirds that prey on aquatic  
41 invertebrates (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high  
42 levels of selenium have a higher risk of selenium toxicity.

43 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations  
44 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to  
45 exacerbate bioaccumulation of selenium in avian species, including greater sandhill crane. Marsh

1 (tidal and nontidal) and floodplain restoration have the potential to mobilize selenium, and  
2 therefore increase avian exposure from ingestion of prey items with elevated selenium levels. Thus,  
3 BDCP restoration activities that create newly inundated areas could increase bioavailability of  
4 selenium (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Changes in  
5 selenium concentrations were analyzed in Chapter 8, *Water Quality*, and it was determined that,  
6 relative to Existing Conditions and the No Action Alternative, CM1 would not result in substantial,  
7 long-term increases in selenium concentrations in water in the Delta under any alternative.  
8 However, it is difficult to determine whether the effects of potential increases in selenium  
9 bioavailability associated with restoration-related conservation measures (CM4 and CM5) would  
10 lead to adverse effects on greater sandhill crane.

11 Because of the uncertainty that exists at this programmatic level of review, there could be a  
12 substantial effect on greater sandhill crane from increases in selenium associated with restoration  
13 activities. This effect would be addressed through the implementation of *AMM27 Selenium*  
14 *Management* (BDCP Appendix 3.C, *Avoidance and Minimization Measures*) which would provide  
15 specific tidal habitat restoration design elements to reduce the potential for bioaccumulation of  
16 selenium and its bioavailability in tidal habitats. Furthermore, the effectiveness of selenium  
17 management to reduce selenium concentrations and/or bioaccumulation would be evaluated  
18 separately for each restoration effort as part of design and implementation. This avoidance and  
19 minimization measure would be implemented as part of the tidal habitat restoration design  
20 schedule.

21 **CEQA Conclusion:** Crane foraging habitat could potentially be affected by general construction noise  
22 (3,186-10,204 acres) and pile driving (1,720-7,382 acres) above baseline level (50–60 dBA).  
23 Construction in certain areas would take place 7 days a week and 24 hours a day and evening and  
24 nighttime construction activities would require the use of extremely bright lights, which could  
25 adversely affect roosting cranes by impacting their sense of photo-period and by exposing them to  
26 predators. The effects of noise and visual disturbances would be reduced through the  
27 implementation of *AMM20 Greater Sandhill Crane* which would include requirements (described  
28 above) to minimize the effects of noise and visual disturbance on greater sandhill cranes. With these  
29 measures in place, in addition to AMM1–AMM7, noise and visual disturbances, the potential for  
30 hazardous spills, increased dust and sedimentation, and operations and maintenance of the water  
31 conveyance facilities would have a less-than-significant impact on greater sandhill crane. The  
32 implementation of tidal natural communities restoration or floodplain restoration could result in  
33 increased exposure of greater sandhill crane to methylmercury. The potential indirect effects of  
34 increased mercury exposure is likely low for greater sandhill crane for the following reasons: 1)  
35 greater sandhill cranes occur in the study area only during the nonbreeding winter months, 2) their  
36 primary foraging habitats in the study area are cultivated crops, and 3) the use of restored tidal  
37 wetlands by cranes is likely to be limited compared to seasonal managed wetlands. Site-specific  
38 restoration plans that address the creation and mobilization of mercury, as well as monitoring and  
39 adaptive management as described in *CM12 Methylmercury Management*, would be available to  
40 address the uncertainty of methylmercury levels in restored tidal marsh and potential impacts on  
41 greater sandhill crane. Tidal habitat restoration could result in increased exposure of greater  
42 sandhill crane to selenium. This effect would be addressed through the implementation of *AMM27*  
43 *Selenium Management*, which would provide specific tidal habitat restoration design elements to  
44 reduce the potential for bioaccumulation of selenium and its bioavailability in tidal habitats. With  
45 these measures in place, the indirect effects of plan implementation would have a less-than-  
46 significant impact on greater sandhill crane.

## 1 Lesser Sandhill Crane

2 This section describes the effects of Alternative 1C, including water conveyance facilities  
3 construction and implementation of other conservation components, on lesser sandhill crane. Lesser  
4 sandhill cranes in the study area are almost entirely dependent on privately owned agricultural  
5 lands for foraging. Long-term sustainability of the lesser sandhill crane is thus dependent on  
6 providing a matrix of compatible crop types that afford suitable foraging habitat and maintaining  
7 compatible agricultural practices, while sustaining and increasing the extent of other essential  
8 habitat elements such as night roosting habitat. The habitat model for lesser sandhill crane includes  
9 “roosting and foraging” and “foraging” habitat. These habitat types include suitable foraging and  
10 roosting habitat in the study area as certain agricultural types, specific grassland types, irrigated  
11 pastures and hay crops, managed seasonal wetland, and other natural seasonal wetland. Roosting  
12 and foraging habitat includes traditional roost sites that are known to be used by sandhill cranes  
13 (both greater and lesser) and also provide foraging habitat. Detail regarding the roosting and  
14 foraging modeled habitat for both subspecies of sandhill crane is included in the BDCP (BDCP  
15 Appendix 2.A *Covered Species Accounts*). Both temporary and permanent roost sites were identified  
16 for sandhill cranes. Permanent roosting and foraging sites are those used regularly, year after year,  
17 while temporary roosting and foraging sites are those used in some years. Factors included in  
18 assessing the loss of foraging habitat for the lesser sandhill crane considers the relative habitat value  
19 of specific crop or land cover types. Although both the greater and the lesser Sandhill crane use  
20 similar crop or land cover types, these provide different values of foraging habitat for the two  
21 subspecies based on proportional use of these habitats. Lesser sandhill cranes are less traditional  
22 than greater sandhill cranes and are more likely to move between different roost site complexes and  
23 different wintering regions (Ivey pers. comm.) The wintering range is ten times larger than the  
24 greater sandhill crane and their average foraging flight radius from roost sites is twice that of  
25 greater sandhill cranes. Because of this higher mobility, lesser sandhill cranes are more flexible in  
26 their use of foraging areas than the greater sandhill crane.

27 Construction and restoration associated with Alternative 1C conservation measures would result in  
28 both temporary and permanent losses of foraging and roosting habitat for lesser sandhill crane as  
29 indicated in Table 12-1C-31. Full implementation of Alternative 1C would include the following  
30 conservation actions over the term of the BDCP for the greater sandhill crane (BDCP Chapter 3,  
31 Section 3.3, *Biological Goals and Objectives*) that would also benefit the lesser sandhill crane.

- 32 ● Protect at least 7,300 acres of high- to very high-value habitat for greater sandhill crane, with at  
33 least 80% maintained in very high-value types in any given year. This protected habitat will be  
34 within 2 miles of known roosting sites in CZs 3, 4, 5, and/or 6 and will consider sea level rise and  
35 local seasonal flood events, greater sandhill crane population levels, and the location of foraging  
36 habitat loss. Patch size of protected cultivated lands will be at least 160 acres (Objective  
37 GSHC1.1, associated with CM3).
- 38 ● To create additional high-value greater sandhill crane winter foraging habitat, 10% of the  
39 habitat protected under Objective GSHC1.1 will involve acquiring low-value habitat or  
40 nonhabitat areas and converting it to high- or very high-value habitat. Created habitat will be  
41 within 2 miles of known roosting sites in CZs 3, 4, 5, and/or 6 and will consider sea level rise and  
42 local seasonal flood events, greater sandhill crane population levels, and the location of foraging  
43 habitat loss (Objective GSHC1.2, associated with CM3).
- 44 ● Create at least 320 acres of managed wetlands in minimum patch sizes of 40 acres within the  
45 Greater Sandhill Crane Winter Use Area in CZs 3, 4, 5, or 6, with consideration of sea level rise

1 and local seasonal flood events. The wetlands will be located within 2 miles of existing  
2 permanent roost sites and protected in association with other protected natural community  
3 types (excluding nonhabitat cultivated lands) at a ratio of 2:1 upland to wetland to provide  
4 buffers around the wetlands (Objective GSHC1.3, associated with CM3).

- 5 ● Create at least two 90-acre wetland complexes within the Stone Lakes National Wildlife Refuge  
6 project boundary. The complexes will be no more than 2 miles apart and will help provide  
7 connectivity between the Stone Lakes and Cosumnes greater sandhill crane populations. Each  
8 complex will consist of at least three wetlands totaling at least 90 acres of greater sandhill crane  
9 roosting habitat, and will be protected in association with other protected natural community  
10 types (excluding nonhabitat cultivated lands) at a ratio of at least 2:1 uplands to wetlands (i.e.,  
11 two sites with at least 90 acres of wetlands each). One of the 90-acre wetland complexes may be  
12 replaced by 180 acres of cultivated lands (e.g., cornfields) that are flooded following harvest to  
13 support roosting cranes and provide highest-value foraging habitat, provided such substitution  
14 is consistent with the long-term conservation goals of Stone Lakes National Wildlife Refuge for  
15 greater sandhill crane. (Objective GSHC1.4, associated with CM10).
- 16 ● Create an additional 95 acres of roosting habitat within 2 miles of existing permanent roost  
17 sites. The habitat will consist of active cornfields that are flooded following harvest to support  
18 roosting cranes and that provide highest-value foraging habitat. Individual fields will be at least  
19 40 acres and can shift locations throughout the Greater Sandhill Crane Winter Use Area, but will  
20 be sited with consideration of the location of roosting habitat loss and will be in place prior to  
21 roosting habitat loss (Objective GSCH1.5, associated with CM3).
- 22 ● Protect at least 48,625 acres of cultivated lands that provide suitable habitat for covered and  
23 other native wildlife species (Objective CLNC1.1, associated with CM3).
- 24 ● Within the at least 48,625 acres of protected cultivated lands, protect at least 42,275 acres of  
25 cultivated lands as Swainson's hawk foraging habitat with at least 50% in very high-value  
26 habitat in CZs 2, 3, 4, 5, 7, 8, 9, and 11 (Objective SH1.2, associated with CM3).
- 27 ● Target cultivated land conservation to provide connectivity between other conservation lands  
28 (Objective CLNC1.2, associated with CM3).
- 29 ● Maintain and protect the small patches of important wildlife habitats associated with cultivated  
30 lands that occur in cultivated lands within the reserve system, including, water conveyance  
31 channels, grasslands, ponds, and wetlands (Objective CLNC1.3, associated with CM3).

32 As explained below, with the restoration and protection of these amounts of habitat, in addition to  
33 natural community enhancement and management commitments (including CM12 *Methylmercury*  
34 *Management*) and the implementation of AMM1–AMM7, AMM20 *Greater Sandhill Crane*, AMM27  
35 *Selenium Management*, and AMM30 *Transmission Line Design and Alignment Guidelines*, impacts on  
36 the lesser sandhill crane would not be adverse for NEPA purposes and would be less than significant  
37 for CEQA purposes.

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**Table 12-1C-31. Changes in Lesser Sandhill Crane Modeled Habitat Associated with Alternative 1C (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	Roosting and Foraging - Permanent	0	0	0	0	NA	NA
	Roosting and Foraging - Temporary	0	0	1	1	NA	NA
	Foraging	3,639	3,639	5,679	5,679	NA	NA
<b>Total Impacts CM1</b>		<b>3,639</b>	<b>3,639</b>	<b>5,680</b>	<b>5,680</b>		
CM2-CM18	Roosting and Foraging - Permanent	0	0	0	0	0	0
	Roosting and Foraging - Temporary	0	41	0	0	0	0
	Foraging	3,610	12,131	2	4	0	0
<b>Total Impacts CM2-CM18</b>		<b>3,610</b>	<b>12,172</b>	<b>2</b>	<b>4</b>	<b>0</b>	<b>0</b>
<b>Total Roosting and Foraging - Permanent</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>Total Roosting and Foraging - Temporary</b>		<b>0</b>	<b>41</b>	<b>1</b>	<b>1</b>	<b>0</b>	<b>0</b>
<b>Total Foraging</b>		<b>7,249</b>	<b>15,770</b>	<b>5,681</b>	<b>5,683</b>		
<b>TOTAL IMPACTS</b>		<b>7,249</b>	<b>15,811</b>	<b>5,682</b>	<b>5,684</b>	<b>0</b>	<b>0</b>

<sup>a</sup> See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only.

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-72: Loss or Conversion of Habitat for and Direct Mortality of Lesser Sandhill**  
5 **Crane**

6 Alternative 1C conservation measures would not impact lesser sandhill crane roosting habitat.  
7 However, they would result in the temporary loss of up to 1 acre of modeled roosting and foraging  
8 habitat and 21,453 acres of foraging habitat (15,770 acres of permanent loss and 5,681 acres of  
9 temporary loss) for lesser sandhill crane (Table 12-1C-31). Conservation measures that would result  
10 in these losses are conveyance facilities and transmission line construction, and establishment and  
11 use of borrow and spoil areas (CM1), Yolo Bypass Fisheries Improvements (CM2), Tidal Natural  
12 Communities Restoration (CM4), Grassland Natural Community Restoration (CM8), Nontidal Marsh  
13 Natural Community Restoration (CM10), and Natural Communities Enhancement and Management  
14 (CM11). The majority of habitat loss would result from water conveyance facility construction and

1 conversion of habitat to tidal natural communities through CM4. Habitat enhancement and  
2 management activities through CM11, which include ground disturbance or removal of nonnative  
3 vegetation, could also result in local adverse habitat effects. In addition, maintenance activities  
4 associated with the long-term operation of the water conveyance facilities and other BDCP physical  
5 facilities could degrade or eliminate lesser sandhill crane modeled habitat. Each of these individual  
6 activities is described below. A summary statement of the combined impacts, NEPA effects and a  
7 CEQA conclusion follow the individual conservation measure discussions.

- 8 • *CM1 Water Facilities and Operation*: Construction of Alternative 1C conveyance facilities as they  
9 are currently designed would result in the combined permanent and temporary loss of up to  
10 9,318 acres of modeled lesser sandhill crane habitat. This would consist of the permanent  
11 removal of 3,639 acres of foraging habitat. Foraging habitat that would be permanently  
12 impacted by CM1 would consist of 1,467 acres of very high-value, 502 acres of high-value, and  
13 882 acres of medium-value foraging habitat (Table 12-1C-32). In addition, 1 acre of temporary  
14 roosting and foraging habitat and 5,679 acres of foraging habitat would be temporarily removed  
15 (Table 12-1C-31). The temporarily removed foraging habitat would consist primarily of  
16 cultivated lands and it would be restored within one year following construction. However, it  
17 would not necessarily be restored to its original topography and it could be restored as  
18 grasslands in the place of cultivated lands. Approximately half of the acres of foraging habitat  
19 that would be impacted would be a result of borrow and spoil areas associated with the  
20 construction of the intakes and the canal.

21 The acre of temporary roosting and foraging habitat that would be temporarily impacted is  
22 located on Webb Tract, east of Bradford Island and the loss would be a result of the installation  
23 of a temporary transmission line along the southern border of the roost site. However, the  
24 implementation of AMM20 Greater Sandhill Crane would require that CM1 activities be  
25 designed to avoid direct loss of crane roost sites. Avoidance of crane roost sites would be  
26 accomplished either by siting activities outside of identified roost sites or by relocating the roost  
27 site if it consisted of cultivated lands. Relocated roost sites would be established prior to  
28 construction activities affecting the original roost site (as described in *AMM20 Greater Sandhill  
29 Crane*, BDCP Appendix 3C, *Avoidance and Minimization Measures*). Therefore there would be no  
30 loss of crane roosting and foraging habitat as a result of water conveyance facility construction  
31 once the facilities were fully designed.

32 Approximately 617 acres of the permanent loss of foraging habitat would be from the storage of  
33 reusable tunnel material on Brannan Island and northeast of Knightsen. This material would  
34 likely be moved to other sites for use in levee build-up and restoration, and the affected area  
35 would likely eventually be restored. While this effect is categorized as permanent because there  
36 is no assurance that the material would eventually be moved, the effect would likely be  
37 temporary. The actual footprint of the storage areas required for reusable tunnel material is  
38 flexible, and the actual acreage of habitat affected by this activity could be reduced based on the  
39 height of the storage piles in addition to other considerations. The implementation of *AMM6  
40 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged Material*, would require that  
41 the areas used for reusable tunnel material storage be minimized in crane foraging habitat and  
42 completely avoid crane roost sites. Conveyance construction impacts would primarily occur  
43 west of the highest crane use areas in the central Delta. Refer to the Terrestrial Biology Map  
44 Book for a detailed view of Alternative 1C construction locations. Impacts from CM1 would  
45 occur within the first 10 years of Plan implementation.

1 **Table 12-1C-32. Total Amount of Affected Lesser Sandhill Crane Foraging Habitat**

Foraging Habitat Value Class	Land Cover Type	CM1 Permanent (Temporary)	CM2-CM18 Permanent (Temporary)
Very high	Corn, alfalfa and alfalfa mixtures	1,467 (2,143)	4,083 (0)
High	Mixed pasture, native pasture, other pasture, irrigated pasture, native vegetation, rice	502 (687)	2,058 (0)
Medium	Grain and hay crops, miscellaneous grain and hay, mixed grain and hay, non-irrigated mixed grain and hay, other grain crops, miscellaneous grasses, grassland, wheat, other grain crops, managed wetlands	882 (1,039)	2,220 (2)
Low	Other irrigated crops, idle cropland, blueberries, asparagus, clover, cropped within the last 3 years, grain sorghum, green beans, miscellaneous truck, miscellaneous field, new lands being prepped for crop production, nonirrigated mixed pasture, nonirrigated native pasture, onions, garlic, peppers, potatoes, safflower, sudan, sugar beets, tomatoes (processing), melons squash and cucumbers all types, artichokes, beans (dry)	788 (1,810)	3,745 (2)

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- *CM2 Yolo Bypass Fisheries Enhancement*: Construction under CM2 would result in a permanent loss of 267 acres and a temporary loss of 2 acres of lesser sandhill crane foraging habitat in CZ 2. Lesser sandhill crane use in this area is less common than in the central Delta. Construction impacts from CM2 would occur within the first 10 years of Plan implementation.
  - *CM4 Tidal Natural Communities Restoration*: Based on the hypothetical tidal restoration footprint, this activity would result in the permanent loss or conversion of approximately 10,248 acres of lesser sandhill crane habitat, consisting of 41 acres of temporary roosting and foraging habitat and 10,207 acres of foraging habitat. Loss of foraging habitat from CM4 would consist of 3,642 acres of very high-value, 1,529 acres of high value, 2,040 acres of medium-value, and 2,983 acres of low-value foraging habitat (Table 12-4-32). Habitat loss would primarily occur in the Cosumnes-Mokelumne River and West Delta ROAs. Tidal wetland restoration in CZ 4 could occur between the high crane use areas of the central Delta and the Cosumnes River Preserve. However, the conversion of grasslands and cultivated lands to tidal wetlands would not prohibit crane movement or reduce use of these areas. Lesser sandhill cranes are less traditional than greater sandhill cranes and would be more adaptable to changes in land use. Approximately 2,516 acres of foraging habitat would be removed within the first 10 years of Plan implementation.
  - *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees would result in the loss of 2 acres of low-value lesser sandhill crane foraging habitat (1 acre of permanent loss, 1

1 acres of temporary loss). This impact would occur after the first 10 years of Plan  
2 implementation.

- 3 ● *CM8 Grassland Natural Community Restoration*: Approximately 300 acres of cultivated lands  
4 (foraging habitat) would be converted to grassland. No roosting/foraging habitat would be  
5 impacted by grassland restoration activities. The restored grasslands would continue to provide  
6 foraging habitat value for the lesser sandhill crane. Approximately 257 acres would be impacted  
7 within the first 10 years of plan implementation.
- 8 ● *CM10 Nontidal Marsh Restoration*: Nontidal marsh restoration would result in the permanent  
9 conversion of approximately 1,350 acres of modeled foraging habitat for the lesser sandhill  
10 crane. A portion of the restored nontidal marsh would be expected to continue to provide  
11 roosting and foraging habitat value for the lesser sandhill crane. However, some of this restored  
12 marsh would be unsuitable as it would lack emergent vegetation and consist of open water that  
13 would be too deep to provide suitable roosting or foraging habitat. Approximately 567 acres of  
14 habitat would be converted to nontidal marsh within the first 10 years of Plan implementation.
- 15 ● *CM11 Natural Communities Enhancement and Management*: A variety of habitat management  
16 actions included in *CM11* that are designed to enhance wildlife values in restored or protected  
17 habitats could result in localized ground disturbances that could temporarily remove small  
18 amounts of modeled habitat. Ground-disturbing activities, such as removal of nonnative  
19 vegetation and road and other infrastructure maintenance activities, would be expected to have  
20 minor adverse effects on available habitat and would be expected to result in overall  
21 improvements to and maintenance of habitat values over the term of the BDCP. The potential for  
22 these activities to result in direct mortality of lesser sandhill crane would be minimized with the  
23 implementation of *AMM20 Greater Sandhill Crane*. *CM11* would also include the construction of  
24 recreational-related facilities including trails, interpretive signs, and picnic tables (BDCP  
25 Chapter 4, *Covered Activities and Associated Federal Actions*). The construction of trailhead  
26 facilities, signs, staging areas, picnic areas, bathrooms, etc. would be placed on existing,  
27 disturbed areas when and where possible. If new ground disturbance was necessary, sandhill  
28 crane habitat would be avoided, with the exception of a permanent loss of 4 acres of grassland  
29 foraging habitat (1 acre of which would be impacted within the first 10 years of plan  
30 implementation).
- 31 ● *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground  
32 water conveyance facilities and restoration infrastructure could result in ongoing but periodic  
33 disturbances that could affect lesser sandhill crane use of the surrounding habitat. Maintenance  
34 activities would include vegetation management, levee and structure repair, and re-grading of  
35 roads and permanent work areas. These effects, could be adverse as sandhill cranes are  
36 sensitive to disturbance. However, potential effects would be reduced by AMMs and  
37 conservation actions as described below.
- 38 ● *Injury and Direct Mortality*: Construction-related activities would not be expected to result in  
39 direct mortality of lesser sandhill crane if they were present in the study area, because they  
40 would be expected to avoid contact with construction and other equipment. Potential effects  
41 would be avoided and minimized with the implementation of *AMM20 Greater Sandhill Crane*.  
42 Injury and mortality from electrical transmission facilities are described below under Impact  
43 BIO-73.

1 The following paragraphs summarize the combined effects discussed above and describe other  
2 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also  
3 included.

#### 4 ***Near-Term Timeframe***

5 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
6 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
7 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
8 effects of construction would not be adverse under NEPA. Based on current design footprints, the  
9 Plan would remove 1 acre of roosting and foraging habitat in the study area in the near-term as a  
10 result of the construction of the water conveyance facilities (CM1). In addition, 12,931 acres of  
11 foraging habitat would be removed or converted in the near-term (CM1, 9,318 acres; *CM4 Tidal*  
12 *Natural Communities Restoration*, *CM8 Grassland Natural Community Restoration*, and *CM11 Natural*  
13 *Communities Enhancement and Management*—3,612 acres). Of these near-term acres of foraging  
14 habitat impacted, 9,226 acres would be medium- to very high-value habitat (CM1, 6,720 acres, CM2-  
15 11, 2,507 acres).

16 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected would  
17 be 1:1 protection and 1:1 restoration for loss of roost sites and 1:1 protection for loss of foraging  
18 habitat. Using these ratios would indicate that 1 acre of lesser sandhill crane roosting habitat should  
19 be restored/created and 1 acre should be protected to compensate for the CM1 losses of lesser  
20 sandhill crane roosting and foraging habitat. In addition, 6,720 acres of high- to very high-value  
21 foraging habitat should be protected to mitigate the CM1 losses of lesser sandhill crane medium- to  
22 very high-value foraging habitat. The near-term effects of other conservation actions would remove  
23 2,507 acres of medium- to very high-value foraging habitat, and therefore require 2,507 acres of  
24 protection of high- to very high-value foraging habitat using the same typical NEPA and CEQA ratios  
25 (1:1 restoration and 1:1 protection for the loss of roosting and foraging habitat; 1:1 protection for  
26 the loss of foraging habitat).

27 The implementation of *AMM20 Greater Sandhill Crane* would require that no sandhill crane roost  
28 sites were directly impacted by CM1 covered activities (including transmission lines and their  
29 associated footprints). Therefore there would be no loss of crane roosting and foraging habitat as a  
30 result of water conveyance facility construction once the facilities were fully designed, which would  
31 avoid the CM1 impact on the acre of roosting and foraging habitat once the project design is final.  
32 Indirect effects of construction-related noise and visual disturbance are discussed below under  
33 Impact BIO-74.

34 The BDCP has committed to near-term goals of creating 500 acres of managed wetlands and  
35 protecting 15,600 acres of cultivated lands in the Plan Area (Table 3-4 in Chapter 3). These  
36 conservation actions are associated with CM3 and CM10 and would occur in the same timeframe as  
37 the construction and early restoration losses.

38 The BDCP also includes the following objectives for the greater sandhill crane which would also  
39 benefit the lesser sandhill crane, as they utilize similar habitats and face similar threats within their  
40 winter use areas.

41 Up to 95 acres of roosting habitat would be created within 2 miles of existing permanent roost sites  
42 (Objective GSHC1.5). These roosts would consist of active cornfields that are flooded following  
43 harvest to support roosting cranes and also provide the highest-value foraging habitat for the

1 species. Individual fields would be at least 40 acres could shift locations throughout the Greater  
2 Sandhill Crane Winter Use Area, but would be sited with consideration of the location of roosting  
3 habitat loss and would be in place prior to roosting habitat loss. Of the 500 acres of managed  
4 wetlands to be created for roosting habitat, 320 acres would be created in minimum patch sizes of  
5 40 acres within the Greater Sandhill Crane Winter Use Area in CZs 3, 4, 5, or 6 (Objective GSHC1.3).  
6 Restoration sites would be identified with consideration of sea level rise and local seasonal flood  
7 events. These wetlands would be created within 2 miles of existing permanent roost sites and  
8 protected in association with other protected natural community types at a ratio of 2:1 upland to  
9 wetland habitat to provide buffers that will protect cranes from the types of disturbances that would  
10 otherwise result from adjacent roads and developed areas (e.g., roads, noise, visual disturbance,  
11 lighting). The remaining 180 acres of crane roosting habitat would be constructed within the Stone  
12 Lakes NWR project boundary (BDCP Chapter 3, Figure 3.3-6) and would be designed to provide  
13 connectivity between the Stone Lakes and Cosumnes greater sandhill crane populations (Objective  
14 GSHC1.4). The large patch sizes of these wetland complexes would provide additional conservation  
15 to address the threats of vineyard conversion, urbanization to the east, and sea level rise to the west  
16 of greater sandhill crane wintering habitat.

17 At least 15,600 acres of cultivated lands that provide habitat for covered and other native wildlife  
18 species would be protected in the near-term time period (Objective CLNC1.1). Mitigation Measure  
19 *BIO-72, Compensate for the Loss of Medium- to Very High-Value Lesser Sandhill Crane Foraging*  
20 *Habitat*, would be available to guide the near-term protection of cultivated lands to ensure that the  
21 nearterm impacts of medium- to very high-value foraging habitat for lesser sandhill crane were  
22 compensated for with appropriate crop types and natural communities.

23 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*  
24 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*  
25 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
26 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
27 *Material, and AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
28 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
29 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

### 30 **Late Long-Term Timeframe**

31 The study area supports approximately 23,919 acres of roosting and foraging habitat and 240,475  
32 acres of foraging habitat for lesser sandhill crane. Alternative 1C as a whole would result in the  
33 permanent loss of and temporary effects on 42 acres of roosting and foraging habitat (less than 1%  
34 of the total habitat in the study area) and 21,453 acres of foraging habitat (9% of the total habitat in  
35 the study area) for the lesser sandhill crane during the term of the Plan. The foraging habitat lost by  
36 the late long-term timeframe would consist of 15,083 acres of medium- to very high-value foraging  
37 habitat. The locations of these losses are described above in the analyses of individual conservation  
38 measures. The implementation of *AMM20 Greater Sandhill Crane* would require that no crane roost  
39 sites were directly affected by water conveyance facilities including transmission lines and  
40 associated footprints. In addition, temporarily removed habitat would be restored within 1 year  
41 following construction. However, it would not necessarily be restored to its original topography and  
42 it could result in the conversion of cultivated lands to grasslands.

43 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*  
44 *Restoration* and *CM10 Nontidal Marsh Restoration* to restore or create at least 595 acres of greater

1 sandhill crane roost habitat (Objectives GSHC1.3, GSHC1.4, and GSHC1.5) and to protect at least  
2 7,300 acres of high- to very high-value foraging habitat for greater sandhill crane (Objective  
3 GSHC1.1). These croptypes would also provide high-value habitat for the lesser sandhill crane.

4 The BDCP also includes the following objectives for the greater sandhill crane which would also  
5 benefit the lesser sandhill crane, as they utilize similar habitats and face similar threats within their  
6 winter use areas.

7 Of the 500 acres of managed wetlands to be created for roosting habitat, 320 acres would be created  
8 in minimum patch sizes of 40 acres within the Greater Sandhill Crane Winter Use Area in CZs 3, 4, 5,  
9 or 6 (Objective GSHC1.3). Restoration sites would be identified with consideration of sea level rise  
10 and local seasonal flood events. These wetlands would be created within 2 miles of existing  
11 permanent roost sites and protected in association with other protected natural community types at  
12 a ratio of 2:1 upland to wetland habitat to provide buffers that will protect cranes from the types of  
13 disturbances that would otherwise result from adjacent roads and developed areas (e.g., roads,  
14 noise, visual disturbance, lighting). The remaining 180 acres of crane roosting habitat would be  
15 constructed within the Stone Lakes NWR project boundary (BDCP Chapter 3, Figure 3.3-6) and  
16 would be designed to provide connectivity between the Stone Lakes and Cosumnes greater sandhill  
17 crane populations (Objective GSHC1.4). These wetlands would consist of two 90-acre wetland  
18 complexes each consisting of at least three wetlands and would be no more than 2 miles apart. The  
19 large patch sizes of these wetland complexes would provide additional conservation to address the  
20 threats of vineyard conversion, urbanization to the east, and sea level rise to the west of greater  
21 sandhill crane wintering habitat. Approximately 95 acres of roosting habitat would be created  
22 within 2 miles of existing permanent roost sites (Objective GSHC1.5). These roosts would consist of  
23 active cornfields that are flooded following harvest to support roosting cranes and also provide the  
24 highest-value foraging habitat for the species. Individual fields would be at least 40 acres could shift  
25 locations throughout the Greater Sandhill Crane Winter Use Area, but would be sited with  
26 consideration of the location of roosting habitat loss and would be in place prior to roosting habitat  
27 loss.

28 The BDCP has committed to protecting 7,300 acres of high- to very high-value greater sandhill crane  
29 foraging habitat by the late long-term timeframe with at least 80% maintained in very-high value  
30 types in any given year (Objective GSHC1.1). These acres of protected foraging habitat would be  
31 located within 2 miles of known roosting sites in CZs 3, 4, 5, and/or 6 and would consider sea level  
32 rise and local seasonal flood events, greater Sandhill crane population levels, and the location of  
33 foraging habitat loss. The patch size of these protected lands would be at least 160 acres (Objectives  
34 GSHC1.1 and GSHC1.2). Because agricultural habitat values change over time based largely on  
35 economically driven agricultural practices, protecting crane habitat would provide enhanced  
36 stability to agricultural habitat value within the crane use area that does not currently exist.  
37 Although lesser sandhill cranes are less traditional in their use of roost sites in the Delta, these  
38 objectives for the greater sandhill crane would also benefit the lesser sandhill crane.

39 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
40 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
41 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
42 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
43 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
44 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
45 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

1 **NEPA Effects:** The loss of lesser sandhill crane habitat and potential for direct mortality of this  
2 special status species under Alternative 1C would represent an adverse effect in the absence of other  
3 conservation actions. However, with habitat protection and restoration associated with *CM3 Natural*  
4 *Communities Protection and Restoration* and *CM10 Nontidal Marsh Restoration*, guided by biological  
5 goals and objectives for the species and by AMM1–AMM7, *AMM20 Greater Sandhill Crane*, which  
6 would be in place throughout the construction period, and Mitigation Measure BIO-72, which would  
7 be available to compensate for loss of medium- to very high-value foraging habitat, the effects of  
8 habitat loss and potential mortality on lesser sandhill crane would not be adverse under NEPA.

9 **CEQA Conclusion:**

10 **Near-Term Timeframe**

11 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
12 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
13 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
14 effects of construction would be less than significant under CEQA. Based on current design  
15 footprints, the Plan would remove 1 acre of roosting and foraging habitat in the study area in the  
16 near-term as a result of the construction of the water conveyance facilities (CM1). In addition,  
17 12,931 acres of foraging habitat would be removed or converted in the near-term (CM1, 9,318 acres;  
18 *CM4 Tidal Natural Communities Restoration*, *CM8 Grassland Natural Community Restoration*, and  
19 *CM11 Natural Communities Enhancement and Management*—3,612 acres). Of these near-term acres  
20 of foraging habitat impacted, 9,226 acres would be medium- to very high-value habitat (CM1, 6,720  
21 acres, CM2-11, 2,507 acres).

22 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected would  
23 be 1:1 protection and 1:1 restoration for loss of roost sites and 1:1 protection for loss of foraging  
24 habitat. Using these ratios would indicate that 1 acre of lesser sandhill crane roosting habitat should  
25 be restored/created and 1 acre should be protected to compensate for the CM1 losses of lesser  
26 sandhill crane roosting and foraging habitat. In addition, 6,720 acres of high- to very high-value  
27 foraging habitat should be protected to mitigate the CM1 losses of lesser sandhill crane medium- to  
28 very high-value foraging habitat. The near-term effects of other conservation actions would remove  
29 2,507 acres of medium- to very high-value foraging habitat, and therefore require 2,507 acres of  
30 protection of high- to very high-value foraging habitat using the same typical NEPA and CEQA ratios  
31 (1:1 restoration and 1:1 protection for the loss of roosting and foraging habitat; 1:1 protection for  
32 the loss of foraging habitat).

33 The implementation of *AMM20 Greater Sandhill Crane* would require that no sandhill crane roost  
34 sites were directly impacted by CM1 covered activities (including transmission lines and their  
35 associated footprints). Therefore there would be no loss of crane roosting and foraging habitat as a  
36 result of water conveyance facility construction once the facilities were fully designed, which would  
37 avoid the CM1 impact on the acre of roosting and foraging habitat once the project design is final.  
38 Indirect effects of construction-related noise and visual disturbance are discussed below under  
39 Impact BIO-74.

40 The BDCP has committed to near-term goals of creating 500 acres of managed wetlands and  
41 protecting 15,600 acres of cultivated lands in the Plan Area (Table 3-4 in Chapter 3). These  
42 conservation actions are associated with CM3 and CM10 and would occur in the same timeframe as  
43 the construction and early restoration losses.

1 The BDCP also includes the following objectives for the greater sandhill crane which would also  
2 benefit the lesser sandhill crane, as they utilize similar habitats and face similar threats within their  
3 winter use areas.

4 Up to 95 acres of roosting habitat would be created within 2 miles of existing permanent roost sites  
5 (Objective GSHC1.5). These roosts would consist of active cornfields that are flooded following  
6 harvest to support roosting cranes and also provide the highest-value foraging habitat for the  
7 species. Individual fields would be at least 40 acres could shift locations throughout the Greater  
8 Sandhill Crane Winter Use Area, but would be sited with consideration of the location of roosting  
9 habitat loss and would be in place prior to roosting habitat loss. Of the 500 acres of managed  
10 wetlands to be created for roosting habitat, 320 acres would be created in minimum patch sizes of  
11 40 acres within the Greater Sandhill Crane Winter Use Area in CZs 3, 4, 5, or 6 (Objective GSHC1.3).  
12 Restoration sites would be identified with consideration of sea level rise and local seasonal flood  
13 events. These wetlands would be created within 2 miles of existing permanent roost sites and  
14 protected in association with other protected natural community types at a ratio of 2:1 upland to  
15 wetland habitat to provide buffers that will protect cranes from the types of disturbances that would  
16 otherwise result from adjacent roads and developed areas (e.g., roads, noise, visual disturbance,  
17 lighting). The remaining 180 acres of crane roosting habitat would be constructed within the Stone  
18 Lakes National Wildlife Refuge project boundary (BDCP Chapter 3, Figure 3.3-6) and would be  
19 designed to provide connectivity between the Stone Lakes and Cosumnes greater sandhill crane  
20 populations (Objective GSHC1.4). The large patch sizes of these wetland complexes would provide  
21 additional conservation to address the threats of vineyard conversion, urbanization to the east, and  
22 sea level rise to the west of greater sandhill crane wintering habitat.

23 At least 15,600 acres of cultivated lands that provide habitat for covered and other native wildlife  
24 species would be protected in the near-term time period (Objective CLNC1.1). Mitigation Measure  
25 *BIO-72, Compensate for the Loss of Medium- to Very High-Value Lesser Sandhill Crane Foraging*  
26 *Habitat*, would be available to guide the near-term protection of cultivated lands to ensure that the  
27 nearterm impacts of medium- to very high-value foraging habitat for lesser sandhill crane were  
28 compensated for with appropriate crop types and natural communities.

29 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*  
30 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*  
31 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
32 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
33 *Material, and AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
34 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
35 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

### 36 ***Late Long-Term Timeframe***

37 The study area supports approximately 23,919 acres of roosting and foraging habitat and 240,475  
38 acres of foraging habitat for lesser sandhill crane. Alternative 1C as a whole would result in the  
39 permanent loss of and temporary effects on 42 acres of roosting and foraging habitat (less than 1%  
40 of the total habitat in the study area) and 21,453 acres of foraging habitat (9% of the total habitat in  
41 the study area) for the lesser sandhill crane during the term of the Plan. The foraging habitat lost by  
42 the late long-term timeframe would consist of 15,083 acres of medium- to very high-value foraging  
43 habitat. The locations of these losses are described above in the analyses of individual conservation  
44 measures. The implementation of *AMM20 Greater Sandhill Crane* would require that no crane roost

1 sites were directly affected by water conveyance facilities including transmission lines and  
2 associated footprints. In addition, temporarily removed habitat would be restored within 1 year  
3 following construction. However, it would not necessarily be restored to its original topography and  
4 it could result in the conversion of cultivated lands to grasslands.

5 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*  
6 *Restoration* and *CM10 Nontidal Marsh Restoration* to restore or create at least 595 acres of greater  
7 sandhill crane roost habitat (Objectives GSHC1.3, GSHC1.4, and GSHC1.5) and to protect at least  
8 7,300 acres of high- to very high-value foraging habitat for greater sandhill crane (Objective  
9 GSHC1.1). These croptypes would also provide high-value habitat for the lesser sandhill crane.

10 The BDCP also includes the following objectives for the greater sandhill crane which would also  
11 benefit the lesser sandhill crane, as they utilize similar habitats and face similar threats within their  
12 winter use areas.

13 Of the 500 acres of managed wetlands to be created for roosting habitat, 320 acres would be created  
14 in minimum patch sizes of 40 acres within the Greater Sandhill Crane Winter Use Area in CZs 3, 4, 5,  
15 or 6 (Objective GSHC1.3). Restoration sites would be identified with consideration of sea level rise  
16 and local seasonal flood events. These wetlands would be created within 2 miles of existing  
17 permanent roost sites and protected in association with other protected natural community types at  
18 a ratio of 2:1 upland to wetland habitat to provide buffers that will protect cranes from the types of  
19 disturbances that would otherwise result from adjacent roads and developed areas (e.g., roads,  
20 noise, visual disturbance, lighting). The remaining 180 acres of crane roosting habitat would be  
21 constructed within the Stone Lakes NWR project boundary (BDCP Chapter 3, Figure 3.3-6) and  
22 would be designed to provide connectivity between the Stone Lakes and Cosumnes greater sandhill  
23 crane populations (Objective GSHC1.4). These wetlands would consist of two 90-acre wetland  
24 complexes each consisting of at least three wetlands and would be no more than 2 miles apart. The  
25 large patch sizes of these wetland complexes would provide additional conservation to address the  
26 threats of vineyard conversion, urbanization to the east, and sea level rise to the west of greater  
27 sandhill crane wintering habitat. Approximately 95 acres of roosting habitat would be created  
28 within 2 miles of existing permanent roost sites (Objective GSHC1.5). These roosts would consist of  
29 active cornfields that are flooded following harvest to support roosting cranes and also provide the  
30 highest-value foraging habitat for the species. Individual fields would be at least 40 acres could shift  
31 locations throughout the Greater Sandhill Crane Winter Use Area, but would be sited with  
32 consideration of the location of roosting habitat loss and would be in place prior to roosting habitat  
33 loss.

34 The BDCP has committed to protecting 7,300 acres of high- to very high-value greater sandhill crane  
35 foraging habitat by the late long-term timeframe with at least 80% maintained in very-high value  
36 types in any given year (Objective GSHC1.1). These acres of protected foraging habitat would be  
37 located within 2 miles of known roosting sites in CZs 3, 4, 5, and/or 6 and would consider sea level  
38 rise and local seasonal flood events, greater Sandhill crane population levels, and the location of  
39 foraging habitat loss. The patch size of these protected lands would be at least 160 acres (Objectives  
40 GSHC1.1 and GSHC1.2). Because agricultural habitat values change over time based largely on  
41 economically driven agricultural practices, protecting crane habitat would provide enhanced  
42 stability to agricultural habitat value within the crane use area that does not currently exist.  
43 Although lesser sandhill cranes are less traditional in their use of roost sites in the Delta, these  
44 objectives for the greater sandhill crane would also benefit the lesser sandhill crane.

1 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*  
2 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*  
3 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
4 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
5 *Material, and AMM7 Barge Operations Plan. All of these AMMs include elements that would avoid or*  
6 *minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are*  
7 *described in detail in BDCP Appendix 3.C, Avoidance and Minimization Measures.*

8 Considering Alternative 1C's protection and restoration provisions, in addition to Mitigation  
9 Measure BIO-72, which would compensate for the loss of medium- to very high-value foraging  
10 habitat at a ratio of 1:1, loss of habitat or direct mortality through implementation of Alternative 1C  
11 would not result in a substantial adverse effect through habitat modifications and would not  
12 substantially reduce the number or restrict the range of the species. Therefore, the alternative  
13 would have a less-than-significant impact on lesser sandhill crane.

#### 14 **Mitigation Measure BIO-72: Compensate for the loss of Medium- to Very High-Value** 15 **Lesser Sandhill Crane Foraging Habitat**

16 DWR must compensate for the loss of lesser sandhill crane medium- to very high-value foraging  
17 habitat at a ratio of 1:1 by protecting or managing high- to very high-value habitat in the Plan  
18 Area. Compensation must occur prior to or concurrent with the impacts to minimize the effects  
19 of habitat loss. The crop types and natural communities that are included in foraging value  
20 categories are listed in Table 12-1C-32. Foraging habitat conservation must occur within 10  
21 kilometers of traditional sandhill crane roost sites and the location of protected habitat or  
22 conservation easements must be preapproved by CDFW.

#### 23 **Impact BIO-73: Effects on Lesser Sandhill Crane Associated with Electrical Transmission** 24 **Facilities**

25 Sandhill cranes are susceptible to collision with power lines and other structures during periods of  
26 inclement weather and low visibility (Avian Power Line Interaction Committee 1994, Brown and  
27 Drewien 1995, Manville 2005). New transmission lines installed in the study area would increase  
28 the risk for bird-power line strikes, which could result in injury or mortality of lesser sandhill  
29 cranes. Both permanent and temporary electrical transmission lines would be constructed to supply  
30 construction and operational power to BDCP facilities. Typically, higher-voltage (230-kilovolt [kV])  
31 lines vary in height from 90 to 110 feet, while "sub" transmission (69-kV) lines vary from 50 to 70  
32 feet (Avian Power Line Interaction Committee 2006). The Alternative 1C alignment would require  
33 the installation of approximately 36 miles of permanent transmission line (18 miles of 230-kV lines  
34 and 18 miles of 69-kV lines) extending north and south, to the west of the high-use crane areas. The  
35 temporary transmission lines would total approximately 71 miles (14 miles of 69-kV line and  
36 57 miles of 12-kV line). Temporary lines would be removed after construction of the water  
37 conveyance facilities, within 10 years.

38 Existing transmission lines in the sandhill crane winter use area include a network of distribution  
39 lines that are between 11- and 22-kV. In addition, there are two 115-kV lines (one that overlaps with  
40 the winter use area between Antioch and I-5 east of Hood, and one that crosses the northern tip of  
41 the crane winter use area north of Clarksburg); and 69-kV lines that parallel Twin Cities Road,  
42 Herzog Road, Lambert Road, and the Southern Pacific Dredge Cut in the vicinity of Stone Lakes  
43 National Wildlife Refuge. At the south end of the winter use area, there are three 230-kV

1 transmission lines that follow I-5, and then cut southwest through Holt, and two 500-kV lines cross  
2 the southwestern corner of the winter use area. This existing network of power lines in the study  
3 currently poses a risk for sandhill cranes, as both distribution and transmission lines cross over or  
4 surround sandhill crane roost sites in the study area. New transmission lines would increase this  
5 risk and have an adverse effect on the species in the absence of other conservation actions.

6 The potential mortality of greater sandhill crane in the area of the proposed transmission lines  
7 under Alternative 1C was estimated using collision mortality rates by Brown and Drewien (1995)  
8 and an estimate of potential crossings along the proposed lines (methods are described in BDCP  
9 Appendix 5.J, Attachment 5J.C, *Analysis of Potential Bird Collisions at Proposed BDCP Powerlines*).  
10 Results indicate that in the absence of any line marking to increase visibility and reduce collision  
11 risk (i.e., without minimization measures), the average annual mortality of greater sandhill crane at  
12 permanent lines would be up to 4 fatalities per year and would be 5 fatalities per year at temporary  
13 lines. Lesser sandhill cranes use the same roost sites as greater sandhill cranes. However, their  
14 numbers fluctuate greatly over the season as they are more mobile and use a broader landscape  
15 than greater sandhill cranes. Although the roost population sizes would fluctuate more for lesser  
16 sandhill cranes, one could expect that proportionally, the total number of potential fatalities for the  
17 lesser sandhill crane would be similar to those of the greater sandhill crane.

18 Marking transmission lines with devices that make the lines more visible to birds has been shown to  
19 dramatically reduce the incidence of bird mortality, including for sandhill cranes. Brown and  
20 Drewien (1995) estimated that marking devices in the Central Valley would reduce crane mortality  
21 by 66%. Using this assumption, by incorporating line-marking devices into the designs the annual  
22 mortality rate would be estimated to decrease to 3 fatalities per year for the permanent lines and 3  
23 fatalities per year for the temporary lines.

24 The current proposed transmission line alignment under Alternative 1C is not fully designed, and  
25 line locations are not final. The implementation of *AMM20 Greater Sandhill Crane* would require that  
26 the final transmission line alignment would not result in a net increase in bird strike risk to greater  
27 sandhill cranes in the Plan Area. This would be achieved by implementing any combination of the  
28 following: (1) siting new transmission lines in lower bird strike risk zones; (2) removing, relocating  
29 or undergrounding existing lines; (3) installing flight diverters on existing lines in the crane winter  
30 use area; and/or (4) for areas outside of the Stone Lakes National Wildlife Refuge project boundary,  
31 shifting locations of flooded areas that provide crane roosts to lower risk areas. This would be  
32 expected to reduce existing mortality and thus fully offset the overall population effects of new  
33 transmission lines. Designing the alignment to minimize risk and removing, relocating, or  
34 undergrounding existing lines would be given priority out of the above methods. With these  
35 measures and the proposed mitigation, and considering that the temporary lines would be removed  
36 within the first 10 years of plan implementation, the risk of lesser sandhill crane mortality from  
37 transmission lines would be reduced substantially.

38 **NEPA Effects:** Sandhill cranes are known to be susceptible to collision with overhead wires. The  
39 existing network of power lines in the study area currently poses a risk for sandhill cranes. New  
40 transmission lines would increase the risk for bird-power line strikes, which could result in injury or  
41 mortality of lesser sandhill cranes. By incorporating line-marking devices on new transmission lines  
42 the estimated mortality rate for the greater sandhill crane would be 3 fatalities per year from  
43 permanent transmission lines and 3 fatalities per year from temporary transmission lines, and  
44 similar mortality rates would be expected for lesser sandhill cranes. The current proposed  
45 transmission line alignment under Alternative 1C is not fully designed, and line locations are not

1 final. The implementation of *AMM20 Greater Sandhill Crane* would require that the final  
2 transmission line alignment avoided crane roost sites and achieved no net increase of greater  
3 sandhill crane strike risk in the Plan Area. Measures to achieve this would also substantially reduce  
4 lesser sandhill crane strike risk. With *AMM20 Greater Sandhill Crane* and the proposed mitigation,  
5 and considering that the temporary lines would be removed within the first 10 years of plan  
6 implementation, the risk of mortality from collision with transmission lines would not result in an  
7 adverse effect on the lesser sandhill crane population.

8 **CEQA Conclusion:** Sandhill cranes are known to be susceptible to collision with overhead wires. The  
9 existing network of power lines in the study area currently poses a risk for sandhill cranes. New  
10 transmission lines would increase the risk for bird-power line strikes, which could result in injury or  
11 mortality of greater sandhill crane. By incorporating line-marking devices on new transmission lines  
12 the estimated mortality rate would be 3 fatalities per year from permanent transmission lines and 3  
13 fatalities per year from temporary transmission lines. A similar mortality rate would be expected for  
14 lesser sandhill crane. The current proposed transmission line alignment under Alternative 1C is not  
15 fully designed, and line locations are not final. The implementation of *AMM20 Greater Sandhill Crane*  
16 would require that the final transmission line alignment avoided crane roost sites and achieved no  
17 net increase of greater sandhill crane strike risk in the Plan Area. Measures to achieve this would  
18 also substantially reduce lesser sandhill crane strike risk. With *AMM20 Greater Sandhill Crane* and  
19 the proposed mitigation, and considering that the temporary lines would be removed within the  
20 first 10 years of plan implementation, the risk of mortality from collision with transmission lines  
21 would not result in a significant impact on the lesser sandhill crane population.

#### 22 **Impact BIO-74: Indirect Effects of Plan Implementation on Lesser Sandhill Crane**

23 **Indirect construction-and operation-related effects:** Sandhill cranes are sensitive to disturbance.  
24 Noise and visual disturbances from the construction of water conveyance facilities and other  
25 conservation measures could reduce lesser sandhill crane use of modeled habitat adjacent to work  
26 areas. Indirect effects associated with construction include noise, dust, and visual disturbance  
27 caused by grading, filling, contouring, and other ground-disturbing operations outside the project  
28 footprint but within 1,300 feet of the construction edge. Furthermore, maintenance of the  
29 aboveground water conveyance facilities could result in ongoing but periodic postconstruction noise  
30 and visual disturbances that could affect lesser sandhill crane use of surrounding habitat. These  
31 effects could result from periodic vehicle use along the conveyance corridor, inspection and  
32 maintenance of aboveground facilities, and similar activities. These potential effects would be  
33 minimized with implementation of *AMM20 Greater Sandhill Crane* described in Appendix 3.C,  
34 *Avoidance and Minimization Measures*.

35 The BDCP includes an analysis of the indirect effects of noise and visual disturbance that would  
36 result from the construction of the Alternative 4 water conveyance facilities on greater sandhill  
37 crane (BDCP Appendix 5J.D, *Indirect Effects of the Construction of the BDCP Conveyance Facility on*  
38 *Sandhill Crane*). The same methods were employed to addresses the potential noise effects on  
39 cranes from Alternative 1C and to determine that as much as 3,186-10,204 acres of crane foraging  
40 habitat could potentially be affected by general construction noise above baseline level (50–60 dBA).  
41 In addition, 1,720 – 7,382 acres of crane foraging habitat could be affected by noise from pile driving  
42 that would be above baseline level (50–60dBA, Table 12-1C-30 under Impact-BIO-71). The analysis  
43 was conducted based on the assumption that there would be direct line-of-sight from sandhill crane  
44 habitat areas to the construction site, and, therefore, provides a worst-case estimate of effects. In  
45 many areas the existing levees would partially or completely block the line-of-sight and would

1 function as effective noise barriers, substantially reducing noise transmission. However, there is  
2 insufficient data to assess the effects that increased noise levels would have on sandhill crane  
3 behavior. Similar acreages of lesser sandhill crane habitat would be expected to be indirectly  
4 affected. However, lesser sandhill cranes are less traditional in their winter roost sites and may be  
5 more likely to travel away from disturbed areas to roost and forage in more suitable habitat.

6 Evening and nighttime construction activities would require the use of extremely bright lights.  
7 Nighttime construction could also result in headlights flashing into roost sites when construction  
8 vehicles are turning onto or off of construction access routes. Proposed surge towers would require  
9 the use of safety lights that would alert low-flying aircraft to the presence of these structures  
10 because of their height. Little data is available on the effects of impact of artificial lighting on  
11 roosting birds. Direct light from automobile headlights has been observed to cause roosting cranes  
12 to flush and it is thought that they may avoid roosting in areas where lighting is bright (BDCP  
13 Chapter 5, *Effects Analysis*). If the birds were to roost in a brightly lit site, they may be vulnerable to  
14 sleep-wake cycle shifts and reproductive cycle shifts. Potential risks of visual impacts from lighting  
15 include a reduction in the cranes' quality of nocturnal rest, and effects on their "sense of photo-  
16 period which might cause them to shift their physiology towards earlier migration and breeding."  
17 (BDCP Chapter 5, *Effects Analysis*). Effects such as these could prove detrimental to the cranes'  
18 overall fitness and reproductive success (which could in turn have population-level impacts). A  
19 change in photo-period interpretation could also cause cranes to fly out earlier from roost sites to  
20 forage and might increase their risk of power line collisions if they were to leave roosts before dawn  
21 (BDCP Chapter 5, *Effects Analysis*).

22 The effects of noise and visual disturbance on lesser sandhill crane would be minimized through the  
23 implementation of AMM20 (Appendix 3.C, *Avoidance and Minimization Measures*). Activities within  
24 0.75 mile of crane roosting habitat would reduce construction noise during night time hours (from  
25 one hour before sunset to one hour after sunrise) such that construction noise levels do not exceed  
26 50 dBA  $L_{eq}$  (1 hour) at the nearest temporary or permanent roosts during periods when the roost  
27 sites are available (flooded). In addition, the area of crane foraging habitat that would be affected  
28 during the day (from one hour after sunrise to one hour before sunset) by construction noise  
29 exceeding 50 dBA  $L_{eq}$  (1 hour) would also be minimized. Unavoidable noise related effects would be  
30 compensated for by the enhancement of 0.1 acre of foraging habitat for every acre indirectly  
31 affected within the 50 dBA  $L_{eq}$  (1 hour) construction noise contour. With these measures in place,  
32 indirect effects of noise and visual disturbance from construction activities are not expected to  
33 reduce the lesser sandhill crane population in the study area.

34 The use of mechanical equipment during water conveyance facilities construction could cause the  
35 accidental release of petroleum or other contaminants that could affect lesser sandhill cranes in the  
36 surrounding habitat. The inadvertent discharge of sediment or excessive dust adjacent to lesser  
37 sandhill crane habitat could also affect the subspecies. AMM1–AMM7, including *AMM2 Construction*  
38 *Best Management Practices and Monitoring*, would minimize the likelihood of such spills and ensure  
39 that measures were in place to prevent runoff from the construction area and negative effects of  
40 dust on foraging habitat.

41 **Methylmercury Exposure:** Covered activities have the potential to exacerbate bioaccumulation of  
42 mercury in lesser sandhill crane. Marsh (tidal and nontidal) and floodplain restoration also have the  
43 potential to increase exposure to methylmercury. Mercury is transformed into the more bioavailable  
44 form of methylmercury in aquatic systems, especially areas subjected to regular wetting and drying  
45 such as tidal marshes and flood plains (Alpers et al. 2008). Thus, BDCP restoration activities that

1 create newly inundated areas could increase bioavailability of mercury (see BDCP Chapter 3,  
 2 *Conservation Strategy*, for details of restoration). Increased methylmercury associated with natural  
 3 community and floodplain restoration may indirectly affect lesser sandhill crane via uptake in lower  
 4 trophic levels (BDCP Appendix 5.D, *Contaminants*). The potential mobilization or creation of  
 5 methylmercury within the study area varies with site-specific conditions and would need to be  
 6 assessed at the project level. *CM12 Methylmercury Management* includes provisions for project-  
 7 specific Mercury Management Plans. Along with avoidance and minimization measures and adaptive  
 8 management and monitoring, *CM12 Methylmercury Management* would be available to address the  
 9 uncertainty of methylmercury levels in restored tidal marsh and potential impacts on lesser sandhill  
 10 crane. The potential indirect effects of increased mercury exposure is likely low for lesser sandhill  
 11 crane for the following reasons: 1) lesser sandhill cranes occur in the study area only during the  
 12 nonbreeding months, 2) their primary foraging habitats in the study area are cultivated crops, and  
 13 3) the use of restored tidal wetlands by cranes is likely to be limited compared to seasonal managed  
 14 wetlands.

15 **Selenium:** Selenium is an essential nutrient for avian species and has a beneficial effect in low  
 16 doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009, Ohlendorf  
 17 and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults, and can also  
 18 result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz 2009). The  
 19 effect of selenium toxicity differs widely between species and also between age and sex classes  
 20 within a species. In addition, the effect of selenium on a species can be confounded by interactions  
 21 with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith 2009).

22 The primary source of selenium bioaccumulation in birds is through their diet (Ackerman and  
 23 Eagles-Smith 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the  
 24 trophic level at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At  
 25 Kesterson Reservoir in the San Joaquin Valley, selenium concentrations in invertebrates have been  
 26 found to be two to six times the levels in rooted plants. Furthermore, bivalves sampled in the San  
 27 Francisco Bay contained much higher selenium levels than crustaceans such as copepods (Stewart et  
 28 al. 2004). Studies conducted at the Grasslands in Merced County recorded higher selenium levels in  
 29 black-necked stilts which feed on aquatic invertebrates than in mallards and pintails, which are  
 30 primarily herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which  
 31 forage on bivalves) have much higher levels of selenium levels than shorebirds that prey on aquatic  
 32 invertebrates (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high  
 33 levels of selenium have a higher risk of selenium toxicity.

34 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations  
 35 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to  
 36 exacerbate bioaccumulation of selenium in avian species, including the lesser sandhill crane. Marsh  
 37 (tidal and nontidal) and floodplain restoration have the potential to mobilize selenium, and  
 38 therefore increase avian exposure from ingestion of prey items with elevated selenium levels. Thus,  
 39 BDCP restoration activities that create newly inundated areas could increase bioavailability of  
 40 selenium (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Changes in  
 41 selenium concentrations were analyzed in Chapter 8, *Water Quality*, and it was determined that,  
 42 relative to Existing Conditions and the No Action Alternative, CM1 would not result in substantial,  
 43 long-term increases in selenium concentrations in water in the Delta under any alternative.  
 44 However, it is difficult to determine whether the effects of potential increases in selenium  
 45 bioavailability associated with restoration-related conservation measures (CM4 and CM5) would  
 46 lead to adverse effects on lesser sandhill crane.

1 Because of the uncertainty that exists at this programmatic level of review, there could be a  
2 substantial effect on lesser sandhill crane from increases in selenium associated with restoration  
3 activities. This effect would be addressed through the implementation of *AMM27 Selenium*  
4 *Management* (BDCP Appendix 3.C, *Avoidance and Minimization Measures*) which would provide  
5 specific tidal habitat restoration design elements to reduce the potential for bioaccumulation of  
6 selenium and its bioavailability in tidal habitats. Furthermore, the effectiveness of selenium  
7 management to reduce selenium concentrations and/or bioaccumulation would be evaluated  
8 separately for each restoration effort as part of design and implementation. This avoidance and  
9 minimization measure would be implemented as part of the tidal habitat restoration design  
10 schedule.

11 **NEPA Effects:** Crane foraging habitat could potentially be affected by general construction noise  
12 (3,186-10,204 acres) and pile driving (1,720-7,382 acres) above baseline level (50–60 dBA).  
13 However, lesser sandhill cranes are less traditional in their winter roost sites and may be more  
14 likely to travel away from disturbed areas to roost in more suitable habitat. Construction in certain  
15 areas would take place 7 days a week and 24 hours a day and evening and nighttime construction  
16 activities would require the use of extremely bright lights, which could adversely affect roosting  
17 cranes by impacting their sense of photo-period and by exposing them to predators. The effects of  
18 noise and visual disturbances would be reduced through the implementation of *AMM20 Greater*  
19 *Sandhill Crane*, which would include requirements (described above) to minimize the effects of noise  
20 and visual disturbance on sandhill cranes. With these measures in place, in addition to AMM1–  
21 AMM7, noise and visual disturbances, the potential for hazardous spills, increased dust and  
22 sedimentation, and operations and maintenance of the water conveyance facilities would not result  
23 in an adverse effect on the lesser sandhill crane. Tidal habitat restoration could result in increased  
24 exposure of lesser sandhill crane to selenium. This effect would be addressed through the  
25 implementation of *AMM27 Selenium Management*, which would provide specific tidal habitat  
26 restoration design elements to reduce the potential for bioaccumulation of selenium and its  
27 bioavailability in tidal habitats. With these measures in place, the effects of noise and visual  
28 disturbance, potential spills of hazardous materials, and increased exposure to selenium would not  
29 have an adverse effect on lesser sandhill crane. The implementation of tidal natural communities  
30 restoration or floodplain restoration could result in increased exposure of lesser sandhill crane to  
31 methylmercury. The potential indirect effects of increased mercury exposure is likely low for lesser  
32 sandhill crane. However, it is unknown what concentrations of methylmercury are harmful to the  
33 species, and the potential for increased exposure varies substantially within the study area. Site-  
34 specific restoration plans that address the creation and mobilization of mercury, as well as  
35 monitoring and adaptive management as described in *CM12 Methylmercury Management*, would be  
36 available to address the uncertainty of methylmercury levels in restored tidal marsh and potential  
37 impacts on lesser sandhill crane. The site-specific planning phase of marsh restoration would be the  
38 appropriate place to assess the potential for risk of methylmercury exposure for lesser sandhill  
39 crane, once site specific sampling and other information could be developed.

40 **CEQA Conclusion:** Crane foraging habitat could potentially be affected by general construction noise  
41 (3,186-10,204 acres) and pile driving (1,720-7,382 acres) above baseline level (50–60 dBA).  
42 However, lesser sandhill cranes are less traditional in their winter roost sites and may be more  
43 likely to travel away from disturbed areas to roost in more suitable habitat. Construction in certain  
44 areas would take place 7 days a week and 24 hours a day and evening and nighttime construction  
45 activities would require the use of extremely bright lights, which could adversely affect roosting  
46 cranes by impacting their sense of photo-period and by exposing them to predators. The effects of

1 noise and visual disturbances would be reduced through the implementation of *AMM20 Greater*  
2 *Sandhill Crane* which would include requirements (described above) to minimize the effects of noise  
3 and visual disturbance on sandhill cranes. The implementation of tidal natural communities  
4 restoration or floodplain restoration could result in increased exposure of lesser sandhill crane to  
5 methylmercury. The potential indirect effects of increased mercury exposure is likely low for lesser  
6 sandhill crane. However, it is unknown what concentrations of methylmercury are harmful to the  
7 species, and the potential for increased exposure varies substantially within the study area. Site-  
8 specific restoration plans that address the creation and mobilization of mercury, as well as  
9 monitoring and adaptive management as described in *CM12 Methylmercury Management*, would be  
10 available to address the uncertainty of methylmercury levels in restored tidal marsh and potential  
11 impacts on lesser sandhill crane. Tidal habitat restoration could result in increased exposure of  
12 lesser sandhill crane to selenium. This effect would be addressed through the implementation of  
13 *AMM27 Selenium Management*, which would provide specific tidal habitat restoration design  
14 elements to reduce the potential for bioaccumulation of selenium and its bioavailability in tidal  
15 habitats. With *AMM1–AMM7* and *AMM27 Selenium Management* in place, in addition to *CM12*  
16 *Methylmercury Management*, indirect effects of Plan implementation would have a less-than-  
17 significant impact on lesser sandhill crane.

#### 18 **Least Bell's Vireo and Yellow Warbler**

19 This section describes the effects of Alternative 1C, including water conveyance facilities  
20 construction and implementation of other conservation components, on the least Bell's vireo and  
21 yellow warbler. Least Bell's vireo and yellow warbler modeled habitat identifies suitable nesting and  
22 migratory habitat as those plant alliances from the valley/foothill riparian modeled habitat that  
23 contain a dense shrub component, including all willow-dominated alliances.

24 Construction and restoration associated with Alternative 1C conservation measures would result in  
25 both temporary and permanent losses of least Bell's vireo and yellow warbler modeled habitat as  
26 indicated in Table 12-1C-33. Full implementation of Alternative 1C would also include the following  
27 conservation actions over the term of the BDCP to benefit least Bell's vireo and yellow warbler  
28 (BDCP Chapter 3, Section 3.3, *Biological Goals and Objectives*).

- 29 ● Restore or create at least 5,000 acres of valley/foothill riparian natural community with at least  
30 3,000 acres occurring on restored seasonally inundated floodplain (Objective VFRNC1.1,  
31 associated with CM7).
- 32 ● Protect at least 750 acres of existing valley/foothill riparian natural community in CZ 7 by year  
33 10 (Objective VFRNC1.2, associated with CM7).
- 34 ● Maintain and enhance structural heterogeneity (Objective VFRNC2.1, associated with CM7).
- 35 ● Maintain at least 1,000 acres of early- to mid-successional vegetation (Objective VFRNC2.2,  
36 associated with CM7).

37 As explained below, with the restoration and protection of these amounts of habitat, in addition to  
38 natural community enhancement and management commitments and the implementation of  
39 *AMM1–AMM7*, *AMM22 Suisun Song Sparrow*, *Yellow-Breasted Chat*, *Least Bell's Vireo*, *Western*  
40 *Yellow-Billed Cuckoo*, and Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys*  
41 *and Avoid Disturbance of Nesting Birds*, impacts on least Bell's vireo and yellow warbler would not be  
42 adverse for NEPA purposes and would be less than significant for CEQA purposes.

1 **Table 12-1C-33. Changes in Least Bell’s Vireo and Yellow Warbler Modeled Habitat Associated**  
2 **with Alternative 1C (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	Migratory and Breeding	14	14	44	44	NA	NA
<b>Total Impacts CM1</b>		<b>14</b>	<b>14</b>	<b>44</b>	<b>44</b>	<b>NA</b>	<b>NA</b>
CM2–CM18	Migratory and Breeding	382	656	88	109	48–85	148
<b>Total Impacts CM2–CM18</b>		<b>382</b>	<b>656</b>	<b>88</b>	<b>109</b>	<b>48–85</b>	<b>148</b>
<b>TOTAL IMPACTS</b>		<b>396</b>	<b>670</b>	<b>132</b>	<b>153</b>	<b>48–85</b>	<b>148</b>

<sup>a</sup> See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-75: Loss or Conversion of Habitat for and Direct Mortality of Least Bell’s Vireo**  
5 **and Yellow Warbler**

6 Alternative 1C conservation measures would result in the combined permanent and temporary loss  
7 of up to 823 acres of modeled habitat (670 acres of permanent loss and 153 acres of temporary loss)  
8 for least Bell’s vireo and yellow warbler (Table 12-1C-33). Conservation measures that would result  
9 in these losses are conveyance facilities and transmission line construction, and establishment and  
10 use of borrow and spoil areas (CM1), Fremont Weir/Yolo Bypass fisheries improvements (CM2),  
11 tidal natural communities restoration (CM4), and seasonally inundated floodplain restoration  
12 (CM5). Habitat enhancement and management activities (CM11) which include ground disturbance  
13 or removal of nonnative vegetation, could result in local adverse habitat effects. In addition,  
14 maintenance activities associated with the long-term operation of the water conveyance facilities  
15 and other BDCP physical facilities could degrade or eliminate least Bell’s vireo and yellow warbler  
16 habitat. Each of these individual activities is described below. A summary statement of the combined  
17 impacts and NEPA effects and a CEQA conclusion follow the individual conservation measure  
18 discussions.

- 19 • *CM1 Water Facilities and Operation*: Construction of Alternative 1C conveyance facilities would  
20 result in the combined permanent and temporary loss of up to 58 acres of modeled least Bell’s  
21 vireo and yellow warbler habitat (Table 12-1C-33). Of the 58 acres of modeled habitat that  
22 would be removed for the construction of the conveyance facilities, 14 acres would be a  
23 permanent loss and 44 acres would be a temporary loss of habitat. Almost all of the losses would  
24 occur on the narrow borders of waterways that are crossed by water conveyance facilities. In

1 the north Delta, most of the permanent loss would be where Intakes 1–5 encroach on the  
 2 Sacramento River’s west bank from just north of Clarksburg to just north of Courtland. The  
 3 riparian areas here are very small patches, some dominated by valley oak and willows, and  
 4 others by nonnative trees and mixed brambles (see Terrestrial Biology Mapbook). Other small  
 5 patches or narrow bands of riparian vegetation dominated by valley oak and willow would be  
 6 permanently removed by canal construction and borrow areas in the vicinity of Elk Slough south  
 7 of Clarksburg. A long band of mixed brambles and willows would be lost adjacent to the  
 8 Sacramento River Deep Water Ship Channel, north of Miner Slough. The temporary losses of  
 9 valley/foothill riparian natural community would be associated with temporary canal and  
 10 siphon work areas where the canal would cross Elk Slough on the west side of Merritt Island,  
 11 Duck Slough west of Courtland, Miner Slough on the northwest corner of Ryer Island, and  
 12 Kellogg Creek southwest of Discovery Bay. The vegetation in these areas ranges from small  
 13 stands of valley oak and willow to narrow bands of alder and mixed brambles. Small temporary  
 14 losses associated with transmission line construction would occur along the entire  
 15 canal/pipeline route. There are no occurrences of least Bell’s vireo or yellow warbler that  
 16 intersect with the CM1 footprint. Refer to the Terrestrial Biology Map Book for a detailed view of  
 17 Alternative 1C construction locations. Impacts from CM1 would occur within the first 10 years of  
 18 Alternative 1C implementation.

- 19 ● *CM2 Yolo Bypass Fisheries Enhancement*: Construction of Yolo Bypass fisheries enhancements  
 20 would permanently remove approximately 83 acres and temporarily remove 88 acres of  
 21 modeled least Bell’s vireo and yellow warbler habitat in the Yolo Bypass in CZ 2. The loss is  
 22 expected to occur during the first 10 years of Alternative 1C implementation.
- 23 ● *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and  
 24 inundation would permanently remove an estimated 545 acres of modeled least Bell’s vireo and  
 25 yellow warbler habitat.
- 26 ● *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore  
 27 seasonally inundated floodplain would permanently remove approximately 28 acres and  
 28 temporarily remove 21 acres of modeled least Bell’s vireo and yellow warbler habitat. Based on  
 29 the riparian habitat restoration assumptions, a minimum of 3,000 acres of valley/foothill  
 30 riparian habitat would be restored as a component of seasonally inundated floodplain  
 31 restoration actions.

32 The actual number of acres of valley/foothill riparian habitat that CM4 and CM5 would restore  
 33 may differ from these estimates, depending on how closely the actual outcome of tidal habitat  
 34 restoration approximates the assumed outcome. However, riparian restoration from CM4 and  
 35 CM5 would increase the extent of least Bell’s vireo and yellow warbler habitat within the study  
 36 area once the restored riparian vegetation has developed habitat functions for these species.

- 37 ● *CM6 Channel Margin Enhancement*: Channel margin habitat enhancement could result in  
 38 removal of small amounts of valley/foothill riparian habitat along 20 miles of river and sloughs.  
 39 The extent of this loss cannot be quantified at this time, but the majority of the enhancement  
 40 activity would occur along waterway margins where riparian habitat stringers exist, including  
 41 levees and channel banks. The improvements would occur within the study area on sections of  
 42 the Sacramento, San Joaquin and Mokelumne Rivers, and along Steamboat and Sutter Sloughs.
- 43 ● *CM11 Natural Communities Enhancement and Management*: Habitat protection and management  
 44 activities that could be implemented in protected least Bell’s vireo and yellow warbler habitats  
 45 are expected to maintain and improve the functions of the habitat over the term of the BDCP.

1 Least Bell's vireo and yellow warbler would be expected to benefit from the increase in  
2 protected habitat, which would maintain conditions favorable for future species establishment  
3 in the study area. If least Bell's vireo and yellow warbler established breeding populations in  
4 restored riparian habitats in the study area, occupied habitat would be monitored to determine  
5 if there were a need to implement controls on brood parasites (brown-headed cowbird) or nest  
6 predators. If implemented, these actions would be expected to benefit the least Bell's vireo and  
7 yellow warbler by removing a potential stressor that could, if not addressed, adversely affect the  
8 stability of newly established populations.

9 Habitat management- and enhancement-related activities could disturb least Bell's vireo and  
10 yellow warbler nests. If either species were to nest in the vicinity of a worksite, equipment  
11 operation could destroy nests, and noise and visual disturbances could lead to their  
12 abandonment, resulting in mortality of eggs and nestlings. The potential for these activities to  
13 result in direct mortality of least Bell's vireo or yellow warbler would be minimized with the  
14 implementation of *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western*  
15 *Yellow-Billed Cuckoo* and Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird*  
16 *Surveys and Avoid Disturbance of Nesting Birds*.

- 17 ● Operations and Maintenance: Postconstruction operation and maintenance of the above-ground  
18 water conveyance facilities and restoration infrastructure could result in ongoing but periodic  
19 disturbances that could affect least Bell's vireo and yellow warbler use of the surrounding  
20 habitat. Maintenance activities would include vegetation management, levee and structure  
21 repair, and re-grading of roads and permanent work areas. These effects, however, would be  
22 reduced by AMMs and conservation actions as described below.
- 23 ● Injury and Direct Mortality: Although least Bell's vireo nesting has not been confirmed in the  
24 study area, recent occurrences in the Yolo Bypass and at the San Joaquin River National Wildlife  
25 Refuge suggest that the reestablishment of a breeding population is a possibility over the  
26 duration of the BDCP. Construction-related activities would not be expected to result in direct  
27 mortality of least Bell's vireo or yellow warbler because adults and fledged young would be  
28 expected to avoid contact with construction and other equipment. However, if either species  
29 were to nest in the construction area, equipment operation, noise and visual disturbances could  
30 destroy nests or lead to their abandonment, resulting in mortality of eggs and nestlings. These  
31 effects on least Bell's vireo would be avoided and minimized with the implementation of *AMM22*  
32 *Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo*. In  
33 addition, Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid*  
34 *Disturbance of Nesting Birds*, would be available to address adverse effects on nesting yellow  
35 warblers.

36 Temporarily affected areas would be restored as riparian habitat within 1 year following completion  
37 of construction activities. Although the effects are considered temporary, the restored riparian  
38 habitat would require a period of time for ecological succession to occur and for restored riparian  
39 habitat to functionally replace habitat that has been affected. However, restored riparian vegetation  
40 can have the habitat structure to support breeding vireos within 3 to 5 years, particularly if the  
41 restored vegetation is adjacent to established riparian areas (Kus 2002), and similar habitat would  
42 be suitable for yellow warbler. The majority of the riparian vegetation to be temporarily removed is  
43 early- to mid-successional; therefore, the replaced riparian vegetation would be expected to have  
44 structural components comparable to the temporarily removed vegetation within the first 5 to 10  
45 years after the initial restoration activities are complete. The following paragraphs summarize the

1 combined effects discussed above and describe other BDCP conservation actions that offset or avoid  
2 these effects. NEPA and CEQA conclusions are also included.

### 3 ***Near-Term Timeframe***

4 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
5 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
6 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
7 effects of construction would not be adverse under NEPA. Alternative 1C would remove 528 acres of  
8 modeled habitat for least Bell's vireo and yellow warbler in the study area in the near-term. These  
9 effects would result from the construction of the water conveyance facilities (CM1, 58 acres of  
10 habitat), and implementing other conservation measures (Yolo Bypass fisheries improvements  
11 [CM2] tidal habitat restoration [CM4], seasonally inundated floodplain restoration [CM5]— 470  
12 acres of habitat).

13 Typical NEPA and CEQA project-level mitigation ratios for those natural communities that would be  
14 affected and that are identified in the biological goals and objectives for least Bell's vireo in Chapter  
15 3 of the BDCP would be 1:1 for restoration/creation and 1:1 protection of dense shrubby  
16 successional valley/foothill riparian habitat. Using these ratios would indicate that 58 acres of  
17 valley/foothill riparian habitat should be restored/created and 58 acres should be protected to  
18 compensate for the CM1 losses of least Bell's vireo and yellow warbler habitat. The near-term effects  
19 of other conservation actions would remove 470 acres of modeled habitat, and therefore require  
20 470 acres of restoration and 470 acres of protection of dense shrubby valley/foothill riparian using  
21 the same typical NEPA and CEQA ratios (1:1 for restoration and 1:1 for protection).

22 The BDCP has committed to near-term goals of protecting 750 acres and restoring 800 acres of the  
23 valley/foothill riparian natural community in the Plan Area (Table 3-4 in Chapter 3, *Description of*  
24 *Alternatives*). These conservation actions are associated with CM3 and CM7 and would occur in the  
25 same timeframe as the construction and early restoration losses, thereby avoiding adverse effects of  
26 habitat loss on least Bell's vireo and yellow warbler. The majority of the riparian restoration acres  
27 would occur in CZ 7 as part of a reserve system with extensive wide bands or large patches of  
28 valley/foothill riparian natural community (Objectives VFRNC1.1 and VFRNC1.2, BDCP Chapter 3,  
29 *Conservation Strategy*). This restoration would provide the large contiguous patches needed for  
30 suitable least Bell's vireo and yellow warbler breeding habitat. Goals and objectives in the Plan for  
31 riparian restoration also include the restoration, maintenance and enhancement of structural  
32 heterogeneity with adequate vertical and horizontal overlap among vegetation components and  
33 over adjacent riverine channels, freshwater emergent wetlands, and grasslands (Objective  
34 VFRNC2.1). These Plan objectives represent performance standards for considering the  
35 effectiveness of CM7 restoration and CM3 protection actions. The acres of protection contained in  
36 the near-term Plan goals and the additional detail in the biological objectives for least Bell's vireo  
37 satisfy the typical mitigation ratios that would be applied to the project-level effects of CM1, as well  
38 as mitigate the near-term effects of the other conservation measures. The restored riparian habitat  
39 could require 5 years to several decades, for ecological succession to occur and for restored riparian  
40 habitat to functionally replace habitat that has been affected. However, because the modeled habitat  
41 impacted largely consists of small patches of blackberry, willow, and riparian scrub, and because  
42 least Bell's vireo and yellow warbler are not known to be established breeders in the study area,  
43 BDCP actions would not be expected to have an adverse population-level effect on either species.

1 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*  
2 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*  
3 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
4 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
5 *Material, AMM7 Barge Operations Plan, and AMM22 Suisun Song Sparrow, Yellow-Breasted Chat,*  
6 *Least Bell's Vireo, Western Yellow-Billed Cuckoo.* All of these AMMs include elements that would  
7 avoid or minimize the risk of affecting individuals and species habitats adjacent to work areas and  
8 storage sites. The AMMs are described in detail in BDCP Appendix 3.C, *Avoidance and Minimization*  
9 *Measures.* The yellow warbler is not a species that is covered under the BDCP. Although  
10 preconstruction surveys for least Bell's vireo may also detect yellow warblers (if they were to nest  
11 in the study area over the course of the BDCP), in order to have a less than adverse effect on  
12 individuals, preconstruction surveys for noncovered avian species would be required to ensure that  
13 yellow warbler nests were detected and avoided. Mitigation Measure BIO-75 would be available to  
14 address adverse effects on nesting yellow warblers.

### 15 **Late Long-Term Timeframe**

16 The habitat model indicates that the study area supports approximately 14,850 acres of modeled  
17 habitat for least Bell's vireo and yellow warbler. Alternative 1C as a whole would result in the  
18 permanent loss of and temporary effects on 823 acres of habitat for these species during the term of  
19 the Plan (6% of the total habitat in the study area). These losses would occur from the construction  
20 of the water conveyance facilities (CM1) and from *CM2 Yolo Bypass Fisheries Enhancement, CM4*  
21 *Tidal Natural Communities Restoration, and CM5 Seasonally Inundated Floodplain Restoration.* The  
22 locations of these losses would be in fragmented riparian habitat throughout the study area.

23 The Plan includes conservation commitments through *CM7 Riparian Natural Community Restoration*  
24 and *CM3 Natural Communities Protection and Restoration* to restore or create at least 5,000 acres  
25 and protect at least 750 acres of valley/foothill riparian woodland. Of the 5,000 acres of restored  
26 riparian natural communities, a minimum of 3,000 acres of valley/foothill riparian would be  
27 restored within the seasonally inundated floodplain, and 1,000 acres would be managed as dense  
28 early to mid-successional riparian forest (Objectives VFRNC1.1 and VFRNC1.2). Goals and objectives  
29 in the Plan for riparian restoration also include the maintenance and enhancement of structural  
30 heterogeneity (Objective VFRNC2.1) which would provide suitable nesting and migratory habitat for  
31 the least Bell's vireo and yellow warbler.

32 The BDCP's beneficial effects analysis (BDCP Chapter 5.6, *Effects on Covered Wildlife and Plant*  
33 *Species*) estimates that the restoration and protection actions discussed above could result in the  
34 restoration of 1,000 acres and the protection of 593 acres of habitat for the least Bell's vireo, which  
35 would also be suitable habitat for the yellow warbler.

36 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*  
37 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*  
38 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
39 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
40 *Material, AMM7 Barge Operations Plan, and AMM22 Suisun Song Sparrow, Yellow-Breasted Chat,*  
41 *Least Bell's Vireo, Western Yellow-Billed Cuckoo.* All of these AMMs include elements that would  
42 avoid or minimize the risk of affecting individuals and species habitats adjacent to work areas and  
43 storage sites. The AMMs are described in detail in BDCP Appendix 3.C, *Avoidance and Minimization*  
44 *Measures.*

1 **NEPA Effects:** The loss of least Bell's vireo and yellow warbler habitat and potential direct mortality  
2 of these special-status species under Alternative 1C would represent an adverse effect in the  
3 absence of other conservation actions. However, neither species is an established breeder in the  
4 study area and impacts would likely be limited to loss of migratory habitat. In addition, with habitat  
5 protection and restoration associated with CM3 and CM7, guided by biological goals and objectives  
6 and by *AMM1 Worker Awareness Training, AMM2 Construction Best Management Practices and*  
7 *Monitoring, AMM3 Stormwater Pollution Prevention Plan, AMM4 Erosion and Sediment Control Plan,*  
8 *AMM5 Spill Prevention, Containment, and Countermeasure Plan, AMM6 Disposal and Reuse of Spoils,*  
9 *Reusable Tunnel Material, and Dredged Material, AMM7 Barge Operations Plan, and AMM22 Suisun*  
10 *Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo,* which would be  
11 in place throughout the construction period, the effects of habitat loss and potential mortality on  
12 least Bell's vireo, and the effect of habitat loss on yellow warbler under Alternative 1C would not be  
13 adverse. The yellow warbler is not a species that is covered under the BDCP and potential mortality  
14 would be an adverse effect without preconstruction surveys to ensure that nests are detected and  
15 avoided. Mitigation Measure BIO-75 would be available to address this effect.

16 **CEQA Conclusion:**

17 **Near-Term Timeframe**

18 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
19 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
20 provide sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that  
21 the impacts of construction would be less than significant under CEQA. Alternative 1C would remove  
22 528 acres of modeled habitat for least Bell's vireo and yellow warbler in the study area in the near-  
23 term. These effects would result from the construction of the water conveyance facilities (CM1, 58  
24 acres of habitat), and implementing other conservation measures (Yolo Bypass fisheries  
25 improvements [CM2] tidal habitat restoration [CM4], seasonally inundated floodplain restoration  
26 [CM5]— 470 acres of habitat).

27 Typical NEPA and CEQA project-level mitigation ratios for those natural communities that would be  
28 affected and that are identified in the biological goals and objectives for least Bell's vireo in Chapter  
29 3 of the BDCP would be 1:1 for restoration/creation and 1:1 protection of dense shrubby  
30 successional valley/foothill riparian habitat. Using these ratios would indicate that 58 acres of  
31 valley/foothill riparian habitat should be restored/created and 58 acres should be protected to  
32 compensate for the CM1 losses of least Bell's vireo and yellow warbler habitat. The near-term effects  
33 of other conservation actions would remove 470 acres of modeled habitat, and therefore require  
34 470 acres of restoration and 470 acres of protection of dense shrubby valley/foothill riparian using  
35 the same typical NEPA and CEQA ratios (1:1 for restoration and 1:1 for protection).

36 The BDCP has committed to near-term goals of protecting 750 acres and restoring 800 acres of the  
37 valley/foothill riparian natural community in the Plan Area (Table 3-4 in Chapter 3, *Description of*  
38 *Alternatives*). These conservation actions are associated with CM3 and CM7 and would occur in the  
39 same timeframe as the construction and early restoration losses, thereby avoiding adverse effects of  
40 habitat loss on least Bell's vireo and yellow warbler. The majority of the riparian restoration acres  
41 would occur in CZ 7 as part of a reserve system with extensive wide bands or large patches of  
42 valley/foothill riparian natural community (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3,  
43 *Conservation Strategy*). This restoration would provide the large contiguous patches needed for  
44 suitable least Bell's vireo and yellow warbler breeding habitat. Goals and objectives in the Plan for

1 riparian restoration also include the restoration, maintenance and enhancement of structural  
2 heterogeneity with adequate vertical and horizontal overlap among vegetation components and  
3 over adjacent riverine channels, freshwater emergent wetlands, and grasslands (Objective  
4 VFRNC2.1). These Plan objectives represent performance standards for considering the  
5 effectiveness of CM7 restoration and CM3 protection actions. biological goals and objectives would  
6 inform the near-term protection and restoration efforts and represent performance standards for  
7 considering the effectiveness of restoration actions. The acres of protection contained in the near-  
8 term Plan goals and the additional detail in the biological objectives for least Bell's vireo satisfy the  
9 typical mitigation ratios that would be applied to the project-level effects of CM1, as well as mitigate  
10 the near-term effects of the other conservation measures. The restored riparian habitat could  
11 require 5 years to several decades, for ecological succession to occur and for restored riparian  
12 habitat to functionally replace habitat that has been affected. However, because the modeled habitat  
13 impacted largely consists of small patches of blackberry, willow, and riparian scrub, and because  
14 least Bell's vireo and yellow warbler are not known to be established breeders in the study area,  
15 BDCP actions would not be expected to have an adverse population-level effect on either species.

16 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
17 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
18 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
19 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
20 *Material*, *AMM7 Barge Operations Plan*, and *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat,*  
21 *Least Bell's Vireo, Western Yellow-Billed Cuckoo*. All of these AMMs include elements that would  
22 avoid or minimize the risk of affecting individuals and species habitats adjacent to work areas and  
23 storage sites. The AMMs are described in detail in BDCP Appendix 3.C, *Avoidance and Minimization*  
24 *Measures*. The yellow warbler is not a species that is covered under the BDCP. Although  
25 preconstruction surveys for least Bell's vireo may also detect yellow warblers (if they were to nest  
26 in the Plan Area over the course of the BDCP), in order to have a less than adverse effect on  
27 individuals, preconstruction surveys for noncovered avian species would be required to ensure that  
28 yellow warbler nests are detected and avoided. Mitigation Measure BIO-75 would reduce the  
29 potential impact on nesting yellow warblers to a less-than-significant impact, should they become  
30 established in the Plan Area.

### 31 ***Late Long-Term Timeframe***

32 The habitat model indicates that the study area supports approximately 14,850 acres of modeled  
33 habitat for least Bell's vireo and yellow warbler. Alternative 1C as a whole would result in the  
34 permanent loss of and temporary effects on 823 acres of habitat for these species during the term of  
35 the Plan (6% of the total habitat in the study area). These losses would occur from the construction  
36 of the water conveyance facilities (CM1) and from *CM2 Yolo Bypass Fisheries Enhancement*, *CM4*  
37 *Tidal Natural Communities Restoration*, and *CM5 Seasonally Inundated Floodplain Restoration*. The  
38 locations of these losses would be in fragmented riparian habitat throughout the study area.

39 The Plan includes conservation commitments through *CM7 Riparian Natural Community Restoration*  
40 and *CM3 Natural Communities Protection and Restoration* to restore or create at least 5,000 acres  
41 and protect at least 750 acres of valley/foothill riparian woodland. Of the 5,000 acres of restored  
42 riparian natural communities, a minimum of 3,000 acres of valley/foothill riparian would be  
43 restored within the seasonally inundated floodplain, and 1,000 acres would be managed as dense  
44 early to mid-successional riparian forest (Objectives VFRNC1.1 and VFRNC1.2). Goals and objectives  
45 in the Plan for riparian restoration also include the maintenance and enhancement of structural

1 heterogeneity (Objective VFRNC2.1) which would provide suitable nesting and migratory habitat for  
2 the least Bell's vireo and yellow warbler. The restored riparian habitat could require 5 years to  
3 several decades, for ecological succession to occur and for restored riparian habitat to functionally  
4 replace habitat that has been affected. Therefore, there would be a time-lag before the restored  
5 habitat would benefit either species. However, neither species are established breeders in the study  
6 area and impacts would likely be limited to loss of migratory habitat for least Bell's vireo and yellow  
7 warbler.

8 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*  
9 *Plant Species*) estimates that the restoration and protection actions discussed above could result in  
10 the restoration of 1,000 acres and the protection of 593 acres of habitat for the least Bell's vireo,  
11 which would also be suitable habitat for the yellow warbler.

12 The loss of least Bell's vireo and yellow warbler habitat and potential direct mortality of these  
13 special-status species under Alternative 1C would represent an adverse effect in the absence of  
14 other conservation actions. However, neither species is an established breeder in the study area and  
15 impacts would likely be limited to loss of migratory habitat for least Bell's vireo and yellow warbler.  
16 In addition, with habitat protection and restoration associated with CM3 and CM7, guided by  
17 biological goals and objectives and by *AMM1 Worker Awareness Training, AMM2 Construction Best*  
18 *Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention Plan, AMM4 Erosion*  
19 *and Sediment Control Plan, AMM5 Spill Prevention, Containment, and Countermeasure Plan, AMM6*  
20 *Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged Material, AMM7 Barge*  
21 *Operations Plan, and AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western*  
22 *Yellow-Billed Cuckoo*, which would be in place throughout the construction period, the effects of  
23 habitat loss and potential mortality on least Bell's vireo under Alternative 1C would be less than  
24 significant. The yellow warbler is not a species that is covered under the BDCP. Although  
25 preconstruction surveys for least Bell's vireo may also detect nesting yellow warblers, in order for  
26 the BDCP to have a less-than-significant impact on individuals, preconstruction surveys for  
27 noncovered avian species would be required to ensure that yellow warbler nests are detected and  
28 avoided. Mitigation Measure BIO-75 would reduce this potential impact on nesting yellow warblers,  
29 if present in the study area, to a less-than-significant level.

30 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**  
31 **Disturbance of Nesting Birds**

32 To reduce impacts on nesting birds, DWR will implement the measures listed below.

- 33
- 34 • To the maximum extent feasible, vegetation (trees, shrubs, ruderal areas) removal and  
35 trimming will be scheduled during the nonbreeding season of birds (September 1–January  
36 31). If vegetation removal cannot be removed in accordance with this timeframe,  
37 preconstruction/preactivity surveys for nesting birds and additional protective measures  
38 will be implemented as described below.
  - 39 • A qualified wildlife biologist with knowledge of the relevant species will conduct nesting  
40 surveys before the start of construction. A minimum of three separate surveys will be  
41 conducted within 30 days prior to construction, with the last survey within 3 days prior to  
42 construction. Surveys will include a search of all suitable nesting habitat (trees, shrubs,  
43 ruderal areas, field crops) in the construction area. In addition, a 500-foot area around the  
project area will be surveyed for nesting raptors, and a 250-foot buffer area will be surveyed

1 for other nesting birds. If no active nests are detected during these surveys, no additional  
2 measures are required.

- 3 • If active nests are found in the survey area, no-disturbance buffers will be established  
4 around the nest sites to avoid disturbance or destruction of the nest site until the end of the  
5 breeding season (approximately September 1) or until a qualified wildlife biologist  
6 determines that the young have fledged and moved out of the project area (this date varies  
7 by species). A qualified wildlife biologist will monitor construction activities in the vicinity  
8 of the nests to ensure that construction activities do not affect nest success. The extent of the  
9 buffers will be determined by the biologists in coordination with USFWS and CDFW and will  
10 depend on the level of noise or construction disturbance, line-of-sight between the nest and  
11 the disturbance, ambient levels of noise and other disturbances, and other topographical or  
12 artificial barriers. Suitable buffer distances may vary between species.

### 13 **Impact BIO-76: Fragmentation of Least Bell's Vireo and Yellow Warbler Habitat**

14 Grading, filling, contouring, and other initial ground-disturbing operations may temporarily  
15 fragment modeled least Bell's vireo and yellow warbler habitat. This could temporarily reduce the  
16 affected habitat's extent and functions. Because there are only two recent occurrences of least Bell's  
17 vireo within the Plan Area, and no occurrences of yellow warbler breeding in the Plan Area, future  
18 occupancy would likely consist of only a small number of individuals, and any such habitat  
19 fragmentation is expected to have no or minimal effect on the species.

20 **NEPA Effects:** Because there are only two recent occurrences of least Bell's vireo within the Plan  
21 Area, and no occurrences of yellow warbler breeding in the Plan Area, habitat fragmentation  
22 resulting from ground-disturbing operations would not have an adverse effect on least Bell's vireo  
23 or yellow warbler.

24 **CEQA Conclusion:** Because there are only two recent occurrences of least Bell's vireo within the Plan  
25 Area, and no occurrences of yellow warbler breeding in the Plan Area, habitat fragmentation  
26 resulting from ground-disturbing operations would have a less-than-significant impact on least  
27 Bell's vireo or yellow warbler.

### 28 **Impact BIO-77: Effects on Least Bell's Vireo and Yellow Warbler Associated with Electrical** 29 **Transmission Facilities**

30 New transmission lines would increase the risk for bird-power line strikes, which could result in  
31 injury or mortality of least Bell's vireo and yellow warbler. While both species could recolonize the  
32 study area during the permit term, recolonization would be expected to result primarily in response  
33 to BDCP riparian restoration, which would occur largely in CZ 7, which does not overlap with the  
34 proposed footprint for new transmission lines. The lack of occurrences in the study area, the lack of  
35 current and future higher value habitat patches in the vicinity of the proposed transmission lines,  
36 and the behavior and habitat requirements of least Bell's vireo and yellow warbler make collision  
37 with the proposed transmission lines highly unlikely.

38 **NEPA Effects:** Installation and presence of new transmission lines would not result in an adverse  
39 effect on least Bell's vireo or yellow warbler because the probability of bird-powerline strikes is  
40 unlikely due to the lack of occurrences in the study area, the lack of current and future higher value  
41 habitat patches in the vicinity of the proposed transmission lines, and the behavior and habitat  
42 requirements of these species.

1 **CEQA Conclusion:** Installation and presence of new transmission lines would result in a less-than-  
2 significant impact on least Bell's vireo or yellow warbler because the probability of bird-powerline  
3 strikes is unlikely due to the lack of occurrences in the study area, the lack of current and future  
4 higher value habitat patches in the vicinity of the proposed transmission lines, and the behavior and  
5 habitat requirements of these species.

6 **Impact BIO-78: Indirect Effects of Plan Implementation on Least Bell's Vireo and Yellow**  
7 **Warbler**

8 **Indirect construction-and operation-related effects:** If least Bell's vireo or yellow warbler were  
9 to nest in or adjacent to work areas, construction and subsequent maintenance-related noise and  
10 visual disturbances could mask calls, disrupt foraging and nesting behaviors, and reduce the  
11 functions of suitable nesting habitat for these species. Construction noise above background noise  
12 levels (greater than 50 dBA) could extend 1,900 to 5,250 feet from the edge of construction  
13 activities (BDCP Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of the BDCP*  
14 *Conveyance Facility on Sandhill Crane*, Table 4), although there are no available data to determine  
15 the extent to which these noise levels could affect least Bell's vireo or yellow warbler. *AMM22 Suisun*  
16 *Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo* would reduce  
17 the potential for adverse effects of construction-related activities on survival and productivity of  
18 nesting least Bell's vireo and a 500 foot no-disturbance buffer would be established around the  
19 active nest. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid*  
20 *Disturbance of Nesting Birds*, would be available to reduce the potential for adverse effects of  
21 construction-related activities on nesting yellow warbler. The use of mechanical equipment during  
22 water conveyance facilities construction could cause the accidental release of petroleum or other  
23 contaminants that could affect least Bell's vireo and yellow warbler in the surrounding habitat. The  
24 inadvertent discharge of sediment or excessive dust adjacent to suitable habitat could also have an  
25 adverse effect on these species. *AMM2 Construction Best Management Practices and Monitoring*  
26 would minimize the likelihood of such spills and ensure that measures are in place to prevent runoff  
27 from the construction area and negative effects of dust on active nests.

28 **Methylmercury Exposure:** Covered activities have the potential to exacerbate bioaccumulation of  
29 mercury in avian species, including the least Bell's vireo and yellow warbler. Marsh (tidal and  
30 nontidal) and floodplain restoration have the potential to increase exposure to methylmercury.  
31 Mercury is transformed into the more bioavailable form of methylmercury in aquatic systems,  
32 especially areas subjected to regular wetting and drying such as tidal marshes and flood plains  
33 (Alpers et al. 2008). Thus, BDCP restoration activities that create newly inundated areas could  
34 increase bioavailability of mercury (see BDCP Chapter 3, *Conservation Strategy*, for details of  
35 restoration). Species sensitivity to methylmercury differs widely and there is a large amount of  
36 uncertainty with respect to species-specific effects. Increased methylmercury associated with  
37 natural community and floodplain restoration could indirectly affect least Bell's vireo and yellow  
38 warbler, via uptake in lower trophic levels (as described in the BDCP, Appendix 5.D, *Contaminants*).

39 In addition, the potential mobilization or creation of methylmercury within the Plan Area varies  
40 with site-specific conditions and would need to be assessed at the project level. *CM12 Methylmercury*  
41 *Management* contains provisions for project-specific Mercury Management Plans. Site-specific  
42 restoration plans that address the creation and mobilization of mercury, as well as monitoring and  
43 adaptive management as described in CM12 would be available to address the uncertainty of  
44 methylmercury levels in restored tidal marsh and potential impacts on least Bell's vireo and yellow  
45 warbler.

1 **NEPA Effects:** Impacts of noise, the potential for hazardous spills, increased dust and sedimentation,  
2 and operations and maintenance of the water conveyance facilities on least Bell's vireo would not be  
3 adverse with the implementation of AMM1-AMM7, and AMM22 *Suisun Song Sparrow, Yellow-*  
4 *Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo*. Mitigation Measure BIO-75, *Conduct*  
5 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to  
6 address adverse effects on nesting yellow warblers. The implementation of tidal natural  
7 communities restoration or floodplain restoration could result in increased exposure of least Bell's  
8 vireo or yellow warbler to methylmercury, should they begin to nest in the study area. However, it is  
9 unknown what concentrations of methylmercury are harmful to these species. Site-specific  
10 restoration plans that address the creation and mobilization of mercury, as well as monitoring and  
11 adaptive management as described in *CM12 Methylmercury Management*, would be available to  
12 address the uncertainty of methylmercury levels in restored tidal marsh and potential effects of  
13 methylmercury on least Bell's vireo and yellow warbler.

14 **CEQA Conclusion:** Noise, the potential for hazardous spills, increased dust and sedimentation, and  
15 operations and maintenance of the water conveyance facilities would have a less-than-significant  
16 impact on least Bell's vireo and yellow warbler with the implementation of AMM2 *Construction Best*  
17 *Management Practices and Monitoring, AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least*  
18 *Bell's Vireo, Western Yellow-Billed Cuckoo*, and Mitigation Measure BIO-75, *Conduct Preconstruction*  
19 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*. The implementation of tidal natural  
20 communities restoration or floodplain restoration could result in increased exposure of least Bell's  
21 vireo or yellow warbler to methylmercury, should they begin to nest in the study area. However, it is  
22 unknown what concentrations of methylmercury are harmful to these species. Sites-specific  
23 restoration plans that address the creation and mobilization of mercury, as well as monitoring and  
24 adaptive management as described in *CM12 Methylmercury Management*, would be available to  
25 address the uncertainty of methylmercury levels in restored tidal marsh and potential significant  
26 impacts on least Bell's vireo and yellow warbler.

27 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**  
28 **Disturbance of Nesting Birds**

29 See Mitigation Measure BIO-75 under Impact BIO-75.

30 **Impact BIO-79: Periodic Effects of Inundation of Least Bell's Vireo and Yellow Warbler**  
31 **Habitat as a Result of Implementation of Conservation Components**

32 Flooding of the Yolo Bypass from Fremont Weir operations (CM2) would increase the frequency and  
33 duration of inundation of approximately 48-85 acres of modeled least Bell's vireo and yellow  
34 warbler habitat in CZ 2. No adverse effects of increased inundation frequency on least Bell's vireo,  
35 yellow warbler, or their habitat would be expected, because riparian vegetation supporting habitat  
36 has persisted under the existing Yolo Bypass flooding regime and changes to frequency and  
37 inundation would be within the tolerance of these vegetation types.

38 Based on hypothetical floodplain restoration for *CM5 Seasonally Inundated Floodplain Restoration*,  
39 construction of setback levees could result in periodic inundation of up to 148 acres of modeled  
40 least Bell's vireo and yellow warbler habitat in CZ 7. Inundation of restored floodplains would not be  
41 expected to affect least Bell's vireo, yellow warbler, or their habitat because the breeding period is  
42 outside the period when floodplains would likely be inundated. Additionally, periodic inundation of  
43 floodplains would be expected to restore a more natural flood regime in support of riparian

1 vegetation types that support least Bell's vireo and yellow warbler habitat. The overall effect of  
2 seasonal inundation in existing riparian natural communities would be beneficial, because,  
3 historically, flooding was the main natural disturbance regulating ecological processes in riparian  
4 areas, and flooding promotes the germination and establishment of many native riparian plants.

5 **NEPA Effects:** Implementation of CM2 and CM5 would result in periodic inundation of 48–85 acres  
6 (CM2) and 148 acres (CM5) of modeled habitat for least Bell's vireo and yellow warbler. However,  
7 periodic effects of inundation would not result in an adverse effect on least Bell's vireo or yellow  
8 warbler because inundation would occur primarily during the nonbreeding season and would  
9 promote a more natural flood regime in support of habitat for these species.

10 **CEQA Conclusion:** Implementation of CM2 and CM5 would result in periodic inundation of 48–85  
11 acres (CM2) and 148 acres (CM5) of modeled habitat for least Bell's vireo and yellow warbler.  
12 However, periodic effects of inundation would have a less-than-significant impact on least Bell's  
13 vireo or yellow warbler because inundation would occur during the nonbreeding season. Flooding  
14 promotes the germination and establishment of many native riparian plants. Therefore, the overall  
15 impact of seasonal inundation in existing riparian natural communities would be beneficial for least  
16 Bell's vireo and yellow warbler.

#### 17 **Suisun Song Sparrow and Saltmarsh Common Yellowthroat**

18 This section describes the effects of Alternative 1C on Suisun song sparrow and saltmarsh common  
19 yellowthroat. The habitat model used to assess effects for Suisun song sparrow and saltmarsh  
20 common yellowthroat is based on primary breeding habitat and secondary habitat. Suisun song  
21 sparrow primary breeding habitat consists of all *Salicornia*-dominated tidal brackish emergent  
22 wetland and all *Typha*-, *Scirpus*-, and *Juncus*-dominated tidal freshwater emergent wetland in the  
23 Plan Area west of Sherman Island, with the exception that *Scirpus acutus* and *S. californicus* plant  
24 communities (low marsh) and all of the plant communities listed below that occur in managed  
25 wetlands were classified as secondary habitat. Upland transitional zones, providing refugia during  
26 high tides, within 150 feet of the wetland edge were also included as secondary habitat. Secondary  
27 habitats generally provide only a few ecological functions such as foraging (low marsh and managed  
28 wetlands) or extreme high tide refuge (upland transition zones), while primary habitats provide  
29 multiple functions, including breeding, effective predator cover, and valuable forage. Construction  
30 and restoration associated with Alternative 1C conservation measures would result in both  
31 temporary and permanent losses of Suisun song sparrow and saltmarsh common yellowthroat  
32 modeled habitat as indicated in Table 12-1C-34. The majority of the losses would take place over an  
33 extended period of time as tidal marsh is restored in the study area. Full implementation of  
34 Alternative 1C would also include the following conservation actions over the term of the BDCP to  
35 benefit the Suisun song sparrow (BDCP Chapter 3, Section 3.3, *Biological Goals and Objectives*).

- 36 ● Restore or create at least 6,000 acres of tidal brackish emergent wetland in CZ 11 including at  
37 least 1,500 acres of middle and high marsh (Objectives TBEWNC1.1 and TBEWNC1.2, associated  
38 with CM4).
- 39 ● Protect and enhance at least 8,100 acres of managed wetland, at least 1,500 acres of which are  
40 in the Grizzly Island Marsh Complex (Objective MWNC1.1, associated with CM3)
- 41 ● Protect at least 200 feet of adjacent grasslands beyond the sea level rise accommodation area  
42 (Objective GNC1.4, associated with CM3)

1 As explained below, with the restoration and protection of these amounts of habitat, in addition to  
 2 natural community enhancement and management commitments (including *CM12 Methylmercury*  
 3 *Management*) and the implementation of AMM1–AMM7, *AMM22 Suisun Song Sparrow*, *Yellow-*  
 4 *Breasted Chat*, *Least Bell’s Vireo*, *Western Yellow-Billed Cuckoo*, and mitigation to minimize potential  
 5 effects, impacts on Suisun song sparrow and saltmarsh common yellowthroat would not be adverse  
 6 for NEPA purposes and would be less than significant for CEQA. purposes.

7 **Table 12-1C-34. Changes in Suisun Song Sparrow Saltmarsh Common Yellowthroat Modeled**  
 8 **Habitat Associated with Alternative 1C (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	Primary	0	0	0	0	NA	NA
	Secondary	0	0	0	0	NA	NA
<b>Total Impacts CM1</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>NA</b>	<b>NA</b>
CM2–CM18	Primary	54	55	0	0	0	0
	Secondary	1,098	3,633	0	0	0	0
<b>Total Impacts CM2–CM18</b>		<b>1,152</b>	<b>3,688</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>TOTAL IMPACTS</b>		<b>1,152</b>	<b>3,688</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

<sup>a</sup> See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only.

NT = near-term

LLT = late long-term

NA = not applicable

9

10 **Impact BIO-80: Loss or Conversion of Habitat for and Direct Mortality of Suisun Song Sparrow**  
 11 **and Saltmarsh Common Yellowthroat**

12 Alternative 1C conservation measures would result in the permanent loss of up to 3,510 acres of  
 13 modeled secondary habitat, the conversion of 55 acres of primary habitat to secondary low marsh,  
 14 and the conversion of 123 acres of secondary habitat to middle or high marsh (for a total impact of  
 15 55 acres primary habitat and 3,633 acres of secondary habitat, Table 12-1C-34). The only  
 16 conservation measure that would affect modeled habitat for Suisun song sparrow and saltmarsh  
 17 common yellowthroat is *CM4 Tidal Natural Communities Restoration*. Habitat enhancement and  
 18 management activities (CM11), which include ground disturbance or removal of nonnative  
 19 vegetation, could also result in local adverse habitat effects. Each of these individual activities is  
 20 described below. A summary statement of the combined impacts and NEPA and CEQA conclusions  
 21 follows the individual conservation measure discussions.

- 22 • *CM4 Tidal Natural Communities Restoration*: Site preparation and inundation would  
 23 permanently remove approximately 3,510 acres of modeled secondary Suisun song sparrow and  
 24 saltmarsh common yellowthroat habitat from CZ 11 (Table 12-1C-34). In addition, 55 acres of

1 primary habitat would be converted to secondary low marsh, and 123 acres of secondary  
2 habitat would be converted to middle or high marsh. Most areas proposed for removal would be  
3 managed wetlands that serve as relatively marginal habitat for Suisun song sparrow and  
4 saltmarsh common yellowthroat, which primarily use brackish tidal wetlands. Approximately  
5 2% of primary habitat for these species would be converted to foraging habitat. Full  
6 implementation of CM4 would restore or create at least 6,000 acres of tidal brackish emergent  
7 wetland natural community in CZ 11, which would be expected to support Suisun song sparrow  
8 and saltmarsh common yellowthroat habitat. It is expected that restoring tidal wetland  
9 communities that are self-sustaining and not reliant on ongoing management actions necessary  
10 to maintain the existing managed wetland habitats would better ensure the long-term viability  
11 of these populations. Furthermore, effects of tidal habitat restoration on sparrow and  
12 yellowthroat abundance and distribution would be monitored, and the restoration of tidal  
13 habitat would be sequenced and located in a manner that minimizes effects on occupied habitats  
14 until functional habitats were restored (see BDCP Chapter 3, Section 3.4.4, *Conservation Measure 4*  
15 *Tidal Natural Communities Restoration*, and Section 3.6, *Adaptive Management and Monitoring*  
16 *Program*).

- 17 ● *CM11 Natural Communities Enhancement and Management*: Control of nonnative Suisun song  
18 sparrow and saltmarsh common yellowthroat predators, if deemed necessary, would be  
19 expected to reduce predation loss of nests and, consequently, increase and maintain the  
20 abundance of Suisun song sparrow and saltmarsh common yellowthroat in restored tidal  
21 habitats over the term of the BDCP. Habitat management- and enhancement-related activities  
22 could disturb Suisun song sparrow or saltmarsh common yellowthroat nests if they are located  
23 near work sites. The potential for these activities to have an adverse effect on Suisun song  
24 sparrow would be avoided and minimized through *AMM22 Suisun Song Sparrow, Yellow-*  
25 *Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo*. In addition, Mitigation Measure  
26 *BIO-75, Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*,  
27 would be available to address these effects on saltmarsh common yellowthroat. A variety of  
28 *CM11* habitat management actions that are designed to enhance wildlife values in restored and  
29 protected tidal wetland habitats may result in localized ground disturbances that could  
30 temporarily remove small amounts of Suisun song sparrow and saltmarsh common  
31 yellowthroat habitat in CZ 11. Ground-disturbing activities, such as removal of nonnative  
32 vegetation and road and other infrastructure maintenance activities, are expected to have minor  
33 adverse effects on available species' habitat.
- 34 ● *Operations and Maintenance*: Postconstruction operation and maintenance of the restoration  
35 infrastructure could result in ongoing but periodic disturbances that could affect Suisun song  
36 sparrow and saltmarsh common yellowthroat use of the surrounding habitat in Suisun.  
37 Maintenance activities could include vegetation management, and levee repair. These effects,  
38 however, would be reduced by *AMMs* and conservation actions as described below.
- 39 ● Construction-related activities could result in nest destruction or disturbance resulting in  
40 mortality of eggs and nestlings if restoration activities took place within the nesting period for  
41 these species. *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western*  
42 *Yellow-Billed Cuckoo* would minimize these potential effects on Suisun song sparrow. Mitigation  
43 Measure *BIO-75, Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting*  
44 *Birds*, would be available to address these effects on saltmarsh common yellowthroat. Grading,  
45 filling, contouring, and other initial ground-disturbing operations during restoration activities  
46 could temporarily fragment existing modeled tidal brackish emergent wetland habitat for

1 Suisun song sparrow and saltmarsh common yellowthroat which could temporarily reduce the  
2 extent and functions of the affected habitat. These temporary effects would be minimized  
3 through sequencing of restoration activities and through *AMM22 Suisun Song Sparrow, Yellow-*  
4 *Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo* and Mitigation Measure BIO-75.

5 The following paragraphs summarize the combined effects discussed above and describe other  
6 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also  
7 included.

### 8 ***Near-Term Timeframe***

9 There would be no impacts resulting from the construction of the water conveyance facilities (CM1).  
10 However, there would be a permanent loss of 1,040 acres of modeled secondary habitat for Suisun  
11 song sparrow and saltmarsh common yellowthroat in the study area in the near-term. In addition,  
12 54 acres of primary habitat would be converted to secondary foraging habitat, and 58 acres of  
13 secondary habitat would be converted to mid to high marsh, which would provide primary nesting  
14 habitat for these species. Although there would be a temporal lag in these conversions, there would  
15 be no net loss of primary habitat in the near-term. These effects would result from implementing  
16 CM4 tidal restoration in CZ 11. The typical NEPA and CEQA project-level mitigation ratio for those  
17 natural communities affected by CM4 and that are identified in the biological goals and objectives in  
18 Chapter 3 of the BDCP would be 1:1 for restoration/creation of tidal brackish emergent habitat.  
19 Using this ratio would indicate that 1,152 acres of tidal brackish emergent wetland should be  
20 restored/created to mitigate the CM4 permanent losses of Suisun song sparrow and saltmarsh  
21 common yellowthroat habitat in the near-term.

22 The BDCP has committed to near-term goals of restoring 1,000 acres of tidal brackish emergent  
23 wetlands in the study area. Although this 1,000 acres is slightly less than the 1:1 restoration ratio,  
24 the secondary habitat that would be permanently lost would be primarily lower value managed  
25 wetlands, and this would be replaced with higher value tidal brackish marsh foraging habitat. These  
26 conservation actions would occur in the same timeframe as the early restoration losses. To ensure  
27 that this natural community conservation benefits the species, the Plan's biological goals and  
28 objectives (BDCP Chapter 3, Section 3.3) further specify that within the 6,000 acres of tidal brackish  
29 emergent marsh restored in the late long-term, at least 1,500 acres would be restored as high and  
30 mid marsh, providing primary habitat for these species. In addition, of the 8,000 acres of protected  
31 and 2,000 acres of restored grassland, in the late long-term, grasslands adjacent to restored tidal  
32 brackish emergent wetlands would be protected or restored, to provide at least 200 feet of adjacent  
33 grasslands beyond the sea level rise accommodation. This adjacent upland habitat would provide  
34 high tide refugia during high tide events, benefitting both species. These biological goals and  
35 objectives would inform the near-term restoration efforts and represent performance standards for  
36 considering the effectiveness of restoration actions. Tidal wetlands would be restored in a mosaic of  
37 large, interconnected and biologically diverse patches. Larger and more interconnected patches of  
38 suitable habitat would be expected to reduce the effects of habitat fragmentation that currently exist  
39 in Suisun Marsh in CZ 11. Nonnative predators would be controlled as needed to reduce nest  
40 predation and to help maintain species abundance (CM11). Restoration would be sequenced over  
41 the term of the Plan and occur in a manner that would minimize any temporary, initial loss and  
42 fragmentation of habitat. The acres of restoration contained in the near-term Plan goals with the  
43 management and enhancement actions (CM11), and the incorporation of the additional measures in  
44 the biological goals and objectives (BDCP Chapter 3, Section 3.3) would be sufficient to mitigate the  
45 near-term effects of tidal restoration.

1 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*  
2 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*  
3 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
4 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
5 *Material, AMM7 Barge Operations Plan, and AMM22 Suisun Song Sparrow, Yellow-Breasted Chat,*  
6 *Least Bell's Vireo, Yellow-Billed Cuckoo.* All of these AMMs include elements that avoid or minimize  
7 the risk of affecting habitats and species adjacent to work areas. The AMMs are described in detail in  
8 BDCP Appendix 3.C. The saltmarsh common yellowthroat is not a species that is covered under the  
9 BDCP. Although preconstruction surveys for Suisun song sparrow would likely also detect nesting  
10 saltmarsh common yellowthroat, in order to avoid adverse effects on individuals, preconstruction  
11 surveys for noncovered avian species would be required to ensure that saltmarsh common  
12 yellowthroat nests are detected and avoided.

### 13 **Late Long-Term Timeframe**

14 Based on modeled habitat, the study area supports approximately 3,761 acres of primary and  
15 23,997 acres of secondary habitat for Suisun song sparrow and saltmarsh common yellowthroat.  
16 Alternative 1C as a whole would result in the permanent loss of 3,510 acres of secondary habitat  
17 (15% of the total secondary habitat in the study area). In addition, 55 acres of primary habitat  
18 would be converted to secondary foraging habitat, and 123 acres of secondary habitat would be  
19 converted to primary habitat. The Plan includes a commitment to restore or create at least 3,000  
20 acres of tidal brackish emergent wetlands in Suisun Marsh in CZ 11 (Table 12-1C-34). The secondary  
21 habitat that would be permanently lost would be primarily lower value managed wetlands, and this  
22 would be replaced with higher value tidal brackish marsh foraging habitat. These conservation  
23 actions would occur in the same timeframe as the early restoration losses. To ensure that this  
24 natural community conservation benefits the species, the Plan's biological goals and objectives  
25 (BDCP Chapter 3, Section 3.3) further specify that within the 3,000 acres of tidal brackish emergent  
26 marsh restored in the late long-term, at least 1,500 acres would be restored as high and mid marsh,  
27 providing primary habitat for these species. In addition, of the 8,000 acres of protected and 2,000  
28 acres of restored grassland, in the late long-term, grasslands adjacent to restored tidal brackish  
29 emergent wetlands would be protected or restored, to provide at least 200 feet of adjacent  
30 grasslands beyond the sea level rise accommodation. This adjacent upland habitat would provide  
31 high tide refugia during high tide events, benefitting both species. These biological goals and  
32 objectives would inform the near-term restoration efforts and represent performance standards for  
33 considering the effectiveness of restoration actions. Tidal wetlands would be restored in a mosaic of  
34 large, interconnected and biologically diverse patches. Larger and more interconnected patches of  
35 suitable habitat would be expected to reduce the effects of habitat fragmentation that currently exist  
36 in Suisun marsh in CZ 11. Nonnative predators would be controlled as needed to reduce nest  
37 predation and to help maintain species abundance (CM11). Restoration would be sequenced over  
38 the term of the Plan and occur in a manner that would minimize any temporary, initial loss and  
39 fragmentation of habitat.

40 The loss of secondary habitat associated with Alternative 1C would represent an adverse effect as a  
41 result of habitat modification of a special-status species and potential for direct mortality in the  
42 absence of other conservation actions. However, with habitat protection and restoration associated  
43 with CM4, with the management and enhancement actions (CM11), and with the incorporation of  
44 the additional measures in the biological goals and objectives (BDCP Chapter 3, Section 3.3), guided  
45 by AMM1-AMM7, and AMM23, which would be in place throughout the construction phase, the  
46 effects of habitat loss and conversion on Suisun song sparrow would not be adverse under

1 Alternative 1C. Although preconstruction surveys for Suisun song sparrow would likely also detect  
2 nesting saltmarsh common yellowthroat, in order to avoid adverse effects on individuals,  
3 preconstruction surveys for noncovered avian species would be required to ensure that saltmarsh  
4 common yellowthroat nests are detected and avoided.

5 **NEPA Effects:** The loss of Suisun song sparrow and saltmarsh common yellowthroat habitat and  
6 potential direct mortality of these special status species under Alternative 1C would represent an  
7 adverse effect in the absence of other conservation actions. However, with habitat protection and  
8 restoration associated with CM4, with the management and enhancement actions (CM11), and with  
9 the incorporation of the additional measures in the biological goals and objectives, AMM1–AMM7  
10 and AMM22 *Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed*  
11 *Cuckoo*, which would be in place throughout the construction period, the effects of habitat loss and  
12 potential mortality on Suisun song sparrow, and the effects of habitat loss on saltmarsh common  
13 yellowthroat would not be adverse under Alternative 1C. The saltmarsh common yellowthroat is not  
14 a species that is covered under the BDCP. Although preconstruction surveys for Suisun song  
15 sparrow would likely also detect nesting saltmarsh common yellowthroat, in order for the BDCP to  
16 avoid adverse effects on individuals, preconstruction surveys for noncovered avian species would be  
17 required to ensure that saltmarsh common yellowthroat nests are detected and avoided. Mitigation  
18 Measure BIO-75 would be available to address this adverse effect.

19 **CEQA Conclusion:** Alternative 1C (CM4) would have permanent impacts on Suisun song sparrow  
20 and saltmarsh common yellowthroat and their modeled habitat, and the operation of construction  
21 equipment could injure or disturb individuals.

#### 22 **Near-Term Timeframe**

23 There would be no impacts resulting from the construction of the water conveyance facilities (CM1).  
24 However, there would be a permanent loss of 1,040 acres of modeled secondary habitat for Suisun  
25 song sparrow and saltmarsh common yellowthroat in the study area in the near-term. In addition,  
26 54 acres of primary habitat would be converted to secondary foraging habitat, and 58 acres of  
27 secondary habitat would be converted to mid to high marsh, which would provide primary nesting  
28 habitat for these species. Although there would be a temporal lag in these conversions, there would  
29 be no net loss of primary habitat in the near-term. These effects would result from implementing  
30 CM4 tidal restoration in CZ 11. Typical NEPA and CEQA project-level mitigation ratios for those  
31 natural communities affected by CM4 and that are identified in the biological goals and objectives in  
32 Chapter 3 of the BDCP would be 1:1 for restoration/creation of tidal brackish emergent habitat.  
33 Using these typical ratios would indicate that 1,152 acres of tidal brackish emergent wetland should  
34 be restored/created to mitigate the CM4 permanent losses of Suisun song sparrow and saltmarsh  
35 common yellowthroat habitat in the near-term.

36 The BDCP has committed to near-term goals of restoring 1,000 acres of tidal brackish emergent  
37 wetlands in the study area in CZ 11. Although this 1,000 acres is slightly less than the 1:1 restoration  
38 ratio, the secondary habitat that would be permanently lost would be primarily lower value  
39 managed wetlands, and this would be replaced with higher value tidal brackish marsh foraging  
40 habitat. These conservation actions would occur in the same timeframe as the early restoration  
41 losses. To ensure that this natural community conservation benefits the species, the Plan's biological  
42 goals and objectives (BDCP Chapter 3, Section 3.3) further specify that within the 3,000 acres of tidal  
43 brackish emergent marsh restored in the late long-term, at least 1,500 acres would be restored as  
44 high and mid marsh, providing primary habitat for these species. In addition, of the 8,000 acres of

1 protected and 2,000 acres of restored grassland, in the late long-term, grasslands adjacent to  
2 restored tidal brackish emergent wetlands would be protected or restored, to provide at least 200  
3 feet of adjacent grasslands beyond the sea level rise accommodation. This adjacent upland habitat  
4 would provide high tide refugia during high tide events, benefitting both species. These biological  
5 goals and objectives would inform the near-term restoration efforts and represent performance  
6 standards for considering the effectiveness of restoration actions. Tidal wetlands would be restored  
7 in a mosaic of large, interconnected and biologically diverse patches. Larger and more  
8 interconnected patches of suitable habitat would be expected to reduce the effects of habitat  
9 fragmentation that currently exist in Suisun Marsh in CZ 11. Nonnative predators would be  
10 controlled as needed to reduce nest predation and to help maintain species abundance (CM11).  
11 Restoration would be sequenced over the term of the Plan and occur in a manner that would  
12 minimize any temporary, initial loss and fragmentation of habitat. The acres of restoration  
13 contained in the near-term Plan goals with the management and enhancement actions (CM11), and  
14 the incorporation of the additional measures in the biological goals and objectives would be  
15 sufficient to mitigate the near-term effects of tidal restoration.

16 The Plan also includes commitments to implement *AMM1 Worker Awareness, AMM2 Construction*  
17 *Best Management Practices and Monitoring, AMM5 Spill Prevention, Containment and*  
18 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
19 *Material, AMM7 Barge Operation Plan and AMM22 Suisun Song Sparrow, Yellow-breasted Chat, Least*  
20 *Bell's Vireo, Yellow-Billed Cuckoo. All of these AMMs include elements that avoid or minimize the risk*  
21 *of affecting habitats and species adjacent to work areas and storage sites. The AMMs are described*  
22 *in detail in BDCP Appendix 3.C. The saltmarsh common yellowthroat is not a species that is covered*  
23 *under the BDCP. Although preconstruction surveys for Suisun song sparrow may also detect nesting*  
24 *saltmarsh common yellowthroat, in order to have a less-than-significant effect on individuals,*  
25 *preconstruction surveys for noncovered avian species would be required to ensure that saltmarsh*  
26 *common yellowthroat nests are detected and avoided. Mitigation Measure BIO-75, Conduct*  
27 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds, would reduce the*  
28 *potential impact on nesting saltmarsh common yellowthroat to a less-than-significant impact.*

29 The 1,000 acres of restoration contained in the near-term Plan goals, the additional direction in the  
30 biological goals and objectives, and management and enhancement activities in CM11, would be  
31 sufficient to support the conclusion that the near-term effects of habitat loss and direct mortality  
32 under Alternative 1C would be less than significant under CEQA, as AMM1-AMM7, AMM22, and  
33 Mitigation Measure BIO-75 would avoid and minimize potential impacts on the species from  
34 construction-related habitat loss.

### 35 ***Late Long-Term Timeframe***

36 The habitat model indicates that the study area supports approximately 3,722 acres of primary and  
37 23,986 acres of secondary habitat for Suisun song sparrow and saltmarsh common yellowthroat.  
38 Alternative 1C as a whole would result in the permanent loss of 3,688 acres of habitat (15% of the  
39 total habitat in the study area) from the implementation of *CM4 Tidal Natural Communities*  
40 *Restoration. Within this habitat loss, 55 acres of primary habitat would be converted to secondary*  
41 *foraging habitat, and 123 acres of secondary habitat would be converted to primary habitat.*

42 The Plan includes a commitment through *CM4 Tidal Natural Communities Restoration* to restore or  
43 create at least 6,000 acres of tidal brackish emergent wetland in CZ 11 (Objective TBEWNC1.1)  
44 These tidal wetlands would be restored as a mosaic of large, interconnected and biologically diverse

1 patches, and at least 1,500 acres of restored marsh would consist of middle-and high-marsh  
2 vegetation with dense, tall stands of pickleweed and bulrush cover, serving as primary habitat for  
3 Suisun song sparrow and saltmarsh common yellowthroat (Objective TBEWNC1.2). In addition,  
4 grasslands adjacent to restored tidal brackish emergent wetlands would be protected or restored, to  
5 provide at least 200 feet of adjacent grasslands beyond the sea level rise accommodation. This  
6 adjacent upland habitat would provide high tide refugia during high tide events, after sea-level rise  
7 has converted the lower-level grasslands to tidal natural communities. Tidal wetlands would be  
8 restored in a mosaic of large, interconnected and biologically diverse patches. Larger and more  
9 interconnected patches of suitable habitat would be expected to reduce the effects of habitat  
10 fragmentation that currently exist in Suisun marsh in CZ 11. Nonnative predators would be  
11 controlled as needed to reduce nest predation and to help maintain species abundance (CM11).  
12 Restoration would be sequenced over the term of the Plan and occur in a manner that would  
13 minimize any temporary, initial loss and fragmentation of habitat.

14 The BDCP's beneficial effects analysis (BDCP Chapter 5.6, *Effects on Covered Wildlife and Plant*  
15 *Species*) estimates that the restoration and protection actions discussed above could result in the  
16 restoration of 1,500 acres of primary habitat and 4,500 acres of secondary habitat in addition to the  
17 protection of 384 acres of secondary habitat for Suisun song sparrow, which would also benefit the  
18 saltmarsh common yellowthroat.

19 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
20 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
21 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
22 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
23 *Material*, *AMM7 Barge Operations Plan*, and *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat,*  
24 *Least Bell's Vireo, Western Yellow-Billed Cuckoo*. All of these AMMs include elements that would  
25 avoid or minimize the risk of affecting individuals and species habitats adjacent to work areas and  
26 storage sites. The AMMs are described in detail in BDCP Appendix 3.C, *Avoidance and Minimization*  
27 *Measures*. The saltmarsh common yellowthroat is not a covered species under the BDCP. Although  
28 preconstruction surveys for Suisun song sparrow may detect nesting saltmarsh common  
29 yellowthroat, for the BDCP to have a less-than-significant impact on individuals, preconstruction  
30 surveys for noncovered avian species would be required to ensure that saltmarsh common  
31 yellowthroat nests are detected and avoided. Mitigation Measure BIO-75 would reduce this potential  
32 impact on nesting saltmarsh common yellowthroat to a less-than-significant level.

33 Considering these restoration provisions, which would replace low-value secondary habitat with  
34 high-value tidal brackish emergent habitat, including both foraging and primary habitat, and provide  
35 upland refugia for Suisun song sparrow and saltmarsh common yellowthroat, the acreages of  
36 restoration would be sufficient to compensate for habitats lost to construction and restoration  
37 activities. Loss of habitat or direct mortality through implementation of Alternative 1C, with the  
38 implementation of AMM1-AMM7, AMM22, and Mitigation Measure BIO-75, *Conduct Preconstruction*  
39 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would not result in a substantial adverse  
40 effect through habitat modifications and would not substantially reduce the number or restrict the  
41 range of the species. Therefore, the loss of habitat or potential mortality under this alternative  
42 would have a less-than-significant impact on Suisun song sparrow and saltmarsh common  
43 yellowthroat.

1           **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**  
2           **Disturbance of Nesting Birds**

3           See Mitigation Measure BIO-75 under Impact BIO-75.

4           **Impact BIO-81: Indirect Effects of Plan Implementation on Suisun Song Sparrow and**  
5           **Saltmarsh Common Yellowthroat**

6           **Indirect construction-related effects:** If Suisun song sparrow or saltmarsh common yellowthroat  
7           were to nest in or adjacent to work areas, construction and subsequent maintenance-related noise  
8           and visual disturbances could mask calls, disrupt foraging and nesting behaviors, and reduce the  
9           functions of suitable nesting habitat for these species. Suisun song sparrow and saltmarsh common  
10          yellowthroat habitat adjacent to restoration work areas could be affected by such disturbances,  
11          which could temporarily result in diminished use of habitat. Construction noise above background  
12          noise levels (greater than 50 dBA) could extend 1,900 to 5,250 feet from the edge of construction  
13          activities (BDCP Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of the BDCP*  
14          *Conveyance Facility on Sandhill Crane*, Table 4), although there are no available data to determine  
15          the extent to which these noise levels could affect either species. If construction occurred during the  
16          nesting season, these indirect effects could result in the loss or abandonment of nests and mortality  
17          of any eggs and/or nestlings. *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo,*  
18          *Western Yellow-Billed Cuckoo* and Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird*  
19          *Surveys and Avoid Disturbance of Nesting Birds*, would avoid the potential for adverse effects of  
20          construction-related activities on survival and productivity of Suisun song sparrow and saltmarsh  
21          common yellowthroat by requiring preconstruction surveys and, if nests are present, the  
22          establishment of a no-disturbance buffer within 250 feet of a nest site. The use of mechanical  
23          equipment during water conveyance facilities construction could cause the accidental release of  
24          petroleum or other contaminants that could affect species in the surrounding habitat. The  
25          inadvertent discharge of sediment or excessive dust adjacent to suitable habitat could also have an  
26          adverse effect on Suisun song sparrow and saltmarsh common yellowthroat. *AMM2 Construction*  
27          *Best Management Practices and Monitoring* would minimize the likelihood of such spills and ensure  
28          that measures are in place to prevent runoff from the construction area and any adverse effects of  
29          dust on active nests.

30          **Salinity:** Water conveyance facilities operations would have an effect on salinity gradients in Suisun  
31          Marsh; however, these effects cannot be reasonably disaggregated from effects resulting from tidal  
32          habitat restoration. It is expected that the salinity of water in Suisun Marsh would generally increase  
33          as a result of water conveyance facilities operations and operations of salinity control gates to mimic  
34          a more natural water flow. This would likely encourage the establishment of tidal wetland plant  
35          communities tolerant of more saline environments, which should have a beneficial effect on Suisun  
36          song sparrow and saltmarsh common yellowthroat because their historical natural Suisun Marsh  
37          habitat is brackish tidal marsh. However, the degree to which salinity changes in all tidal channels  
38          and sloughs in and around Suisun Marsh would be highly variable.

39          **Methylmercury Exposure:** Marsh (tidal and nontidal) and floodplain restoration have the potential  
40          to increase exposure to methylmercury. Mercury is transformed into the more bioavailable form of  
41          methylmercury in aquatic systems, especially areas subjected to regular wetting and drying such as  
42          tidal marshes and flood plains (Alpers et al. 2008). Thus, BDCP restoration activities that create  
43          newly inundated areas could increase bioavailability of mercury (see BDCP Chapter 3, *Conservation*  
44          *Strategy*, for details of restoration). Although tidal habitat restoration might increase methylation of

1 mercury export to other habitats, restoration is unlikely to significantly increase the exposure of  
2 methylmercury to Suisun song sparrow or saltmarsh common yellowthroat, as they currently reside  
3 in tidal marshes where elevated methylmercury levels exist. Robinson et al. (2011) found toxic  
4 levels of methylmercury levels in song sparrow populations from southern San Francisco Bay,  
5 although populations near Suisun Marsh (i.e., San Pablo and Simas Creeks) were much lower. The  
6 potential mobilization or creation of methylmercury within the study area varies with site-specific  
7 conditions and would need to be assessed at the project level. The Suisun Marsh Plan anticipates  
8 that restored tidal wetlands would generate less methylmercury than the existing managed  
9 wetlands to be restored (Bureau of Reclamation et al. 2010). *CM12 Methylmercury Management*  
10 includes provisions for project-specific Mercury Management Plans. Along with minimization and  
11 mitigation measures and adaptive management and monitoring, CM12 would be available to  
12 address the uncertainty of methylmercury levels resulting from restored tidal marsh in the study  
13 area.

14 **NEPA Effects:** Noise and visual disturbances would not have an adverse effect on Suisun song  
15 sparrow with the implementation of *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's*  
16 *Vireo, Western Yellow-Billed Cuckoo*. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting*  
17 *Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to address adverse effects of  
18 noise and visual disturbance on saltmarsh common yellowthroat. AMM1–AMM7, including *AMM2*  
19 *Construction Best Management Practices and Monitoring*, would minimize the likelihood of spills, and  
20 ensure that measures were in place to prevent runoff from the construction area and to avoid  
21 negative effects of dust on the species. Implementation of Operational Scenario A, including  
22 operation of salinity-control gates, and tidal habitat restoration would be expected to increase water  
23 salinity in Suisun Marsh, which would be expected to establish tidal marsh similar to historic  
24 conditions. Tidal habitat restoration is unlikely to have a substantial impact on Suisun song sparrow  
25 and saltmarsh common yellowthroat through increased exposure to methylmercury, as these  
26 species currently reside in tidal marshes where elevated methylmercury levels exist. However, it is  
27 unknown what concentrations of methylmercury are harmful to the species and the potential for  
28 increased exposure varies substantially within the study area. Site-specific restoration plans in  
29 addition to monitoring and adaptive management, described in *CM12 Methylmercury Management*,  
30 would address the uncertainty of methylmercury levels in restored tidal marsh. The site-specific  
31 planning phase of marsh restoration would be the appropriate place to assess the potential for risk  
32 of methylmercury exposure for these species, once site specific sampling and other information  
33 could be developed.

34 **CEQA Conclusion:** Impacts of noise, the potential for hazardous spills, increased dust and  
35 sedimentation, and operations and maintenance of the water conveyance facilities would be less  
36 than significant with the implementation of *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat,*  
37 *Least Bell's Vireo, Western Yellow-Billed Cuckoo*, Mitigation Measure BIO-75, *Conduct Preconstruction*  
38 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, and *AMM2 Construction Best*  
39 *Management Practices and Monitoring*. Changes in salinity gradients would be expected to have a  
40 beneficial impact on Suisun song sparrow and saltmarsh common yellowthroat through the  
41 establishment of tidal marsh similar to historic conditions. The implementation of tidal natural  
42 communities restoration (CM4) is unlikely to significantly increase the exposure of methylmercury  
43 to Suisun song sparrow or saltmarsh common yellowthroat, as they currently reside in tidal  
44 marshes where elevated methylmercury levels exist. However, it is unknown what concentrations of  
45 methylmercury are harmful to these species. Sites-specific restoration plans that address the  
46 creation and mobilization of mercury, as well as monitoring and adaptive management as described

1 in *CM12 Methylmercury Management*, would better inform potential impacts and address the  
2 uncertainty of methylmercury levels in restored tidal marsh in the study area. With these additional  
3 avoidance and minimization measures, Mitigation Measure BIO-75, and CM12, indirect effects of  
4 Plan implementation would have a less-than-significant impact on Suisun song sparrow and  
5 saltmarsh common yellowthroat.

6 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**  
7 **Disturbance of Nesting Birds**

8 See Mitigation Measure BIO-75 under Impact BIO-75.

9 **Impact BIO-82: Effects on Suisun Song Sparrow and Saltmarsh Common Yellowthroat**  
10 **Associated with Electrical Transmission Facilities**

11 The range of the Suisun song sparrow extends eastward into the study area to approximately  
12 Kimball Island. There are several reported occurrences from Kimball Island, Browns Island, and in  
13 the Suisun Marsh in the western portion of the study area. The easternmost range of the saltmarsh  
14 common yellowthroat also ends in Suisun Marsh. These species ranges, along with areas of suitable  
15 habitat, are far from the proposed transmission line routes (BDCP Appendix 5.J, Attachment5J.C,  
16 *Analysis of Potential Bird Collisions at Proposed BDCP Transmission Lines*). Location of the current  
17 populations, species ranges, and suitable habitat in the plan area make collision with the proposed  
18 transmission lines highly unlikely. Therefore the construction and presence of new transmission  
19 lines would not have an adverse effect on Suisun song sparrow and saltmarsh common  
20 yellowthroat.

21 **NEPA Effects:** The construction and presence of new transmission lines would not have an adverse  
22 effect on Suisun song sparrow and saltmarsh common yellowthroat because the location of the  
23 current populations, species ranges, and suitable habitat for the species make collision with the  
24 proposed transmission lines highly unlikely.

25 **CEQA Conclusion:** The construction and presence of new transmission lines would have a less-than-  
26 significant impact on Suisun song sparrow and saltmarsh common yellowthroat because the  
27 location of the current populations, species ranges, and suitable habitat for the species make  
28 collision with the proposed transmission lines highly unlikely.

29 **Swainson's Hawk**

30 This section describes the effects of Alternative 1C, including water conveyance facilities  
31 construction and implementation of other conservation components, on Swainson's hawk. The  
32 habitat model used to assess impacts on Swainson's hawk includes plant alliances and land cover  
33 types associated with Swainson's hawk nesting and foraging habitat. Construction and restoration  
34 associated with Alternative 1C conservation measures would result in both temporary and  
35 permanent losses of Swainson's hawk modeled habitat as indicated in Table 12-1C-35. The majority  
36 of the losses would take place over an extended period of time as tidal marsh is restored in the study  
37 area. Although protection and restoration for the loss of nesting and foraging habitat would be  
38 initiated in the same timeframe as the losses, it could take one or more decades (for nesting habitat)  
39 for restored habitats to replace the functions of habitat lost. This time lag between impacts and  
40 restoration of habitat function would be minimized through specific requirements of *AMM18*  
41 *Swainson's Hawk and White-Tailed Kite*, including transplanting mature trees in the near-term time  
42 period. Full implementation of Alternative 1C would also include the following conservation actions

1 over the term of the BDCP to benefit the Swainson's hawk (BDCP Chapter 3, Section 3.3, *Biological*  
2 *Goals and Objectives*).

- 3 ● Restore or create at least 5,000 acres of valley/foothill riparian natural community, with at least  
4 3,000 acres occurring on restored seasonally inundated floodplain (Objective VFRNC1.1,  
5 associated with CM7)
- 6 ● Protect at least 750 acres of existing valley/foothill riparian natural community in CZ 7 by year  
7 10 (Objective VFRNC1.2, associated with CM3).
- 8 ● Plant and maintain native trees along roadsides and field borders within protected cultivated  
9 lands at a rate of one tree per 10 acres (Objective SH2.1, associated with CM3 and CM11).
- 10 ● Establish 20- to 30- foot-wide hedgerows along fields and roadsides to promote prey  
11 populations throughout protected cultivated lands (Objective SH2.2, associated with CM3 and  
12 CM11).
- 13 ● Increase prey abundance and accessibility for grassland-foraging species (Objectives ASWNC2.4,  
14 VPNC2.5, and GNC2.4, associated with CM11).
- 15 ● Conserve at least 1 acre of Swainson's hawk foraging habitat for each acre of lost foraging  
16 habitat (Objective SH1.1, associated with CM3).
- 17 ● Protect at least 42,275 acres of cultivated lands as Swainson's hawk foraging habitat with at  
18 least 50% in very high-value habitat in CZs 2, 3, 4, 5, 7, 8, 9, and 11 (Objective SH1.2, associated  
19 with CM3).
- 20 ● Of the at least 42,275 acres of cultivated lands protected as Swainson's hawk foraging habitat  
21 under Objective SH1.2, up to 1,500 acres can occur in CZs 5 and 6, and must have land surface  
22 elevations greater than -1 foot NAVD88 (Objective SH1.3, associated with CM3).
- 23 ● Protect at least 10,750 acres of grassland, vernal pool, and alkali seasonal wetland as Swainson's  
24 hawk foraging habitat (Objective SH1.4, associated with CM3).
- 25 ● Protect and enhance at least 8,100 acres of managed wetland, at least 1,500 acres of which are  
26 in the Grizzly Island Marsh Complex (Objective MWNC1.1, associated with CM3).
- 27 ● Maintain and protect the small patches of important wildlife habitats associated with cultivated  
28 lands within the reserve system including isolated valley oak trees, trees and shrubs along field  
29 borders and roadsides, remnant groves, riparian corridors, water conveyance channels,  
30 grasslands, ponds, and wetlands (Objective CLNC1.3, associated with CM3).

31 As explained below, with the restoration or protection of these amounts of habitat, in addition to  
32 management activities that would enhance these natural communities for the species and the  
33 implementation of AMM1-AMM7 and AMM18 *Swainson's Hawk and White-Tailed Kite*, impacts on  
34 Swainson's hawk would not be adverse for NEPA purposes and would be less than significant for  
35 CEQA purposes.

1 **Table 12-1C-35. Changes in Swainson’s Hawk Modeled Habitat Associated with Alternative 1C**  
2 **(acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	Breeding	32	32	64	64	NA	NA
	Foraging	4,920	4,920	6,895	6,895	NA	NA
<b>Total Impacts CM1</b>		<b>4,952</b>	<b>4,952</b>	<b>6,959</b>	<b>6,959</b>	<b>NA</b>	<b>NA</b>
CM2–CM18	Breeding	252	412	54	85	41–70	189
	Foraging	8,903	48,511	504	1,540	3,025–6,635	8,008
<b>Total Impacts CM2–CM18</b>		<b>9,155</b>	<b>48,923</b>	<b>558</b>	<b>1,625</b>	<b>3,066–6,705</b>	<b>8,197</b>
<b>Total Breeding</b>		<b>284</b>	<b>444</b>	<b>118</b>	<b>149</b>		189
<b>Total Foraging</b>		<b>13,823</b>	<b>53,431</b>	<b>7,399</b>	<b>8,435</b>		8,008
<b>TOTAL IMPACTS</b>		<b>14,107</b>	<b>53,875</b>	<b>7517</b>	<b>8584</b>		<b>8,197</b>

<sup>a</sup> See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-83: Loss or Conversion of Habitat for and Direct Mortality of Swainson’s Hawk**

5 Alternative 1C conservation measures would result in the combined permanent and temporary loss  
6 of up to 62,459 acres of modeled habitat (593 acres of nesting habitat and 61,866 acres of foraging  
7 habitat) for Swainson’s hawk (Table 12-1C-35). Conservation measures that would result in these  
8 losses are conveyance facilities and transmission line construction, and establishment and use of  
9 borrow and spoil areas (CM1), Yolo Bypass fisheries improvements (CM2), tidal habitat restoration  
10 (CM4), floodplain restoration (CM5), riparian habitat restoration, (CM7), grassland restoration  
11 (CM8), vernal pool and wetland restoration (CM9), nontidal marsh restoration (CM10), and  
12 construction of conservation hatcheries (CM18). Habitat enhancement and management activities  
13 (CM11), which include ground disturbance or removal of nonnative vegetation, could result in local  
14 habitat effects. In addition, maintenance activities associated with the long-term operation of the  
15 water conveyance facilities and other BDCP physical facilities could affect Swainson’s hawk modeled  
16 habitat. Each of these individual activities is described below. A summary statement of the combined  
17 impacts and NEPA effects, and a CEQA conclusion follow the individual conservation measure  
18 discussions.

- 19 • *CM1 Water Facilities and Operation*: Construction of Alternative 1C water conveyance facilities  
20 would result in the combined permanent and temporary loss of up to 96 acres of Swainson’s  
21 hawk nesting habitat (32 acres of permanent loss habitat and 64 acres of temporary loss). Most

1 of the permanent loss of nesting habitat would occur where Intakes 1–5 impact the Sacramento  
 2 River’s west bank between just north of Clarksburg and Courtland. The riparian areas here are  
 3 very small patches, dominated by valley oak, scrub vegetation, and nonnative trees. In addition,  
 4 11,815 acres of foraging habitat would be removed (4,920 acres of permanent loss, 6,895 acres  
 5 of temporary loss; Table 12-1C-35). The permanent losses of foraging habitat would occur at  
 6 various locations along the western canal route, at the intake sites along the Sacramento River,  
 7 construction of the new forebay, and associated RTM storage areas. Both temporary and  
 8 permanent losses of foraging habitat would occur from the transmission line corridors west of  
 9 the study area and along the tunnel alignment in the west Delta. Temporary losses would occur  
 10 from siphon construction areas, safe haven work areas, railroad work areas, and potential  
 11 borrow and spoil sites along the canal alignment. habitat impacts from CM1 would include the  
 12 permanent loss of 1,012 acres and the temporary loss of 1,256 acres of very high-value habitat  
 13 (alfalfa; Table 12-1C-36). Refer to the Terrestrial Biology Map Book for a detailed view of  
 14 Alternative 1C construction locations. The CM1 construction footprint overlaps with 20  
 15 Swainson’s hawk occurrences in the study area. Eight occurrences overlap with permanent  
 16 impacts from the construction of the canal, the permanent transmission line, intakes, shafts and  
 17 siphons. In addition, twelve occurrences overlap with temporary impacts from work areas and  
 18 the temporary transmission line alignment. The implementation of *AMM18 Swainson’s Hawk and*  
 19 *White-Tailed Kite*, would require preconstruction surveys and the establishment of no-  
 20 disturbance buffers and would minimize potential effects on nesting Swainson’s hawks present  
 21 within or adjacent to construction areas. Impacts from CM1 would occur within the first 10  
 22 years of Alternative 1C implementation.

23 **Table 12-1C-36. Acres of Impacted Swainson’s Hawk Foraging Habitat by Value Classes**

Foraging Habitat Value Class	Cultivated Land and Other Land Cover Types	CM1 Permanent (temporary)	CM2-18 permanent (temporary)
Very high	Alfalfa hay	1,012 (1,256)	12,002 (345)
Moderate	Irrigated pasture, other hay crops	2,128 (3,444)	24,865 (642)
Low	Other irrigated field and truck/berry crops	258 (554)	5,911 (313)
Very low	Safflower, sunflower, corn, grain sorghum	1,522 (1,641)	5,732 (241)

- 24
- 25 ● *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo bypass fisheries enhancement  
 26 would result in the combined permanent and temporary loss of up to 133 acres of nesting  
 27 habitat (79 acres of permanent loss, 54 acres of temporary loss) in the Yolo Bypass in CZ 2. In  
 28 addition, 1,500 acres of foraging habitat would be removed (996 acres of permanent loss, 554  
 29 acres of temporary loss). Activities through CM2 could involve excavation and grading in  
 30 valley/foothill riparian areas to improve passage of fish through the bypasses. Most of the  
 31 riparian losses would occur at the north end of Yolo Bypass where major fish passage  
 32 improvements are planned. Excavation to improve water movement in the Toe Drain and in the  
 33 Sacramento Weir would also remove Swainson’s hawk habitat. The loss is expected to occur  
 34 during the first 10 years of Alternative 1C implementation.
  - 35 ● *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and  
 36 inundation would permanently remove an estimated 295 acres of Swainson’s hawk nesting

1 habitat and 37,359 acres of foraging habitat. The majority of the acres lost would consist of  
 2 cultivated lands in CZs 1, 2, 4, 5, 6, and/or 7. Grassland losses would likely occur in the vicinity  
 3 of Cache Slough, on Decker Island in the West Delta ROA, on the upslope fringes of Suisun Marsh,  
 4 and along narrow bands adjacent to waterways in the South Delta ROA. Tidal restoration would  
 5 directly impact and fragment grassland just north of Rio Vista in and around French and  
 6 Prospect Islands, and in an area south of Rio Vista around Threemile Slough. Losses of alkali  
 7 seasonal wetland complex habitat would likely occur in the south end of the Yolo Bypass and on  
 8 the northern fringes of Suisun Marsh. Impacts on foraging habitat from CM4 would consist of  
 9 10,757 acres of very high-value (alfalfa), 18,565 acres of moderate-value, and 4,098 acres of  
 10 low-value habitat (See Table 12-4-36 for land cover types classified by habitat value). Because  
 11 the species is highly mobile and wide-ranging, habitat fragmentation is not expected to reduce  
 12 the use of remaining cultivated lands or preclude access to surrounding lands. However, the  
 13 conversion of cultivated lands to tidal wetlands over fairly broad areas within the tidal  
 14 restoration footprints could result in the removal or abandonment of nesting territories that  
 15 occur within or adjacent to the restoration areas. Trees would not be actively removed but tree  
 16 mortality would be expected over time as areas became tidally inundated. Depending on the  
 17 extent and value of remaining habitat, this could reduce the local nesting population. There are  
 18 at least 27 Swainson's hawk nest sites that overlap with the hypothetical restoration areas for  
 19 CM4, suggesting that numerous nest sites could be directly affected by inundation from tidal  
 20 restoration activities.

- 21 ● *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore  
 22 seasonally inundated floodplain and riparian restoration actions would remove approximately  
 23 69 acres of Swainson's hawk nesting habitat (38 acres of permanent loss, 31 acres of temporary  
 24 loss) and 2,856 acres of foraging habitat (1,820 acres of permanent loss, 1,036 acres of  
 25 temporary loss). These losses would be expected after the first 10 years of Alternative 1C  
 26 implementation along the San Joaquin River and other major waterways in CZ 7.
- 27 ● *CM7 Riparian Natural Community Restoration*: Riparian restoration would permanently remove  
 28 approximately 953 acres of Swainson's hawk foraging habitat as part of tidal restoration and  
 29 3,991 acres as part of seasonal floodplain restoration through CM7. There are at least 27  
 30 Swainson's hawk nest sites that overlap with the hypothetical restoration areas for CM7.
- 31 ● *CM8 Grassland Natural Community Restoration*: Restoration of grassland is expected to be  
 32 implemented on agricultural lands and would result in the conversion of 1,849 acres of  
 33 Swainson's hawk agricultural foraging habitat to grassland foraging habitat in CZs 1, 2, 4, 5, 7, 8,  
 34 and 11. If agricultural lands supporting higher value foraging habitat than the restored  
 35 grassland were removed, there would be a loss of Swainson's hawk foraging habitat value.
- 36 ● *CM10 Nontidal Marsh Restoration*: Restoration and creation of nontidal freshwater marsh would  
 37 result in the permanent removal of 1,440 acres of Swainson's hawk foraging habitat in CZ 2 and  
 38 CZ 4. Small patches of riparian vegetation that support Swainson's hawk nesting habitat may  
 39 develop along the margins of restored nontidal marsh if appropriate site conditions are present.
- 40 ● *CM11 Natural Communities Enhancement and Management*: Habitat management- and  
 41 enhancement-related activities could disturb Swainson's hawk nests if they were present near  
 42 work sites. A variety of habitat management actions that are designed to enhance wildlife values  
 43 in BDCP-protected habitats may result in localized ground disturbances that could temporarily  
 44 remove small amounts of Swainson's hawk habitat and reduce the functions of habitat until  
 45 restoration is complete. Ground-disturbing activities, such as removal of nonnative vegetation

1 and road and other infrastructure maintenance, are expected to have minor effects on available  
2 Swainson's hawk habitat and are expected to result in overall improvements to and  
3 maintenance of habitat values over the term of the BDCP. These effects cannot be quantified, but  
4 are expected to be minimal and would be avoided and minimized by the AMMs listed below.  
5 CM11 would also include the construction of recreational-related facilities including trails,  
6 interpretive signs, and picnic tables (BDCP Chapter 4, *Covered Activities and Associated Federal*  
7 *Actions*). The construction of trailhead facilities, signs, staging areas, picnic areas, bathrooms,  
8 etc. would be placed on existing, disturbed areas when and where possible. However,  
9 approximately 50 acres of Swainson's hawk grassland foraging habitat would be lost from the  
10 construction of trails and facilities.

- 11 • *CM18 Conservation Hatcheries*: Implementation of CM18 would remove up to 35 acres of  
12 Swainson's hawk foraging habitat for the development of a delta and longfin smelt conservation  
13 hatchery in CZ 1. The loss is expected to occur during the first 10 years of Plan implementation.

14 Permanent and temporary nesting habitat losses from the above conservation measures, would  
15 primarily consist of small, fragmented riparian stands. Temporarily affected nesting habitat  
16 would be restored as riparian habitat within 1 year following completion of construction  
17 activities. The restored riparian habitat would require 1 to several decades to functionally  
18 replace habitat that has been affected and for trees to attain sufficient size and structure suitable  
19 for nesting by Swainson's hawks. *AMM18 Swainson's Hawk and White-Tailed Kite* contains  
20 actions described below to reduce the effect of temporal loss of nesting habitat, including the  
21 transplanting of mature trees and planting of trees near high-value foraging habitat. The  
22 functions of cultivated lands and grassland communities that provide foraging habitat for  
23 Swainson's hawk are expected to be restored relatively quickly.

- 24 • *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground  
25 water conveyance facilities and restoration infrastructure could result in ongoing but periodic  
26 disturbances that could affect Swainson's hawk use of the surrounding habitat. Maintenance  
27 activities would include vegetation management, levee and structure repair, and re-grading of  
28 roads and permanent work areas. These effects, however, would be reduced by AMM1-AMM7  
29 and *AMM18 Swainson's Hawk and White-Tailed Kite* in addition to conservation actions as  
30 described below.

- 31 • *Injury and Direct Mortality*: Construction-related activities would not be expected to result in  
32 direct mortality of adult or fledged Swainson's hawk if they were present in the study area,  
33 because they would be expected to avoid contact with construction and other equipment.  
34 However, if Swainson's hawk were to nest in the construction area, construction-related  
35 activities, including equipment operation, noise and visual disturbances could affect nests or  
36 lead to their abandonment, potentially resulting in mortality of eggs and nestlings. These effects  
37 would be avoided and minimized with the incorporation of *AMM18 Swainson's Hawk and White-*  
38 *Tailed Kite* into the BDCP.

39 The following paragraphs summarize the combined effects discussed above and describe other  
40 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also  
41 included.

#### 42 ***Near-Term Timeframe***

43 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
44 the near-term BDCP conservation strategy has been evaluated to determine whether it would

1 provide sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that  
2 the effect of construction would not be adverse under NEPA. Alternative 1C would remove 402 acres  
3 (284 permanent, 118 temporary) of Swainson's hawk nesting habitat in the study area in the near-  
4 term. These effects would result from the construction of the water conveyance facilities (CM1, 96  
5 acres), and implementing other conservation measures (*CM2 Yolo Bypass Fisheries Enhancement*,  
6 *CM4 Tidal Natural Communities Restoration*, and *CM5 Seasonally Inundated Floodplain Restoration*,  
7 *CM7 Riparian Natural Community Restoration*—306 acres). In addition, 21,222 acres of Swainson's  
8 hawk foraging habitat would be removed or converted in the near-term (CM1, 11,815 acres; *CM2*  
9 *Yolo Bypass Fisheries Enhancement*, *CM4 Tidal Natural Communities Restoration*, *CM5, Seasonally*  
10 *Inundated Floodplain Restoration*, *CM7 Riparian Natural Community Restoration*, *CM8 Grassland*  
11 *Natural Community Restoration*, *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*,  
12 *CM11 Natural Communities Enhancement and Management* and *CM18 Conservation Hatcheries*—  
13 9,407 acres).

14 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected and  
15 those that are identified in the biological goals and objectives for Swainson's hawk in Chapter 3 of  
16 the BDCP would be 1:1 for restoration/creation and 1:1 protection of valley/foothill riparian habitat  
17 for nesting habitat, and 1:1 protection for foraging habitat. Using these ratios would indicate that 96  
18 acres of nesting habitat should be restored/ created and 96 acres should be protected to  
19 compensate for the CM1 losses of Swainson's hawk nesting habitat. In addition, 11,815 acres of  
20 foraging habitat should be protected to mitigate the CM1 losses of Swainson's hawk foraging habitat.  
21 The near-term effects of other conservation actions would remove 306 acres of modeled nesting  
22 habitat, and therefore require 306 acres of restoration and 306 acres of protection of nesting  
23 habitat. Similarly, the near-term effects of other conservation actions would remove 9,407 acres of  
24 modeled foraging habitat, and therefore require 9,407 acres of protection of foraging habitat using  
25 the same typical NEPA and CEQA ratios (1:1 restoration and 1:1 protection for the loss of nesting  
26 habitat; 1:1 protection for the loss of foraging habitat).

27 The BDCP has committed to near-term goals of protecting 750 acres and restoring 800 acres of  
28 valley/foothill riparian natural community, protecting 2,000 acres and restoring 1,140 acres of  
29 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of  
30 alkali seasonal wetland complex, protecting 4,800 acres of managed wetland natural community,  
31 and protecting 15,400 acres of non-rice cultivated lands (Table 3-4 in Chapter 3, *Description of*  
32 *Alternatives*). These conservation actions are associated with CM3, CM5, CM7, and CM8, and would  
33 occur in the same timeframe as the construction and early restoration losses.

34 The majority of riparian protection and restoration acres would occur in CZ 7 as part of a reserve  
35 system with extensive wide bands or large patches of valley/foothill riparian natural community  
36 (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*). Riparian  
37 restoration would expand the patches of existing riparian forest in order to support nesting habitat  
38 for the species. The distribution and abundance of potential Swainson's hawk nest trees would be  
39 increased by planting and maintaining native trees along roadsides and field borders within  
40 protected cultivated lands at a rate of one tree per 10 acres (Objective SWHA2.1). In addition, small  
41 but essential nesting habitat for Swainson's hawk associated with cultivated lands would also be  
42 maintained and protected such as isolated trees, tree rows along field borders or roads, or small  
43 clusters of trees in farmyards or at rural residences (Objective CLNC1.3).

44 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1  
45 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali

1 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous  
2 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would  
3 provide foraging habitat for Swainson's hawk and reduce the effects of current levels of habitat  
4 fragmentation. Small mammal populations would also be increased on protected lands, enhancing  
5 the foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4).  
6 Foraging opportunities would also be improved by enhancing prey populations through the  
7 establishment of 20- to 30-foot-wide hedgerows along field borders and roadsides within protected  
8 cultivated lands (Objective SWHA2.2). Remnant patches of grassland or other uncultivated areas  
9 would also be protected and maintained as part of the cultivated lands reserve system which would  
10 provide additional foraging habitat and a source of rodent prey that could recolonize cultivated  
11 fields (Objective CLNC1.3). The protection of managed wetlands (including upland grassland  
12 components) that dry during the spring would also serve as foraging habitat for Swainson's hawks  
13 as prey species recolonize the fields (Objective MWNC1.1). These biological goals and objectives  
14 would inform the near-term protection and restoration efforts and represent performance  
15 standards for considering the effectiveness of restoration actions. At least 15,400 acres of cultivated  
16 lands that provide habitat for covered and other native wildlife species would be protected in the  
17 near-term time period (Objective CLNC1.1) A minimum of 87% of cultivated lands protected by the  
18 late long-term time period would be in very high- and high-value crop types for Swainson's hawk  
19 (Objective SH1.2). This biological objective provides an estimate for the proportion of cultivated  
20 lands protected in the near-term time period which would provide high-value habitat for Swainson's  
21 hawk. The acres of restoration and protection contained in the near-term Plan goals and the  
22 additional detail in the biological objectives satisfy the typical mitigation that would be applied to  
23 the project-level effects of CM1 on Swainson's hawk foraging habitat, as well as mitigate the near-  
24 term effects of the other conservation measures.

25 The 750 acres of protection and 800 acres of restoration contained in the near-term Plan goals  
26 satisfy the typical mitigation ratios that would be applied to the project-level effects of CM1 and  
27 other near-term impacts on Swainson's hawk nesting habitat. The 800 acres of restored riparian  
28 habitat would be initiated in the near-term to offset the loss of modeled nesting habitat, but would  
29 require one to several decades to functionally replace habitat that has been affected and for trees to  
30 attain sufficient size and structure suitable for nesting by Swainson's hawks. This time lag between  
31 the removal and restoration of nesting habitat could have a substantial impact on Swainson's hawk  
32 in the near-term time period. Nesting habitat is limited throughout much of the Plan Area, consisting  
33 mainly of intermittent riparian, isolated trees, small groves, tree rows along field borders, roadside  
34 trees, and ornamental trees near rural residences. The removal of nest trees or nesting habitat  
35 would further reduce this limited resource and could reduce or restrict the number of active  
36 Swainson's hawk nests within the Plan Area until restored riparian habitat is sufficiently developed.

37 *AMM18 Swainson's hawk and White-Tailed Kite* would implement a program to plant large mature  
38 trees, including transplanting trees scheduled for removal. These would be supplemented with  
39 additional saplings and would be expected to reduce the temporal effects of loss of nesting habitat.  
40 The plantings would occur prior to or concurrent with (in the case of transplanting) the loss of trees.  
41 In addition, at least five trees (5-gallon container size) would be planted within the BDCP reserve  
42 system for every tree anticipated to be removed by construction during the near-term period that  
43 was suitable for nesting by Swainson's hawks (20 feet or taller). A variety of native tree species  
44 would be planted to provide trees with differing growth rates, maturation, and life span. Trees  
45 would be planted within the BDCP reserve system in areas that support high value foraging habitat  
46 in clumps of at least 3 trees each at appropriate sites within or adjacent to conserved cultivated

1 lands, or they could be incorporated as a component of the riparian restoration (CM5, CM7) where  
2 they are in close proximity to suitable foraging habitat. Replacement trees that were incorporated  
3 into the riparian restoration would not be clustered in a single region of the study area, but would  
4 be distributed throughout the lands protected as foraging habitat for Swainson's hawk.

5 To enhance Swainson's hawk and reproductive output until the replacement nest trees become  
6 suitable for nesting, 100 acres of high-value foraging habitat (alfalfa rotation) would be protected in  
7 the near-term for each potential nest site removed (a nest site is defined as a 125-acre block in  
8 which more than 50% of nest trees are 20 feet or greater in height) as a result of construction  
9 activity during the near-term. The foraging habitat to be protected would be within 6 kilometers of  
10 the removed tree within an otherwise suitable foraging landscape and on land not subject to threat  
11 of seasonal flooding, construction disturbances, or other conditions that would reduce the foraging  
12 value of the land. With this program in place, Alternative 1C would not have a substantial adverse  
13 effect on Swainson's hawk in the near-term timeframe, either through direct mortality or through  
14 habitat modifications.

15 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
16 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
17 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
18 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
19 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
20 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
21 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

### 22 **Late Long-Term Timeframe**

23 The study area supports approximately 9,796 acres of modeled nesting habitat and 477,879 acres of  
24 modeled foraging habitat for Swainson's hawk. Alternative 1C as a whole would result in the  
25 permanent loss of and temporary effects on 593 acres of potential nesting habitat (6% of the  
26 potential nesting habitat in the study area) and 61,866 acres of foraging habitat (13% of the foraging  
27 habitat in the study area).

28 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*  
29 *Restoration*, *CM5 Seasonally Inundated Floodplain Restoration*, *CM7 Riparian Natural Community*  
30 *Restoration*, and *CM8 Grassland Natural Community Restoration* to restore or create at least 5,000  
31 acres and protect at least 750 acres of valley/foothill riparian natural community, protect 8,000  
32 acres and restore 2,000 acres of grassland natural community, protect 600 acres of vernal pool  
33 complex, protect 150 acres of alkali seasonal wetland complex, protect 8,100 acres of managed  
34 wetland, and protect 48,625 acres of cultivated lands that provide suitable habitat for native wildlife  
35 species (Table 3-4 in Chapter 3, *Description of Alternatives*).

36 The majority of riparian protection and restoration acres would occur in CZ 7 as part of a reserve  
37 system with extensive wide bands or large patches of valley/foothill riparian natural community  
38 (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*). Riparian  
39 restoration would expand the patches of existing riparian forest in order to support nesting habitat  
40 for the species. The distribution and abundance of potential Swainson's hawk nest trees would be  
41 increased by planting and maintaining native trees along roadsides and field borders within  
42 protected cultivated lands at a rate of one tree per 10 acres (Objective SH2.1). In addition, small but  
43 essential nesting habitat for Swainson's hawk associated with cultivated lands would also be

1 maintained and protected such as isolated trees, tree rows along field borders or roads, or small  
2 clusters of trees in farmyards or at rural residences (Objective CLNC1.3).

3 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1  
4 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali  
5 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous  
6 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would  
7 provide foraging habitat for Swainson's hawk and reduce the effects of current levels of habitat  
8 fragmentation. Small mammal populations would also be increased on protected lands, enhancing  
9 the foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4).  
10 Foraging opportunities would also be improved by enhancing prey populations through the  
11 establishment of 20- to 30-foot-wide hedgerows along field borders and roadsides within protected  
12 cultivated lands (Objective SH2.2). Remnant patches of grassland or other uncultivated areas would  
13 also be protected and maintained as part of the cultivated lands reserve system which would  
14 provide additional foraging habitat and a source of rodent prey that could recolonize cultivated  
15 fields (Objective CLNC1.3). The protection of managed wetlands (including upland grassland  
16 components) that dry during the spring would also serve as foraging habitat for Swainson's hawks  
17 as prey species recolonize the fields (Objective MWNC1.1). These biological goals and objectives  
18 would inform the near-term protection and restoration efforts and represent performance  
19 standards for considering the effectiveness of restoration actions. Foraging habitat would be  
20 conserved at a ratio of 1:1 (Objective SH1.1) and at least 42,275 acres of cultivated lands that  
21 provide Swainson's hawk foraging habitat would be protected by the late long-term, 50% of which  
22 would be in very high-value habitat production in CZs 1-4, 7- 9, and 11 (Objective SH1.2).

23 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
24 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
25 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
26 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
27 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
28 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
29 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

30 **NEPA Effects:** The loss of Swainson's hawk habitat and potential for direct mortality of this special-  
31 status species under Alternative 1C would represent an adverse effect in the absence of other  
32 conservation actions. With habitat protection and restoration associated with CM3, CM5, CM7, CM8,  
33 CM9, and CM11, guided by biological goals and objectives and by AMM1-AMM7 and *AMM18*  
34 *Swainson's Hawk and White-Tailed Kite*, which would be in place throughout the construction period,  
35 the effects of habitat loss and potential mortality on Swainson's hawk under Alternative 1C would  
36 not be adverse.

### 37 **CEQA Conclusion:**

#### 38 **Near-Term Timeframe**

39 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
40 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
41 provide sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that  
42 the effect of construction would be less than significant under CEQA. Alternative 1C would remove  
43 402 acres (284 permanent, 118 temporary) of Swainson's hawk nesting habitat in the study area in  
44 the near-term. These effects would result from the construction of the water conveyance facilities

1 (CM1, 96 acres), and implementing other conservation measures (CM2 Yolo Bypass Fisheries  
2 Enhancement, CM4 Tidal Natural Communities Restoration, and CM5 Seasonally Inundated Floodplain  
3 Restoration, CM7 Riparian Natural Community Restoration—306 acres). In addition, 21,222 acres of  
4 Swainson's hawk foraging habitat would be removed or converted in the near-term (CM1, 11,815  
5 acres; CM2 Yolo Bypass Fisheries Enhancement, CM4 Tidal Natural Communities Restoration, CM5  
6 Seasonally Inundated Floodplain Restoration, CM7 Riparian Natural Community Restoration, CM8  
7 Grassland Natural Community Restoration, CM9 Vernal Pool and Alkali Seasonal Wetland Complex  
8 Restoration, CM11 Natural Communities Enhancement and Management and CM18 Conservation  
9 Hatcheries—9,407 acres).

10 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected and  
11 those that are identified in the biological goals and objectives for Swainson's hawk in Chapter 3 of  
12 the BDCP would be 1:1 for restoration/creation and 1:1 protection of valley/foothill riparian habitat  
13 for nesting habitat, and 1:1 protection for foraging habitat. Using these ratios would indicate that 96  
14 acres of nesting habitat should be restored/ created and 96 acres should be protected to  
15 compensate for the CM1 losses of Swainson's hawk nesting habitat. In addition, 11,815 acres of  
16 foraging habitat should be protected to mitigate the CM1 losses of Swainson's hawk foraging habitat.  
17 The near-term effects of other conservation actions would remove 306 acres of modeled nesting  
18 habitat, and therefore require 306 acres of restoration and 306 acres of protection of nesting  
19 habitat. Similarly, the near-term effects of other conservation actions would remove 9,407 acres of  
20 modeled foraging habitat, and therefore require 9,407 acres of protection of foraging habitat using  
21 the same typical NEPA and CEQA ratios (1:1 restoration and 1:1 protection for the loss of nesting  
22 habitat; 1:1 protection for the loss of foraging habitat).

23 The BDCP has committed to near-term goals of protecting 750 acres and restoring 800 acres of  
24 valley/foothill riparian natural community, protecting 2,000 acres and restoring 1,140 acres of  
25 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of  
26 alkali seasonal wetland complex, protecting 4,800 acres of managed wetland natural community,  
27 and protecting 15,400 acres of non-rice cultivated lands (Table 3-4 in Chapter 3, *Description of*  
28 *Alternatives*). These conservation actions are associated with CM3, CM5, CM7, and CM8, and would  
29 occur in the same timeframe as the construction and early restoration losses.

30 The majority of riparian protection and restoration acres would occur in CZ 7 as part of a reserve  
31 system with extensive wide bands or large patches of valley/foothill riparian natural community  
32 (Objectives VFRNC1.1 and VFRNC1.2, BDCP Chapter 3, *Conservation Strategy*). Riparian restoration  
33 would expand the patches of existing riparian forest in order to support nesting habitat for the  
34 species. The distribution and abundance of potential Swainson's hawk nest trees would be increased  
35 by planting and maintaining native trees along roadsides and field borders within protected  
36 cultivated lands at a rate of one tree per 10 acres (Objective SWHA2.1). In addition, small but  
37 essential nesting habitat for Swainson's hawk associated with cultivated lands would also be  
38 maintained and protected such as isolated trees, tree rows along field borders or roads, or small  
39 clusters of trees in farmyards or at rural residences (Objective CLNC1.3).

40 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1  
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42 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous  
43 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would  
44 provide foraging habitat for Swainson's hawk and reduce the effects of current levels of habitat  
45 fragmentation. Small mammal populations would also be increased on protected lands, enhancing

1 the foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4).  
2 Foraging opportunities would also be improved by enhancing prey populations through the  
3 establishment of 20- to 30-foot-wide hedgerows along field borders and roadsides within protected  
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8 components) that dry during the spring would also serve as foraging habitat for Swainson's hawks  
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10 would inform the near-term protection and restoration efforts and represent performance  
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12 lands that provide habitat for covered and other native wildlife species would be protected in the  
13 near-term time period (Objective CLNC1.1) A minimum of 87% of cultivated lands protected by the  
14 late long-term time period would be in very high- and high-value crop types for Swainson's hawk  
15 (Objective SH1.2). This biological objective provides an estimate for the proportion of cultivated  
16 lands protected in the near-term time period which would provide high-value habitat for Swainson's  
17 hawk. The acres of restoration and protection contained in the near-term Plan goals and the  
18 additional detail in the biological objectives satisfy the typical mitigation that would be applied to  
19 the project-level effects of CM1 on Swainson's hawk foraging habitat, as well as mitigate the near-  
20 term effects of the other conservation measures.

21 The 750 acres of protection and 800 acres of restoration contained in the near-term Plan goals  
22 satisfy the typical mitigation ratios that would be applied to the project-level effects of CM1 and  
23 other near-term impacts on Swainson's hawk nesting habitat. The 800 acres of restored riparian  
24 habitat would be initiated in the near-term to offset the loss of modeled nesting habitat, but would  
25 require one to several decades to functionally replace habitat that has been affected and for trees to  
26 attain sufficient size and structure suitable for nesting by Swainson's hawks. This time lag between  
27 the removal and restoration of nesting habitat could have a substantial impact on Swainson's hawk  
28 in the near-term time period. Nesting habitat is limited throughout much of the Plan Area, consisting  
29 mainly of intermittent riparian, isolated trees, small groves, tree rows along field borders, roadside  
30 trees, and ornamental trees near rural residences. The removal of nest trees or nesting habitat  
31 would further reduce this limited resource and could reduce or restrict the number of active  
32 Swainson's hawk within the Plan Area until restored riparian habitat is sufficiently developed.

33 *AMM18 Swainson's hawk and White-Tailed Kite* would implement a program to plant large mature  
34 trees, including transplanting trees scheduled for removal. These would be supplemented with  
35 additional saplings and would be expected to reduce the temporal effects of loss of nesting habitat.  
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38 system for every tree anticipated to be removed by construction during the near-term period that  
39 was suitable for nesting by Swainson's hawks (20 feet or taller). A variety of native tree species  
40 would be planted to provide trees with differing growth rates, maturation, and life span. Trees  
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43 lands, or they may be incorporated as a component of the riparian restoration (CM5, CM7) where  
44 they are in close proximity to suitable foraging habitat. Replacement trees that are incorporated into  
45 the riparian restoration would not be clustered in a single region of the Plan Area, but would be  
46 distributed throughout the lands protected as foraging habitat for Swainson's hawk.

1 To enhance Swainson's hawk reproductive output until the replacement nest trees become suitable  
2 for nesting, 100 acres of high-value foraging habitat (alfalfa rotation) would be protected in the  
3 near-term for each potential nest site removed (a nest site is defined as a 125-acre block in which  
4 more than 50% of nest trees are 20 feet or greater in height) as a result of construction activity  
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7 seasonal flooding, construction disturbances, or other conditions that would reduce the foraging  
8 value of the land. With this program in place, Alternative 1C would not have a substantial adverse  
9 effect on Swainson's hawk in the near-term timeframe, either through direct mortality or through  
10 habitat modifications.

11 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
12 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
13 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
14 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
15 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
16 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
17 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

### 18 **Late Long-Term Timeframe**

19 The study area supports approximately 9,796 acres of modeled nesting habitat and 477,879 acres of  
20 modeled foraging habitat for Swainson's hawk. Alternative 1C as a whole would result in the  
21 permanent loss of and temporary effects on 593 acres of potential nesting habitat (6% of the  
22 potential nesting habitat in the study area) and 61,866 acres of foraging habitat (13% of the foraging  
23 habitat in the study area).

24 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*  
25 *Restoration*, *CM5 Seasonally Inundated Floodplain Restoration*, *CM7 Riparian Natural Community*  
26 *Restoration*, and *CM8 Grassland Natural Community Restoration* to restore or create at least 5,000  
27 acres and protect at least 750 acres of valley/foothill riparian natural community, protect 8,000  
28 acres and restore 2,000 acres of grassland natural community, protect 600 acres of vernal pool  
29 complex, protect 150 acres of alkali seasonal wetland complex, protect 8,100 acres of managed  
30 wetland, and protect 48,625 acres of cultivated lands that provide suitable habitat for native wildlife  
31 species (Table 3-4 in Chapter 3, *Description of Alternatives*).

32 The majority of riparian protection and restoration acres would occur in CZ 7 as part of a reserve  
33 system with extensive wide bands or large patches of valley/foothill riparian natural community  
34 (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*). Riparian  
35 restoration would expand the patches of existing riparian forest in order to support nesting habitat  
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37 increased by planting and maintaining native trees along roadsides and field borders within  
38 protected cultivated lands at a rate of one tree per 10 acres (Objective SH2.1). In addition, small but  
39 essential nesting habitat for Swainson's hawk associated with cultivated lands would also be  
40 maintained and protected such as isolated trees, tree rows along field borders or roads, or small  
41 clusters of trees in farmyards or at rural residences (Objective CLNC1.3).

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1 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would  
2 provide foraging habitat for Swainson's hawk and reduce the effects of current levels of habitat  
3 fragmentation. Small mammal populations would also be increased on protected lands, enhancing  
4 the foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4).  
5 Foraging opportunities would also be improved by enhancing prey populations through the  
6 establishment of 20- to 30-foot-wide hedgerows along field borders and roadsides within protected  
7 cultivated lands (Objective SH2.2). Remnant patches of grassland or other uncultivated areas would  
8 also be protected and maintained as part of the cultivated lands reserve system which would  
9 provide additional foraging habitat and a source of rodent prey that could recolonize cultivated  
10 fields (Objective CLNC1.3). The protection of managed wetlands (including upland grassland  
11 components) that dry during the spring would also serve as foraging habitat for Swainson's hawks  
12 as prey species recolonize the fields (Objective MWNC1.1). These biological goals and objectives  
13 would inform the near-term protection and restoration efforts and represent performance  
14 standards for considering the effectiveness of restoration actions. Foraging habitat would be  
15 conserved at a ratio of 1:1 (Objective SH1.1) and at least 42,275 acres of cultivated lands that  
16 provide Swainson's hawk foraging habitat would be protected by the late long-term, 50% of which  
17 would be in very high-value habitat production in CZs 1-4, 7-9, and 11 (Objective SH1.2).

18 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
19 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
20 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
21 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
22 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
23 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
24 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

25 Considering Alternative 1C's protection and restoration provisions, which would provide acreages  
26 of new or enhanced habitat in amounts greater than necessary to compensate for the time lag of  
27 restoring riparian and foraging habitats lost to construction and restoration activities, and with  
28 implementation of AMM1-AMM7 and *AMM18 Swainson's Hawk and White-Tailed Kite*, the loss of  
29 habitat or direct mortality through implementation of Alternative 1C would not result in a  
30 substantial adverse effect through habitat modifications and would not substantially reduce the  
31 number or restrict the range of the species. Therefore, the loss of habitat or potential mortality  
32 under this alternative would have a less-than-significant impact on Swainson's hawk.

### 33 **Impact BIO-84: Effects on Swainson's Hawk Associated with Electrical Transmission Facilities**

34 New transmission lines would increase the risk that Swainson's hawks could be subject to power  
35 line strikes, which could result in injury or mortality of Swainson's hawks. This species would be at  
36 low risk of bird strike mortality based on factors assessed in the bird strike vulnerability analysis  
37 (BDCP Attachment 5J.C, *Analysis of Potential Bird Collisions at Proposed BDCP Transmission Lines*).  
38 Factors analyzed include the height of the new transmission lines and the flight behavior of the  
39 species. The existing network of transmission lines in the Plan Area currently poses the same small  
40 risk for Swainson's hawk, and any incremental risk associated with the new power line corridors  
41 would also be expected to be low. *AMM20 Greater Sandhill Crane* would further reduce any potential  
42 effects.

1 **NEPA Effects:** New transmission lines would minimally increase the risk for Swainson's hawk power  
2 line strikes. With the implementation of *AMM20 Greater Sandhill Crane* the potential effect of the  
3 construction of new transmission lines on Swainson's hawk would not be adverse.

4 **CEQA Conclusion:** New transmission lines would minimally increase the risk for Swainson's hawk  
5 power line strikes. *AMM20 Greater Sandhill Crane* would reduce the potential impact of the  
6 construction of new transmission lines on Swainson's hawk to a less-than-significant level.

#### 7 **Impact BIO-85: Indirect Effects of Plan Implementation on Swainson's Hawk**

8 Noise and visual disturbances from the construction of water conveyance facilities and other  
9 conservation measures could reduce Swainson's hawk use of modeled habitat adjacent to work  
10 areas. Construction noise above background noise levels (greater than 50 dBA) could extend 1,900  
11 to 5,250 feet from the edge of construction activities (BDCP Appendix 5.J, Attachment 5J.D, *Indirect*  
12 *Effects of the Construction of the BDCP Conveyance Facility on Sandhill Crane*, Table 4), although there  
13 are no available data to determine the extent to which these noise levels could affect Swainson's  
14 hawk. Moreover, operation and maintenance of the water conveyance facilities, including the  
15 transmission facilities, could result in ongoing but periodic postconstruction disturbances that could  
16 affect Swainson's hawk use of the surrounding habitat. These construction activities would include  
17 water conveyance construction, tidal restoration activities, floodplain restoration, and Fremont  
18 Weir/Yolo Bypass Enhancements. Swainson's hawks are seasonally abundant across much of the  
19 study area wherever adequate nest trees occur within a cultivated landscape that supports suitable  
20 foraging habitat. There would be a potential for noise and visual disturbances associated with BDCP  
21 actions to temporarily displace Swainson's hawks and temporarily reduce the use of suitable habitat  
22 adjacent to construction areas. These adverse effects would be minimized with the implementation  
23 of *AMM18 Swainson's Hawk and White-Tailed Kite*.

24 The use of mechanical equipment during water conveyance facilities construction could cause the  
25 accidental release of petroleum or other contaminants that could affect Swainson's hawk foraging in  
26 the surrounding habitat. The inadvertent discharge of sediment or excessive dust adjacent to  
27 suitable habitat could also have an adverse effect on these species. *AMM2 Construction Best*  
28 *Management Practices and Monitoring* would minimize the likelihood of such spills and ensure that  
29 measures are in place to prevent runoff from the construction area and negative effects of dust on  
30 habitat.

31 **NEPA Effects:** Noise and visual disturbances from the construction of water conveyance facilities  
32 could reduce Swainson's hawk use of modeled habitat adjacent to work areas. Moreover, operation  
33 and maintenance of the water conveyance facilities, including the transmission facilities, could result  
34 in ongoing but periodic postconstruction disturbances that could affect Swainson's hawk use of the  
35 surrounding habitat. The effects of noise, the potential for hazardous spills, increased dust and  
36 sedimentation, and operations and maintenance of the water conveyance facilities would not have  
37 an adverse effect on Swainson's hawk with the implementation of *AMM1-AMM7*, and *AMM18*  
38 *Swainson's Hawk and White-Tailed Kite*.

39 **CEQA Conclusion:** Noise and visual disturbances from the construction of water conveyance  
40 facilities could reduce Swainson's hawk use of modeled habitat adjacent to work areas. Moreover,  
41 operation and maintenance of the water conveyance facilities, including the transmission facilities,  
42 could result in ongoing but periodic postconstruction disturbances that could affect Swainson's  
43 hawk use of the surrounding habitat. The effects of noise, the potential for hazardous spills,  
44 increased dust and sedimentation, and operations and maintenance of the water conveyance

1 facilities would result in a less-than-significant impact on Swainson's hawk with the implementation  
2 of AMM1-AMM7, and *AMM18 Swainson's Hawk and White-Tailed Kite*.

3 **Impact BIO-86: Periodic Effects of Inundation of Swainson's Hawk Nesting and Foraging**  
4 **Habitat as a Result of Implementation of Conservation Components**

5 Flooding of the Yolo Bypass from Fremont Weir operations (*CM2 Yolo Bypass Fisheries*  
6 *Enhancement*) would increase the frequency and duration of inundation on approximately 3,066-  
7 6,706 acres of modeled Swainson's hawk habitat (consisting of approximately 41-70 acres of  
8 nesting habitat and 3,025-6,635 acres of foraging habitat; Table 12-1C-35). However, project-  
9 associated inundation of areas that would not otherwise have been inundated would be expected to  
10 occur in no more than 30% of all years, since Fremont Weir is expected to overtop the remaining  
11 estimated 70% of all years, and during those years notch operations would not typically affect the  
12 maximum extent of inundation. In more than half of all years under Existing Conditions, an area  
13 greater than the project-related inundation area already inundates in the bypass. Therefore, habitat  
14 conditions in the bypass would not be expected to change substantially as a result of Yolo Bypass  
15 operations. However, increased duration of inundation during years of Fremont Weir operation,  
16 may delay the period for which foraging habitat is available to Swainson's hawks by up to several  
17 weeks.

18 Based on hypothetical footprints, implementation of *CM5 Seasonally Inundated Floodplain*  
19 *Restoration* could result in the periodic inundation of up to approximately 8,197 acres of modeled  
20 Swainson's hawk habitat (Table 12-1C-35), consisting of 189 acres of nesting and 8,008 acres of  
21 foraging habitat. Floodplain restoration would be expected to restore a more natural flood regime  
22 and sustain riparian vegetation types that support regeneration of Swainson's hawk nesting habitat.  
23 The restored floodplains would transition from areas that flood frequently (e.g., every 1 to 2 years)  
24 to areas that flood infrequently (e.g., every 10 years or more). Foraging habitat that is inundated  
25 after Swainson's hawks arrive in the Central Valley in mid-March could result in a periodic loss of  
26 available foraging habitat due to the reduction in available prey. Inundated habitats would be  
27 expected to recover following draw-down and provide suitable foraging conditions until the  
28 following inundation period. Thus, this is considered a periodic and short term effect that is unlikely  
29 to affect Swainson's hawk distribution and abundance, or foraging use of the study area.

30 **NEPA Effects:** Increased periodic flooding would not be expected to cause any adverse effect on nest  
31 sites because trees in which nest sites are situated already withstand floods, the increase in  
32 inundation frequency and duration is expected to remain within the range of tolerance of riparian  
33 trees, and nest sites are located above floodwaters. Although foraging habitat would be periodically  
34 unavailable to Swainson's hawk, inundated habitats are expected to recover following draw down.  
35 This would be considered a short-term effect that would not result in an adverse effect on  
36 Swainson's hawk.

37 **CEQA Conclusion:** Increased periodic flooding would not be expected to cause any adverse effect on  
38 nest sites because trees in which nest sites are situated already withstand floods, the increase in  
39 inundation frequency and duration is expected to remain within the range of tolerance of riparian  
40 trees, and nest sites are located above floodwaters. Although foraging habitat would be periodically  
41 unavailable to Swainson's hawk, inundated habitats are expected to recover following draw down.  
42 This would be considered a short-term effect that would not have a significant impact on Swainson's  
43 hawk.

## 1 Tricolored Blackbird

2 This section describes the effects of Alternative 1C, including water conveyance facilities  
3 construction and implementation of other conservation components, on tricolored blackbird.  
4 Although nesting colonies have been documented along the fringe of Suisun Marsh, in the Yolo  
5 Bypass and along the southwestern perimeter of the Plan Area, breeding colonies are uncommon in  
6 the Plan Area. Modeled breeding habitat includes bulrush/cattail wetlands and shrub communities  
7 that may provide suitable nesting substrate, and adjacent high-value foraging areas within 5 miles of  
8 nesting colonies documented in the Plan Area. The foraging component includes cultivated lands  
9 and noncultivated land cover types known to support abundant insect populations such as  
10 grasslands, pasturelands (including alfalfa), natural seasonal wetlands, and sunflower croplands.  
11 The Delta is recognized as a major wintering area for tricolored blackbird (Hamilton 2004, Beedy  
12 2008). Modeled nonbreeding habitat includes emergent wetlands and shrub stands that provide  
13 suitable roosting habitat, as well as cultivated lands and noncultivated lands that provide foods  
14 sought by tricolored blackbirds during the winter. Outside of the breeding season, tricolored  
15 blackbirds are primarily granivores that forage opportunistically across the Plan Area in grasslands,  
16 pasturelands, croplands, dairies, and livestock feed lots. Factors considered in assessing the value of  
17 affected habitat for the tricolored blackbird, include patch size, suitability of vegetation, and  
18 proximity to recorded occurrences.

19 Construction and restoration associated with Alternative 1C conservation measures would result in  
20 both temporary and permanent losses of tricolored blackbird modeled habitat as indicated in Table  
21 12-1C-37. Full implementation of Alternative 1C would also include the following conservation  
22 actions over the term of the BDCP to benefit the tricolored blackbird (BDCP Chapter 3, Section 3.3,  
23 *Biological Goals and Objectives*).

- 24 ● Protect and manage at least 50 acres of occupied or recently occupied (within the last 15 years)  
25 tricolored blackbird nesting habitat located within 5 miles of high-value foraging habitat in CZs  
26 1, 2, 8, or 11. (TRBL1.1).
- 27 ● Protect at least 26,300 acres of moderate-, high-, or very high-value cultivated lands as  
28 nonbreeding foraging habitat, 50% of which is of high or very high value (TRBL1.2).
- 29 ● Protect at least 11,050 acres of high- to very high-value breeding-foraging habitat within 5 miles  
30 of occupied or recently occupied (within the last 15 years) tricolored blackbird nesting habitat  
31 in CZs 1, 2, 3, 4, 7, 8, or 11. At least 1,000 acres of which will be within 5 miles of the at least 50  
32 acres of nesting habitat protected under Objective TRBL1.1 (Objective TRBL1.3).
- 33 ● Maintain and protect the small patches of important wildlife habitats associated with cultivated  
34 lands within the reserve system including isolated valley oak trees, trees and shrubs along field  
35 borders and roadsides, remnant groves, riparian corridors, water conveyance channels,  
36 grasslands, ponds, and wetlands (Objective CLNC1.3, associated with CM3).
- 37 ● Protect at least 8,000 acres of grassland with at least 2,000 acres protected in CZ 1, at least 1,000  
38 acres protected in CZ 8, at least 2,000 acres protected in CZ 11, and the remainder distributed  
39 among CZs 1, 2, 4, 5, 7, 8, and 11 (Objective GNC1.1, associated with CM3).
- 40 ● Restore at least 2,000 acres of grasslands (Objective GNC1.2, associated with CM8).
- 41 ● Protect at least 150 acres of alkali seasonal wetland and at least 600 acres of existing vernal pool  
42 complex in CZs 1, 8, and/or 11 (Objectives ASWNC1.1 and VPNC1.1, associated with CM3).

- 1 • Increase prey abundance and accessibility for grassland-foraging species (Objectives ASWNC2.4,  
2 VPNC2.5, and GNC2.4, associated with CM11).

3 As explained below, with the restoration or protection of these amounts of habitat, in addition to  
4 management activities that would enhance these natural communities for the species and the  
5 implementation of AMM1–AMM7 and AMM21 *Tricolored Blackbird*, impacts on tricolored blackbird  
6 would not be adverse for NEPA purposes and would be less than significant for CEQA purposes.

7 **Table 12-1C-37. Changes in Tricolored Modeled Habitat Associated with Alternative 1C (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>		
		NT	LLT	NT	LLT	CM2	CM5	
CM1	Breeding	Nesting	3	3	5	5	NA	NA
		Foraging-cultivated	1,274	1,274	1,942	1,942	NA	NA
		Foraging-noncultivated	230	230	190	190	NA	NA
	Nonbreeding	Roosting	0	0	11	11	NA	NA
		Foraging-cultivated	2,259	2,259	2,567	2,567	NA	NA
		Foraging-noncultivated	148	145	148	145	NA	NA
<b>Total Impacts CM1</b>		<b>3,914</b>	<b>3,911</b>	<b>4,863</b>	<b>4,860</b>			
CM2–CM18	Breeding	Nesting	13	72	75	77	11–26	30
		Foraging-cultivated	1,657	9,525	84	359	1,837–2,598	2,124
		Foraging noncultivated	704	1,991	155	184	600–1,689	355
	Nonbreeding	Roosting	570	1,642	0	1	0–4	29
		Foraging-cultivated	3,747	23,955	54	420	222–1,057	2,506
		Foraging-noncultivated	459	1,341	0	3	42–191	158
<b>Total Impacts CM2–CM18</b>		<b>7,150</b>	<b>38,526</b>	<b>368</b>	<b>1,044</b>	<b>2,711</b>	<b>5,766</b>	
<b>Total Breeding</b>		<b>3,881</b>	<b>13,095</b>	<b>2,451</b>	<b>2,757</b>	<b>2,447–4,312</b>	<b>2,509</b>	
<b>Total Nonbreeding</b>		<b>7,183</b>	<b>29,342</b>	<b>2,780</b>	<b>3,147</b>	<b>263–1,252</b>	<b>2,694</b>	
<b>TOTAL IMPACTS</b>		<b>11,064</b>	<b>42,437</b>	<b>5,231</b>	<b>5,904</b>	<b>2,711</b>	<b>5,766</b>	

<sup>a</sup> See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

## 1 **Impact BIO-87: Loss or Conversion of Habitat for and Direct Mortality of Tricolored Blackbird**

2 Alternative 1C conservation measures would result in the combined permanent and temporary loss  
3 of up to 48,341 acres of modeled habitat (15,852 acres of breeding habitat and 32,489 habitat) for  
4 tricolored blackbird (Table 12-1C-37). Conservation measures that would result in these losses are  
5 conveyance facilities and transmission line construction, and establishment and use of borrow and  
6 spoil areas (CM1), Yolo Bypass improvements (CM2), tidal habitat restoration (CM4), floodplain  
7 restoration (CM5), riparian habitat restoration (CM7), grassland restoration (CM8), marsh  
8 restoration (CM10), and construction of conservation hatcheries (CM18). Habitat enhancement and  
9 management activities (CM11), which include ground disturbance or removal of nonnative  
10 vegetation, could result in local adverse habitat effects. In addition, maintenance activities  
11 associated with the long-term operation of the water conveyance facilities and other BDCP physical  
12 facilities could degrade or eliminate tricolored blackbird habitat. Each of these individual activities  
13 is described below. A summary statement of the combined impacts and NEPA effects and a CEQA  
14 conclusion follow the individual conservation measure discussions.

- 15 • *CM1 Water Facilities and Operation:* Construction of Alternative 1C conveyance facilities would  
16 result in the permanent loss of 1,507 acres of tricolored blackbird breeding habitat (3 acres  
17 nesting habitat, 1,274 acres of cultivated lands, and 230 acres of noncultivated lands suitable for  
18 foraging) and 2,407 acres of nonbreeding habitat (0 acres roosting habitat, 2,259 acres of  
19 cultivated lands, and 148 acres of noncultivated lands suitable for foraging (Table 12-1C-37).  
20 Approximately 602 of the 3,914 acres permanently impacted would be lost as reusable tunnel  
21 material storage areas, which would likely be moved to other sites for use in levee build-up and  
22 restoration, and the affected area would likely be restored. While this effect is categorized as  
23 permanent because there is no assurance that the material would eventually be moved, the  
24 effect would likely be temporary.

25 In addition, CM1 would result in the temporary removal of 2,137 acres of breeding habitat (5  
26 acres nesting habitat, 1,942 acres of cultivated lands, and 190 acres of noncultivated lands  
27 suitable for foraging) and 2,726 acres of nonbreeding habitat (11 acres roosting habitat, 2,567  
28 acres of cultivated lands, and 148 acres of noncultivated lands suitable for foraging, Table 12-  
29 1C-37). Most of the habitat that would be lost is located in the central Delta, from CZs 3, 5, 6, 8,  
30 and 9. There are no occurrences of tricolored blackbird that overlap with the construction  
31 footprint for CM1. However, records exist throughout the study area. The implementation of  
32 *AMM21 Tricolored Blackbird* (BDCP Appendix 3.C, *Avoidance and Minimization Measures*) would  
33 require preconstruction surveys and the establishment of no-disturbance buffers and would  
34 minimize potential effects on nesting tricolored blackbirds. Refer to the Terrestrial Biology Map  
35 Book for a detailed view of Alternative 1C construction locations. Impacts from CM1 would  
36 occur within the first 10 years of Alternative 1C implementation.

- 37 • *CM2 Yolo Bypass Fisheries Enhancement:* Construction activity associated with fisheries  
38 improvements in the Yolo Bypass would permanent loss of 595 acres of tricolored blackbird  
39 breeding habitat (13 acres nesting habitat, 477 acres of cultivated lands, and 105 acres of  
40 noncultivated lands suitable for foraging) and 8 acres of nonbreeding habitat (consisting  
41 entirely of roosting habitat). In addition, CM2 construction would result in the temporary  
42 removal of 314 acres of breeding habitat (75 acres nesting habitat, 84 acres of cultivated lands,  
43 and 155 acres of noncultivated lands suitable for foraging) and 54 acres of nonbreeding habitat  
44 (consisting entirely of cultivated lands). The loss is expected to occur during the first 10 years of  
45 Alternative 1C implementation.

- 1       ● *CM4 Tidal Natural Communities Restoration*: Tidal natural communities restoration would result  
2       in the inundation of approximately 3,937 acres of tricolored blackbird breeding habitat (21  
3       acres of nesting, 2,814 acres of cultivated lands, and 1,102 acres of noncultivated lands suitable  
4       for foraging) and 10,794 acres of nonbreeding habitat (1,633 acres of roosting, 18,489 acres of  
5       cultivated lands, and 672 acres of noncultivated lands suitable for foraging). An estimated  
6       13,692 acres of the 28,424 acres to be permanently lost would be expected to convert to tidal  
7       emergent wetland communities that could provide nonbreeding season roosting habitat for  
8       tricolored blackbirds, depending on future vegetation density and composition. Conversion  
9       would result in the loss of an estimated 4,316 acres of tricolored blackbird breeding habitat (34  
10      acres of nesting habitat; plus 3,635 acres of cultivated lands and 647 acres of noncultivated  
11      habitats suitable for foraging) and 9,375 acres of nonbreeding habitat (8,716 acres of cultivated  
12      lands and 659 acres of noncultivated habitats suitable for foraging). These habitat losses and  
13      conversions would occur in CZs 1, 2, 4, 5, 6, 7, 8, and 11. Although considered to be a permanent  
14      loss, due to the uncertainty of the quantity of restored suitable habitat, any areas that develop  
15      into riparian scrub-shrub could provide suitable nesting and roosting habitat for tricolored  
16      blackbird.
- 17      ● *CM5 Seasonally Inundated Floodplain Restoration*: Levee construction and riparian restoration  
18      associated with floodplain restoration in the south Delta (CZ 7) would result in the permanent  
19      removal of up to 554 acres of tricolored blackbird breeding habitat (4 acres of nesting habitat,  
20      503 acres of cultivated lands, and 47 acres of noncultivated habitats suitable for foraging) and  
21      656 acres of nonbreeding habitat (1 acre of roosting habitat, 652 acres of cultivated lands, and 3  
22      acres of noncultivated habitats suitable for foraging) in CZ 7. Patches of riparian scrub  
23      associated with the restoration of approximately 1,000 acres of valley/foothill riparian habitat  
24      managed as early- to mid-successional habitats (as a component of CM5) could provide suitable  
25      nesting, roosting or foraging habitat for tricolored blackbird once these restored habitats have  
26      developed habitat functions for the species.
- 27      ● *CM8 Grassland Natural Community Restoration*: Restoration of grassland would result in the  
28      permanent removal of 1,521 acres of tricolored breeding habitat and 210 acres of nonbreeding  
29      habitat. Grassland restoration would be implemented on cultivated lands and would therefore  
30      result in the conversion of tricolored blackbird cultivated foraging habitat to high-value  
31      grassland foraging habitat in CZs 2, 4, and 5.
- 32      ● *CM10 Nontidal Marsh Restoration*: Marsh restoration activities would result in the permanent  
33      removal or conversion of approximately 568 acres of tricolored blackbird breeding habitat and  
34      945 acres of nonbreeding habitat (all cultivated lands suitable for foraging). About two-thirds of  
35      the restored nontidal marsh would be open water, and the remainder would support emergent  
36      wetland vegetation that could provide low-value roosting habitat for tricolored blackbird  
37      depending on vegetation density and composition.
- 38      ● *CM11 Natural Communities Enhancement and Management*: A variety of habitat management  
39      actions that are designed to enhance wildlife values in BDCP-protected habitats could result in  
40      localized ground disturbances that could temporarily remove small amounts of tricolored  
41      blackbird habitat. Ground-disturbing activities, such as removal of nonnative vegetation and  
42      road and other infrastructure maintenance, would be expected to have minor effects on  
43      available tricolored blackbird habitat and are expected to result in overall improvements to and  
44      maintenance of tricolored blackbird habitat values over the term of the BDCP. These effects  
45      cannot be quantified, but are expected to be minimal and would be avoided and minimized by  
46      the AMMs listed below. CM11 would also include the construction of recreational-related

1 facilities including trails, interpretive signs, and picnic tables (BDCP Chapter 4, *Covered Activities*  
2 *and Associated Federal Actions*). Trailhead facilities, signs, staging areas, picnic areas, bathrooms,  
3 etc. would be placed on existing, disturbed areas when and where possible. However,  
4 approximately 43.5 acres of breeding habitat and 6.5 acres of nonbreeding habitat (all grassland  
5 suitable for foraging) would be lost as a result of construction of trails and facilities. Impacts  
6 from recreational-related facilities that would occur within the first 10 years of Alternative 1C  
7 implementation would include a loss of 13 acres of breeding habitat.

- 8 ● *CM18 Conservation Hatcheries*: Implementation of CM18 would remove up to 35 acres of  
9 tricolored blackbird grassland foraging habitat in CZ 1.
- 10 ● *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground  
11 water conveyance facilities and restoration infrastructure could result in ongoing but periodic  
12 disturbances that could affect tricolored blackbird use of the surrounding habitat in or adjacent  
13 to work areas. Maintenance activities would include vegetation management, levee and  
14 structure repair, and re-grading of roads and permanent work areas. These effects, however,  
15 would be reduced by AMMs and conservation actions as described below.
- 16 ● *Injury and Direct Mortality*: Operation of construction equipment may cause injury to or  
17 mortality of tricolored blackbirds. Risk would be greatest to eggs and nestlings susceptible to  
18 land clearing activities, nest abandonment, or increased exposure to the elements or to  
19 predators. Injury to or mortality of adults and fledged juveniles would not be expected as  
20 individuals would be expected to avoid contact with construction equipment. Construction  
21 activities could temporarily fragment existing tricolored blackbird habitat during grading, filling,  
22 contouring, and other initial ground-disturbing operations that could temporarily reduce the  
23 extent and functions supported by the affected habitat. To the maximum extent practicable,  
24 construction activity will be avoided up to 1,300 feet, but not less than a minimum of 250 feet,  
25 from an active tricolored blackbird nesting colony. If monitoring determines an activity is  
26 adversely affecting a nesting colony, construction will be modified, as practicable, by either  
27 delaying construction until the colony site is abandoned or until the end of the breeding season,  
28 whichever occurs first, by temporarily relocating staging areas, or temporarily rerouting access  
29 to the construction site. These measures to avoid injury or mortality of nesting tricolored  
30 blackbirds are described in *AMM21 Tricolored Blackbird* (Appendix 3.C, *Avoidance and*  
31 *Minimization Measures*).

32 The following paragraphs summarize the combined effects discussed above and describe other  
33 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also  
34 included.

### 35 ***Near-Term Timeframe***

36 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
37 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
38 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
39 effects of construction would not be adverse under NEPA. Alternative 1C would remove 6,332 acres  
40 of breeding habitat (96 acres of nesting, 4,957 acres of cultivated lands, and 1,279 acres of  
41 noncultivated lands suitable for foraging) and 9,963 acres of nonbreeding habitat (581 acres of  
42 roosting, 8,627 acres of cultivated lands, and 755 acres of noncultivated lands suitable for foraging)  
43 for tricolored blackbird in the study area in the near-term. These effects would result from the  
44 construction of the water conveyance facilities (CM1, 3,644 acres of breeding, 5,133 acres of

1 nonbreeding habitat), and implementing other conservation measures (*CM2 Yolo Bypass Fisheries*  
2 *Enhancement, CM4 Tidal Natural Communities Restoration, and CM5 Seasonally Inundated Floodplain*  
3 *Restoration, CM7 Riparian Natural Community Restoration*—2,688 acres of breeding, 4,830 acres of  
4 nonbreeding habitat).

5 Typical NEPA and CEQA project-level mitigation ratios would be 1:1 for restoration/creation and  
6 1:1 for protection for the loss of nesting and roosting wetland habitat, 2:1 protection for loss of  
7 noncultivated lands suitable for foraging (for the breeding and nonbreeding season), and 1:1  
8 protection for the loss of cultivated lands.

9 Using these ratios would indicate that the compensation for loss or conversion of tricolored  
10 blackbird habitat from CM1 would require 8 acres of restoration and 8 acres of protection of nesting  
11 habitat, 11 acres of restoration and 11 acres of protection of roosting habitat, 1,432 acres of  
12 protection of noncultivated lands that provide foraging habitat, 3,216 acres of protection of  
13 cultivated lands suitable for foraging during the breeding season, and 4,826 acres of cultivated lands  
14 that provide foraging habitat during the nonbreeding season. The near-term effects of other  
15 conservation actions would remove or convert 88 acres of nesting habitat, 570 acres of roosting  
16 habitat, 619 acres of noncultivated lands suitable for foraging, 1,741 acres of cultivated lands that  
17 provide foraging habitat during the breeding season, and 3,801 acres of cultivated lands during the  
18 nonbreeding season. Compensation for these losses from other conservation measures would  
19 therefore require 88 acres of restoration and 88 acres of protection of nesting habitat, 570 acres of  
20 restoration and 570 acres of protection of roosting habitat, 1,238 acres of protection of  
21 noncultivated lands that provide foraging habitat, 1,741 acres of protection of cultivated lands  
22 suitable for foraging during the breeding season, and 3,801 acres of cultivated lands that provide  
23 foraging habitat during the nonbreeding season.

24 Total compensation for near-term loss or conversion of tricolored blackbird required using the  
25 typical ratios above would be 96 acres of restoration and 96 acres of protection for nesting habitat,  
26 581 acres of restoration and 581 acres of protection for roosting habitat, 4,068 acres of protection of  
27 noncultivated foraging habitat, 4,957 acres of protection for cultivated lands that provide foraging  
28 habitat during the breeding season, and 8,627 acres of cultivated lands that provide foraging habitat  
29 during the nonbreeding season.

30 The BDCP has committed to near-term goals of protecting 25 acres and restoring protecting 750  
31 acres and restoring 800 acres of valley/foothill riparian natural community, protecting 2,000 acres  
32 and restoring 1,140 acres of grassland natural community, protecting 400 acres of vernal pool  
33 complex, protecting 120 acres of alkali seasonal wetland complex, protecting 4,800 acres of  
34 managed wetland natural community, protecting 15,400 acres of non-rice cultivated lands,  
35 protecting 900 acres of rice or rice equivalent habitat, restoring 8,850 acres of tidal freshwater  
36 emergent wetlands and 2,000 acres of tidal brackish emergent wetlands (Table 3-4 in Chapter 3).  
37 These conservation actions are associated with CM3, CM4, CM5, CM7, and CM8 and would occur in  
38 the same timeframe as the construction and early restoration losses. Some proportion of these  
39 natural communities provide suitable habitat for tricolored blackbird as described below.

40 Nesting by tricolored blackbirds is currently limited by the availability of high-value breeding  
41 habitat, which is represented by suitable nesting substrate, such as cattail/bulrush emergent  
42 wetland, in close association with highly productive foraging areas that support abundant insect  
43 prey, such as grasslands, seasonal wetlands, pasturelands, alfalfa and other hay crops, and some  
44 croplands. The nesting habitat would be located within 5 miles of high-value foraging habitat in CZs

1 1, 2, 8, or 11 (see Table 12-1C-38 for foraging habitat values) and would be actively managed to  
2 maintain actively growing stands of bulrush/cattail emergent vegetation through mechanical  
3 habitat manipulation, prescribed fire, or other measures described in *CM11 Natural Communities*  
4 *Enhancement and Management*. In addition to the actively managed nesting habitat, a portion of the  
5 750 acres of protection and 800 acres of restoration of valley/foothill riparian natural community,  
6 and the restoration of 900 acres nontidal marsh would provide nesting habitat for tricolored  
7 blackbird. The Plan estimates that modeled nesting habitat in the Plan Area currently includes 8% of  
8 valley/foothill riparian and 22% of nontidal freshwater emergent marsh (BDCP Chapter 5, Section  
9 5.6.12.2, *Beneficial Effects*). Assuming similar proportions of modeled habitat on conservation lands  
10 restored in the near-term, approximately 64 acres of valley/foothill riparian and 198 acres of  
11 nontidal marsh restored would provide nesting habitat for tricolored blackbird.

12 The Plan estimates that modeled roosting habitat in the Plan Area currently includes 95% of tidal  
13 freshwater emergent wetland, 57% of brackish emergent wetland, 21% of valley/foothill riparian,  
14 75% of nontidal marsh, and 15% of managed wetlands (BDCP Chapter 5, Section 5.6.12.2, *Beneficial*  
15 *Effects*). Assuming similar proportions of modeled habitat on conservation lands restored in the  
16 near-term, the restoration of approximately 8,408 acres of tidal freshwater emergent wetland, 1,140  
17 acres of tidal brackish emergent wetland, 675 acres of nontidal marsh, and 168 acres of valley  
18 foothill riparian would provide 10,391 acres of nesting habitat for tricolored blackbird. An estimated  
19 878 acres of roosting habitat would also be protected in the near-term time period (158 acres of  
20 valley/foothill riparian, 720 acres managed wetland).

21 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1  
22 and GNC1.2). Grassland protection in CZs 1, 8, and 11 would be associated with vernal pool and  
23 alkali seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) which would result in a  
24 contiguous matrix of grassland, alkali seasonal wetland, and vernal pool natural communities. The  
25 protection and restoration of grasslands, alkali seasonal wetlands, and vernal pool complexes would  
26 provide improved foraging opportunities for tricolored blackbirds during both the breeding and  
27 nonbreeding seasons. Proximity of nesting colonies to suitable foraging habitat contributes to high  
28 reproductive success in tricolored blackbirds. These natural communities are known to support  
29 large insect populations, a vital food resource for successful rearing and fledging of young. Those  
30 conservation lands that lie within a few miles of active nesting colonies would provide high-value  
31 foraging areas to support breeding tricolored blackbirds. Under *CM11 Natural Communities*  
32 *Enhancement and Management*, insect prey populations would be increased on protected lands,  
33 further enhancing the foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5,  
34 and GNC2.4).

35 Cultivated lands that provide habitat for covered and other native wildlife species would provide  
36 approximately 15,600 acres of potential foraging habitat for tricolored blackbird in the near-term  
37 (Objective CLNC1.1). Objective TRBL1.3 commits to protecting 11,050 acres (23% of the total  
38 cultivated lands commitment) of high- to very high-value breeding-foraging habitat by the late long-  
39 term. Assuming that lands would be protected proportional to the conservation objectives for  
40 covered species, approximately 3,588 acres of high- to very high-value breeding foraging habitat  
41 consisting of cultivated lands would be protected in the near-term. These lands would be protected  
42 within 5 miles of occupied or recently occupied tricolored blackbird nesting habitat in CZs 1, 2, 3, 4,  
43 7, 8 or 11. In addition, Objective TRBL1.2 states that of the cultivated lands protected in the late  
44 long-term time period, 26,300 acres (54% of all cultivated lands protected) would be maintained in  
45 moderate – high, or very high-value cultivated lands, at least 50% of which would be high- to very  
46 high-value. Assuming proportional conservation in the near-term, an estimated 8,424 acres of

1 cultivated lands that provide foraging habitat for tricolored blackbird would be protected in the  
 2 near-term, 4,212 of which would be in high- to very high-value cultivated lands. Small but essential  
 3 habitats for species including tricolored blackbird would also be protected that occur within the  
 4 agricultural matrix. This would include the retention of wetlands, grassland patches, shrub stands,  
 5 and herbaceous edge habitats, which could provide suitable nesting, foraging or roosting habitat for  
 6 tricolored blackbird (Objective CLNC1.3).

7 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*  
 8 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*  
 9 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
 10 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
 11 *Material, and AMM7 Barge Operations Plan. All of these AMMs include elements that would avoid or*  
 12 *minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are*  
 13 *described in detail in BDCP Appendix 3.C, Avoidance and Minimization Measures.*

14 The acres of protection and restoration contained in the near-term Plan goals, in addition to the  
 15 detailed habitat value goals that would be applied to near-term acres, are more than sufficient to  
 16 satisfy the typical mitigation ratios that would be applied to the project-level effects of CM1 and the  
 17 near-term impacts from other conservation measures on nesting, roosting, and cultivated lands  
 18 foraging habitat. The 3,660 acres of grassland protection in the near-term are 213 acres short of the  
 19 2:1 protection mitigation ratio. However, the acres of permanent impact would be compensated for  
 20 by this acreage and temporary impacts on grassland would be restored to preproject conditions  
 21 (including revegetation with native vegetation if within 1 year of completion of construction) under  
 22 *AMM2 Construction Best Management Practices and Monitoring. With the enhancement of grasslands*  
 23 *described above, and the restoration of temporary habitat impacts, this difference between*  
 24 *impacted and conserved grassland acreages in the near-term time period would not result in an*  
 25 *adverse effect on tricolored blackbird.*

26 **Table 12-1C-38. Tricolored Blackbird Foraging Habitat Value Classes**

Foraging Habitat Value Class	Agricultural Crop Type/Habitats	
	Breeding Season <sup>a</sup> Foraging Habitat	Nonbreeding Season Foraging Habitat
Very high	Native pasture, nonirrigated native pasture, annual grasslands, vernal pool grasslands, alkali grasslands	Livestock feed lots
High	Sunflower, alfalfa and mixed alfalfa, mixed pasture, induced high water table native pasture, nonirrigated mixed pasture, dairies	Corn, sunflower, millet, alfalfa and mixed alfalfa, mixed pasture, native pasture, induced high water table native pasture, nonirrigated native pasture, rice, dairies, annual grasslands, vernal pool grasslands, alkali grasslands
Moderate	Miscellaneous grass pasture, fallow lands cropped within 3 years, new lands prepped for crop production, livestock feed lots	Miscellaneous grass pasture, nonirrigated mixed pasture, fallow lands cropped within 3 years, new lands prepped for crop production
Low	Wheat, mixed grain and hay, farmsteads	Wheat, oats, mixed grain and hay, farmsteads
Marginal	Rice	None
None	All remaining crop types	All remaining crop types

<sup>a</sup> Generally March through August; occasional breeding in fall (September through November).

1 **Late Long-Term Timeframe**

2 Based on the habitat model, the study area approximately 164,947 acres of breeding and 259,093  
3 acres of nonbreeding habitat for tricolored blackbird. The Delta is an important wintering area for  
4 the tricolored blackbird (Hamilton 2004, Beedy 2008). Although there is a large acreage of modeled  
5 breeding habitat available, the study area does not currently support many nesting tricolored  
6 blackbirds with the exception of a few occurrences on the fringes of the Suisun Marsh, in the Yolo  
7 Bypass, and along the southwestern perimeter of the study area (BDCP Chapter 5, *Effects Analysis*).  
8 Alternative 1C as a whole would result in the permanent loss of and temporary effects on 15,852  
9 acres of breeding habitat and 32,489 acres of nonbreeding habitat for tricolored blackbird during  
10 the term of the Plan (10% of the total breeding habitat in the study area and 13% of the total  
11 nonbreeding habitat in the study area). The locations of these losses are described above in the  
12 analyses of individual conservation measures.

13 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*  
14 *Restoration, CM4 Tidal Natural Communities Restoration, CM5 Seasonally Inundated Floodplain*  
15 *Restoration, CM7 Riparian Natural Community Restoration, and CM8 Grassland Natural Community*  
16 *Restoration* to restore or create at least 5,000 acres and protect at least 750 acres of valley/foothill  
17 riparian natural community, protect 8,000 acres and restore 2,000 acres of grassland natural  
18 community, protect 600 acres of vernal pool complex, protect 150 acres of alkali seasonal wetland  
19 complex, protect 8,100 acres of managed wetland, and protect 48,625 acres of cultivated lands that  
20 provide suitable habitat for native wildlife species (Table 3-4 in Chapter 3, *Description of*  
21 *Alternatives*). In addition,

22 Species-specific biological goals and objectives for tricolored blackbird commit to protecting or  
23 restoring at least 50 acres of occupied or recently occupied (within the last 15 years) tricolored  
24 blackbird nesting habitat located within 5 miles of high-value foraging habitat in CZs 1, 2, 8, or 11  
25 (Objective TRBL1.1). Foraging habitat value classes for tricolored blackbird are found in Table 12-  
26 1C-38. To ensure that natural community conservation benefits tricolored blackbird, the Plan  
27 further specifies that cultivated lands protected for tricolored blackbird retain residual wetland,  
28 grassland patches, shrub stands, and herbaceous edge habitats which may provide suitable nesting,  
29 foraging or roosting habitat for the species (Objective CLNC1.3). In addition, 26,300 acres of  
30 moderate-, high-, or very high-value cultivated lands would be conserved and managed as  
31 nonbreeding foraging habitat, 50% of which would be of high- or very high-value (Objective  
32 TRBL1.2). At least 11,050 acres of cultivated lands managed as high to very high breeding foraging  
33 habitat would be conserved within 5 miles of occupied or recently occupied (within the last 15  
34 years) tricolored blackbird nesting habitat in CZs 1, 2, 3, 4, 7, 8, or 11 (Objective TRBL1.2). Most of  
35 the loss of breeding and nonbreeding habitat would be to cultivated lands that are abundant  
36 throughout the study area, so the loss is not expected to adversely affect the population in the study  
37 area.

38 The BDCP's beneficial effects analysis (BDCP Chapter 5.6, *Effects on Covered Wildlife and Plant*  
39 *Species*) estimates that the restoration and protection actions discussed above could result in the  
40 protection of an estimated 46,566 acres of tricolored blackbird habitat (16,476 acres breeding  
41 habitat and 31,090 acres nonbreeding habitat) and restoration of 31,001 acres of tricolored  
42 blackbird habitat (2,190 acres breeding habitat and 28,811 acres nonbreeding habitat).

43 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*  
44 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*  
45 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*

1 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
2 *Material, and AMM7 Barge Operations Plan. All of these AMMs include elements that would avoid or*  
3 *minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are*  
4 *described in detail in BDCP Appendix 3.C, Avoidance and Minimization Measures.*

5 **NEPA Effects:** The losses of tricolored blackbird habitat and potential for direct mortality of a  
6 special-status species under Alternative 1C would represent an adverse effect in the absence of  
7 other conservation actions. However, with habitat protection and restoration associated with CM3,  
8 CM4, CM5, CM7, CM8, and CM11, guided by species-specific goals and objectives and by AMM1–  
9 AMM7 and *AMM21 Tricolored Blackbird*, which would be in place throughout the construction  
10 period, the effects of habitat loss or potential for mortality on tricolored blackbird would not be  
11 adverse under Alternative 1C.

## 12 **CEQA Conclusion:**

### 13 **Near-Term Timeframe**

14 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
15 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
16 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
17 effects of construction would be less than significant under CEQA. Alternative 1C would remove  
18 6,332 acres of breeding habitat (96 acres of nesting, 4,957 acres of cultivated lands, and 1,279 acres  
19 of noncultivated lands suitable for foraging) and 9,963 acres of nonbreeding habitat (581 acres of  
20 roosting, 8,627 acres of cultivated lands, and 755 acres of noncultivated lands suitable for foraging)  
21 for tricolored blackbird in the study area in the near-term. These effects would result from the  
22 construction of the water conveyance facilities (CM1, 3,644 acres of breeding, 5,133 acres of  
23 nonbreeding), and implementing other conservation measures (*CM2 Yolo Bypass Fisheries*  
24 *Enhancement, CM4 Tidal Natural Communities Restoration, and CM5 Seasonally Inundated Floodplain*  
25 *Restoration, CM7 Riparian Natural Community Restoration—2,688 acres of breeding, 4,830 acres of*  
26 *nonbreeding).*

27 Typical NEPA and CEQA project-level mitigation ratios would be 1:1 for restoration/creation and  
28 1:1 for protection for the loss of nesting and roosting wetland habitat, 2:1 protection for loss of  
29 noncultivated lands suitable for foraging (for the breeding and nonbreeding season), and 1:1  
30 protection for the loss of cultivated lands.

31 Using these ratios would indicate that the compensation for loss or conversion of tricolored  
32 blackbird habitat from CM1 would require 8 acres of restoration and 8 acres of protection of nesting  
33 habitat, 11 acres of restoration and 11 acres of protection of roosting habitat, 1,432 acres of  
34 protection of noncultivated lands that provide foraging habitat, 3,216 acres of protection of  
35 cultivated lands suitable for foraging during the breeding season, and 4,826 acres of cultivated lands  
36 that provide foraging habitat during the nonbreeding season. The near-term effects of other  
37 conservation actions would remove or convert 88 acres of nesting habitat, 570 acres of roosting  
38 habitat, 619 acres of noncultivated lands suitable for foraging, 1,741 acres of cultivated lands that  
39 provide foraging habitat during the breeding season, and 3,801 acres of cultivated lands during the  
40 nonbreeding season. Compensation for these losses from other conservation measures would  
41 therefore require 88 acres of restoration and 88 acres of protection of nesting habitat, 570 acres of  
42 restoration and 570 acres of protection of roosting habitat, 1,238 acres of protection of  
43 noncultivated lands that provide foraging habitat, 1,741 acres of protection of cultivated lands

1 suitable for foraging during the breeding season, and 3,801 acres of cultivated lands that provide  
2 foraging habitat during the nonbreeding season.

3 Total compensation for near-term loss or conversion of tricolored blackbird required using the  
4 typical ratios above would be 96 acres of restoration and 96 acres of protection for nesting habitat,  
5 581 acres of restoration and 581 acres of protection for roosting habitat, 4,068 acres of protection of  
6 noncultivated foraging habitat, 4,957 acres of protection for cultivated lands that provide foraging  
7 habitat during the breeding season, and 8,627 acres of cultivated lands that provide foraging habitat  
8 during the nonbreeding season.

9 The BDCP has committed to near-term goals of protecting 25 acres and restoring protecting 750  
10 acres and restoring 800 acres of valley/foothill riparian natural community, protecting 2,000 acres  
11 and restoring 1,140 acres of grassland natural community, protecting 400 acres of vernal pool  
12 complex, protecting 120 acres of alkali seasonal wetland complex, protecting 4,800 acres of  
13 managed wetland natural community, protecting 15,400 acres of non-rice cultivated lands,  
14 protecting 900 acres of rice or rice equivalent habitat, restoring 8,850 acres of tidal freshwater  
15 emergent wetlands and 2,000 acres of tidal brackish emergent wetlands (Table 3-4 in Chapter 3).  
16 These conservation actions are associated with CM3, CM4, CM5, CM7, and CM8 and would occur in  
17 the same timeframe as the construction and early restoration losses. Some proportion of these  
18 natural communities provide suitable habitat for tricolored blackbird as described below.

19 Nesting by tricolored blackbirds is currently limited by the availability of high-value breeding  
20 habitat, which is represented by suitable nesting substrate, such as cattail/bulrush emergent  
21 wetland, in close association with highly productive foraging areas that support abundant insect  
22 prey, such as grasslands, seasonal wetlands, pasturelands, alfalfa and other hay crops, and some  
23 croplands. The nesting habitat would be located within 5 miles of high-value foraging habitat in CZs  
24 1, 2, 8, or 11 (see Table 12-1C-38 for foraging habitat values) and would be actively managed to  
25 maintain actively growing stands of bulrush/cattail emergent vegetation through mechanical  
26 habitat manipulation, prescribed fire, or other measures described in *CM11 Natural Communities  
27 Enhancement and Management*. In addition to the actively managed nesting habitat, a portion of the  
28 750 acres of protection and 800 acres of restoration of valley/foothill riparian natural community,  
29 and the restoration of 900 acres nontidal marsh would provide nesting habitat for tricolored  
30 blackbird. The Plan estimates that modeled nesting habitat in the Plan Area currently includes 8% of  
31 valley/foothill riparian and 22% of nontidal freshwater emergent marsh (BDCP Chapter 5, Section  
32 5.6.12.2, *Beneficial Effects*). Assuming similar proportions of modeled habitat on conservation lands  
33 restored in the near-term, approximately 64 acres of valley/foothill riparian and 198 acres of  
34 nontidal marsh restored would provide nesting habitat for tricolored blackbird.

35 The Plan estimates that modeled roosting habitat in the Plan Area currently includes 95% of tidal  
36 freshwater emergent wetland, 57% of brackish emergent wetland, 21% of valley/foothill riparian,  
37 75% of nontidal marsh, and 15% of managed wetlands (BDCP Chapter 5, Section 5.6.12.2, *Beneficial  
38 Effects*). Assuming similar proportions of modeled habitat on conservation lands restored in the  
39 near-term, the restoration of approximately 8,408 acres of tidal freshwater emergent wetland, 1,140  
40 acres of tidal brackish emergent wetland, 675 acres of nontidal marsh, and 168 acres of valley  
41 foothill riparian would provide 10,391 acres of nesting habitat for tricolored blackbird. An estimated  
42 878 acres of roosting habitat would also be protected in the near-term time period (158 acres of  
43 valley/foothill riparian, 720 acres managed wetland).

1 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1  
2 and GNC1.2). Grassland protection in CZs 1, 8, and 11 would be associated with vernal pool and  
3 alkali seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) which would result in a  
4 contiguous matrix of grassland, alkali seasonal wetland, and vernal pool natural communities. The  
5 protection and restoration of grasslands, alkali seasonal wetlands, and vernal pool complexes would  
6 provide improved foraging opportunities for tricolored blackbirds during both the breeding and  
7 nonbreeding seasons. Proximity of nesting colonies to suitable foraging habitat contributes to high  
8 reproductive success in tricolored blackbirds. These natural communities are known to support  
9 large insect populations, a vital food resource for successful rearing and fledging of young. Those  
10 conservation lands that lie within a few miles of active nesting colonies would provide high-value  
11 foraging areas to support breeding tricolored blackbirds. Under *CM11 Natural Communities*  
12 *Enhancement and Management*, insect prey populations would be increased on protected lands,  
13 further enhancing the foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5,  
14 and GNC2.4).

15 Cultivated lands that provide habitat for covered and other native wildlife species would provide  
16 approximately 15,600 acres of potential foraging habitat for tricolored blackbird in the near-term  
17 (Objective CLNC1.1). Objective TRBL1.3 commits to protecting 11,050 acres (23% of the total  
18 cultivated lands commitment) of high- to very high-value breeding-foraging habitat by the late long-  
19 term. Assuming that lands would be protected proportional to the conservation objectives for  
20 covered species, approximately 3,588 acres of high- to very high-value breeding foraging habitat  
21 consisting of cultivated lands would be protected in the near-term. These lands would be protected  
22 within 5 miles of occupied or recently occupied tricolored blackbird nesting habitat in CZs 1, 2, 3, 4,  
23 7, 8 or 11. In addition, Objective TRBL1.2 states that of the cultivated lands protected in the late  
24 long-term time period, 26,300 acres (54% of all cultivated lands protected) would be maintained in  
25 moderate – high, or very high-value cultivated lands, at least 50% of which would be high- to very  
26 high-value. Assuming proportional conservation in the near-term, an estimated 8,424 acres of  
27 cultivated lands that provide foraging habitat for tricolored blackbird would be protected in the  
28 near-term, 4,212 of which would be in high- to very high-value cultivated lands. Small but essential  
29 habitats for species including tricolored blackbird would also be protected that occur within the  
30 agricultural matrix. This would include the retention of wetlands, grassland patches, shrub stands,  
31 and herbaceous edge habitats, which could provide suitable nesting, foraging or roosting habitat for  
32 tricolored blackbird (Objective CLNC1.3).

33 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
34 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
35 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
36 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
37 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
38 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
39 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

40 The acres of protection and restoration contained in the near-term Plan goals, in addition to the  
41 detailed habitat value goals that would be applied to near-term acres, are more than sufficient to  
42 satisfy the typical mitigation ratios that would be applied to the project-level effects of CM1 and the  
43 near-term impacts from other conservation measures on nesting, roosting, and cultivated lands  
44 foraging habitat. The 3,660 acres of grassland protection in the near-term are 213 acres short of the  
45 2:1 protection mitigation ratio. However, the acres of permanent impact would be compensated for  
46 by this acreage and temporary impacts on grassland would be restored to preproject conditions

1 (including revegetation with native vegetation if within 1 year of completion of construction) under  
2 *AMM2 Construction Best Management Practices and Monitoring*. With the enhancement of grasslands  
3 described above, and the restoration of temporary habitat impacts, this difference between  
4 impacted and conserved grassland acreages in the near-term time period would not result in a  
5 significant impact on tricolored blackbird.

### 6 ***Late Long-Term Timeframe***

7 Based on the habitat model, the study area approximately 164,947 acres of breeding and 259,093  
8 acres of nonbreeding habitat for tricolored blackbird. The Delta is an important wintering area for  
9 the tricolored blackbird (Hamilton 2004, Beedy 2008). Although there is a large acreage of modeled  
10 breeding habitat available, the study area does not currently support many nesting tricolored  
11 blackbirds with the exception of a few occurrences on the fringes of the Suisun Marsh, in the Yolo  
12 Bypass, and along the southwestern perimeter of the study area (BDCP Chapter 5, *Effects Analysis*).  
13 Alternative 1C as a whole would result in the permanent loss of and temporary effects on 15,852  
14 acres of breeding habitat and 32,489 acres of nonbreeding habitat for tricolored blackbird during  
15 the term of the Plan (10% of the total breeding habitat in the study area and 13% of the total  
16 nonbreeding habitat in the study area). The locations of these losses are described above in the  
17 analyses of individual conservation measures.

18 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*  
19 *Restoration*, *CM4 Tidal Natural Communities Restoration*, *CM5 Seasonally Inundated Floodplain*  
20 *Restoration*, *CM7 Riparian Natural Community Restoration*, and *CM8 Grassland Natural Community*  
21 *Restoration* to restore or create at least 5,000 acres and protect at least 750 acres of valley/foothill  
22 riparian natural community, protect 8,000 acres and restore 2,000 acres of grassland natural  
23 community, protect 600 acres of vernal pool complex, protect 150 acres of alkali seasonal wetland  
24 complex, protect 8,100 acres of managed wetland, and protect 48,625 acres of cultivated lands that  
25 provide suitable habitat for native wildlife species (Table 3-4 in Chapter 3). In addition,

26 Species-specific biological goals and objectives for tricolored blackbird commit to protecting or  
27 restoring at least 50 acres of occupied or recently occupied (within the last 15 years) tricolored  
28 blackbird nesting habitat located within 5 miles of high-value foraging habitat in CZs 1, 2, 8, or 11  
29 (Objective TRBL1.1). Foraging habitat value classes for tricolored blackbird are found in Table 12-  
30 1C-38. To ensure that natural community conservation benefits tricolored blackbird, the Plan  
31 further specifies that cultivated lands protected for tricolored blackbird retain residual wetland,  
32 grassland patches, shrub stands, and herbaceous edge habitats which may provide suitable nesting,  
33 foraging or roosting habitat for the species (Objective CLNC1.3). In addition, 26,300 acres of  
34 moderate-, high-, or very high-value cultivated lands would be conserved and managed as  
35 nonbreeding foraging habitat, 50% of which would be of high- or very high-value (Objective  
36 TRBL1.2). At least 11,050 acres of cultivated lands managed as high to very high breeding foraging  
37 habitat would be conserved within 5 miles of occupied or recently occupied (within the last 15  
38 years) tricolored blackbird nesting habitat in CZs 1, 2, 3, 4, 7, 8, or 11 (Objective TRBL1.2). Most of  
39 the loss of breeding and nonbreeding habitat would be to cultivated lands that are abundant  
40 throughout the study area, so the loss is not expected to adversely affect the population in the study  
41 area.

42 The BDCP's beneficial effects analysis (BDCP Chapter 5.6, *Effects on Covered Wildlife and Plant*  
43 *Species*) estimates that the restoration and protection actions discussed above could result in the  
44 protection of an estimated 46,566 acres of tricolored blackbird habitat (16,476 acres breeding

1 habitat and 31,090 acres nonbreeding habitat) and restoration of 31,001 acres of tricolored  
2 blackbird habitat (2,190 acres breeding habitat and 28,811 acres nonbreeding habitat).

3 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
4 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
5 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
6 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
7 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
8 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
9 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

10 Considering Alternative 1C's protection and restoration provisions, which would provide acreages  
11 of new or enhanced habitat in amounts greater than necessary to compensate for habitats lost to  
12 construction and restoration activities, and implementation of AMM1–AMM7 and *AMM21 Tricolored*  
13 *Blackbird*, the loss of habitat or direct mortality through the implementation of Alternative 1C as a  
14 whole would not result in a substantial adverse effect through habitat modifications and would not  
15 substantially reduce the number or restrict the range of the species. Therefore, the alternative  
16 would have a less-than-significant impact on tricolored blackbird.

17 There are three other factors relevant to effects on tricolored blackbird.

- 18 ● Very little loss of nesting structure would occur (up to 81 acres of permanent loss and 93 acres  
19 of temporary loss).
- 20 ● Most of the loss of breeding and nonbreeding habitat would be to cultivated lands that are  
21 abundant throughout the Plan Area, so the loss is not expected to adversely affect the population  
22 in the Plan Area.
- 23 ● Most temporary impacts would be to cultivated lands and grasslands that could be restored  
24 relatively quickly to suitable foraging habitat after completion of construction activities.

25 Considering these protection and restoration provisions, which would provide acreages of new or  
26 enhanced habitat in amounts greater than necessary to compensate for habitats lost to construction  
27 and restoration activities, and with implementation of AMM1–AMM7 and *AMM21 Tricolored*  
28 *Blackbird*, the loss of habitat or direct mortality through the implementation of Alternative 1C as a  
29 whole would not result in a substantial adverse effect through habitat modifications and would not  
30 substantially reduce the number or restrict the range of the species. Therefore, the alternative  
31 would have a less-than-significant impact on tricolored blackbird.

### 32 **Impact BIO-88: Effects on Tricolored Blackbird Associated with Electrical Transmission** 33 **Facilities**

34 New transmission lines would increase the risk that tricolored blackbirds could be subject to power  
35 line strikes, which could result in injury or mortality of individuals. Tricolored blackbirds would  
36 have the potential to intersect the proposed transmission lines largely due to winter movements  
37 throughout the study area, when individuals are migrating in large flocks and dense fog is common  
38 in the area). Although migratory movements may increase the risk of strike hazard, daily flights  
39 associated with winter foraging likely occurs in smaller flocks at heights that are lower than the  
40 transmission lines (BDCP Attachment 5J.C, *Analysis of Potential Bird Collisions at Proposed BDCP*  
41 *Transmission Lines*). Transmission line poles and towers provide perching substrate for raptors,  
42 which could result in increased predation pressure on local tricolored blackbirds. The existing

1 network of transmission lines in the Plan Area currently poses these risks and any incremental risk  
2 associated with the new power line corridors would not be expected to affect the study area  
3 population. *AMM20 Greater Sandhill Crane* would further reduce any potential effects of  
4 transmission lines on tricolored blackbird.

5 **NEPA Effects:** New transmission lines would increase the risk for tricolored blackbird powerline  
6 strikes, primarily in winter during migration movements. *AMM20 Greater Sandhill Crane* would  
7 reduce the potential impact of the construction of new transmission lines on tricolored blackbird  
8 and would not result in an adverse effect on the species.

9 **CEQA Conclusion:** New transmission lines would increase the risk for tricolored blackbird  
10 powerline strikes, primarily in winter during migration movements. *AMM20 Greater Sandhill Crane*  
11 would reduce the potential impact of the construction of new transmission lines on tricolored  
12 blackbird to a less-than-significant level.

### 13 **Impact BIO-89: Indirect Effects of Plan Implementation on Tricolored Blackbird**

14 **Indirect construction- and operation-related effects:** Tricolored blackbird nesting habitat within  
15 the vicinity of proposed construction areas that could be indirectly affected by construction  
16 activities. Construction noise above background noise levels (greater than 50 dBA) could extend  
17 1,900 to 5,250 feet from the edge of construction activities (BDCP Appendix 5.J, Attachment 5J.D,  
18 *Indirect Effects of the Construction of the BDCP Conveyance Facility on Sandhill Crane*, Table 4),  
19 although there are no available data to determine the extent to which these noise levels could affect  
20 tricolored blackbird. Indirect effects associated with construction include noise, dust, and visual  
21 disturbance caused by grading, filling, contouring, and other ground-disturbing operations outside  
22 the project footprint but within 1,300 feet from the construction edge. Construction and subsequent  
23 maintenance-related noise and visual disturbances could mask calls, disrupt foraging and nesting  
24 behaviors, and reduce the functions of suitable nesting habitat for these species. *AMM21 Tricolored*  
25 *Blackbird* would require preconstruction surveys, and if detected, covered activities would be  
26 avoided within a minimum 250 feet of an active nesting colony and up to 1,300 feet where  
27 practicable until breeding has ceased. In addition, monitoring would be implemented to ensure that  
28 construction does not adversely affect the nesting colony. The use of mechanical equipment during  
29 water conveyance facilities construction could cause the accidental release of petroleum or other  
30 contaminants that could affect tricolored blackbird in the surrounding habitat. The inadvertent  
31 discharge of sediment or excessive dust adjacent to tricolored blackbird habitat could also affect the  
32 species. *AMM1-AMM7*, including *AMM2 Construction Best Management Practices and Monitoring*,  
33 would minimize the likelihood of such spills and ensure that measures are in place to prevent runoff  
34 from the construction area and negative effects of dust on active nests.

35 **Methylmercury Exposure:** Covered activities have the potential to exacerbate bioaccumulation of  
36 mercury in avian species, including tricolored blackbird. Marsh (tidal and nontidal) and floodplain  
37 restoration also have the potential to increase exposure to methylmercury. Mercury is transformed  
38 into the more bioavailable form of methylmercury in aquatic systems, especially areas subjected to  
39 regular wetting and drying such as tidal marshes and flood plains (Alpers et al. 2008). Thus, BDCP  
40 restoration activities that create newly inundated areas could increase bioavailability of mercury  
41 (see BDCP Chapter 3 *Conservation Strategy*, for details of restoration).

42 The potential mobilization or creation of methylmercury within the study area varies with site-  
43 specific conditions and would need to be assessed at the project level. *CM12 Methylmercury*  
44 *Management* contains provisions for project-specific Mercury Management Plans. Breeding

1 tricolored blackbirds are not thought to be highly susceptible to methylmercury exposure because  
2 tidal wetlands are not expected to be a major foraging area for the species. Furthermore, the Suisun  
3 Marsh Plan (Bureau of Reclamation et al. 2010) anticipates that tidal wetlands restored under the  
4 plan would generate less methylmercury than the existing managed wetlands, potentially reducing  
5 the overall risk. However, species sensitivity to methylmercury differs widely and there is a large  
6 amount of uncertainty with respect to species-specific effects and increased methylmercury  
7 associated with natural community and floodplain restoration could indirectly affect tricolored  
8 blackbird, via uptake in lower trophic levels (as described in the BDCP, Appendix 5.D, *Contaminants*).  
9 Site-specific restoration plans that address the creation and mobilization of mercury, as well as  
10 monitoring and adaptive management as described in CM12 would be available to address the  
11 uncertainty of methylmercury levels in restored tidal marsh and potential impacts on tricolored  
12 blackbird.

13 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in  
14 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,  
15 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,  
16 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz  
17 2009). The effect of selenium toxicity differs widely between species and also between age and sex  
18 classes within a species. In addition, the effect of selenium on a species can be confounded by  
19 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith  
20 2009).

21 The primary source of selenium bioaccumulation in birds is through their diet (Ackerman and  
22 Eagles-Smith 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the  
23 trophic level at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At  
24 Kesterson Reservoir in the San Joaquin Valley, selenium concentrations in invertebrates have been  
25 found to be two to six times the levels in rooted plants. Furthermore, bivalves sampled in the San  
26 Francisco Bay contained much higher selenium levels than crustaceans such as copepods (Stewart et  
27 al. 2004). Studies conducted at the Grasslands in Merced County recorded higher selenium levels in  
28 black-necked stilts which feed on aquatic invertebrates than in mallards and pintails, which are  
29 primarily herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which  
30 forage on bivalves) have much higher levels of selenium levels than shorebirds that prey on aquatic  
31 invertebrates (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high  
32 levels of selenium have a higher risk of selenium toxicity.

33 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations  
34 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to  
35 exacerbate bioaccumulation of selenium in avian species, including tricolored blackbird. Marsh  
36 (tidal and nontidal) and floodplain restoration have the potential to mobilize selenium, and  
37 therefore increase avian exposure from ingestion of prey items with elevated selenium levels. Thus,  
38 BDCP restoration activities that create newly inundated areas could increase bioavailability of  
39 selenium (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Changes in  
40 selenium concentrations were analyzed in Chapter 8, *Water Quality*, and it was determined that,  
41 relative to Existing Conditions and the No Action Alternative, CM1 would not result in substantial,  
42 long-term increases in selenium concentrations in water in the Delta under any alternative.  
43 However, it is difficult to determine whether the effects of potential increases in selenium  
44 bioavailability associated with restoration-related conservation measures (CM4 and CM5) would  
45 lead to adverse effects on tricolored blackbird.

1 Because of the uncertainty that exists at this programmatic level of review, there could be a  
2 substantial effect on tricolored blackbird from increases in selenium associated with restoration  
3 activities. This effect would be addressed through the implementation of *AMM27 Selenium*  
4 *Management* (BDCP Appendix 3.C, *Avoidance and Minimization Measures*) which would provide  
5 specific tidal habitat restoration design elements to reduce the potential for bioaccumulation of  
6 selenium and its bioavailability in tidal habitats. Furthermore, the effectiveness of selenium  
7 management to reduce selenium concentrations and/or bioaccumulation would be evaluated  
8 separately for each restoration effort as part of design and implementation. This avoidance and  
9 minimization measure would be implemented as part of the tidal habitat restoration design  
10 schedule.

11 **NEPA Effects:** The effects of noise, potential spills of hazardous material, increased dust and  
12 sedimentation, and operations and maintenance of the water conveyance facilities would not be  
13 adverse with the implementation of AMM1–AMM7 and *AMM21 Tricolored Blackbird*. Tidal habitat  
14 restoration could result in increased exposure of California least tern to selenium. This effect would  
15 be addressed through the implementation of *AMM27 Selenium Management*, which would provide  
16 specific tidal habitat restoration design elements to reduce the potential for bioaccumulation of  
17 selenium and its bioavailability in tidal habitats. The implementation of tidal natural communities  
18 restoration or floodplain restoration could result in increased exposure of tricolored blackbird to  
19 methylmercury. It is unlikely that breeding tricolored blackbird would be highly susceptible to  
20 methylmercury exposure because tidal wetlands are not expected to be a major foraging area for the  
21 species. However, it is unknown what concentrations of methylmercury are harmful to this species  
22 and the potential for increased exposure varies substantially within the study area. Site-specific  
23 restoration plans that address the creation and mobilization of mercury, as well as monitoring and  
24 adaptive management as described in *CM12 Methylmercury Management*, would better inform the  
25 potential effects of methylmercury on tricolored blackbird. The site-specific planning phase of  
26 marsh restoration would be the appropriate place to assess the potential for risk of methylmercury  
27 exposure for tricolored blackbird, once site specific sampling and other information could be  
28 developed.

29 **CEQA Conclusion:** Impacts of noise, the potential for hazardous spills, increased dust and  
30 sedimentation, and operations and maintenance of the water conveyance facilities would be less  
31 than significant with the implementation of *AMM21 Tricolored Blackbird* and AMM1–AMM7. Tidal  
32 habitat restoration could result in increased exposure of California least tern to selenium. This  
33 impact would be addressed through the implementation of *AMM27 Selenium Management* which  
34 would provide specific tidal habitat restoration design elements to reduce the potential for  
35 bioaccumulation of selenium and its bioavailability in tidal habitats. The implementation of tidal  
36 natural communities restoration or floodplain restoration could result in increased exposure of  
37 tricolored blackbird to methylmercury. It is unlikely that breeding tricolored blackbird would be  
38 highly susceptible to methylmercury exposure because tidal wetlands are not expected to be a major  
39 foraging area for the species. However, it is unknown what concentrations of methylmercury are  
40 harmful to this species. Site-specific restoration plans that address the creation and mobilization of  
41 mercury, as well as monitoring and adaptive management as described in *CM12 Methylmercury*  
42 *Management*, would better inform the potential impacts of methylmercury on tricolored blackbird.  
43 With these measures in place, indirect effects from Alternative 1C would have a less-than-significant  
44 impact on tricolored blackbird.

1 **Impact BIO-90: Periodic Effects of Inundation of Tricolored Blackbird Habitat as a Result of**  
2 **Implementation of Conservation Components**

3 Flooding of the Yolo Bypass (CM2) would inundate 2,447–4,312 acres of breeding habitat and 263–  
4 1,252 acres of nonbreeding habitat (Table 12-1C-37). Based on hypothetical floodplain restoration,  
5 construction of setback levees for *CM5 Seasonally Inundated Floodplain Restoration* could result in  
6 periodic inundation of approximately 2,509 acres of breeding habitat (30 acres of nesting, 2,124  
7 acres of cultivated lands, 355 acres of noncultivated lands suitable for foraging) and 2,694 acres of  
8 nonbreeding habitat (29 acres of roosting, 2,506 acres of cultivated lands, 158 acres of noncultivated  
9 lands suitable for foraging, Table 12-1C-37) resulting in the temporary loss of these habitats.  
10 Tricolored blackbirds are highly nomadic during the winter and would be expected to move to  
11 adjacent suitable foraging habitat when the bypass is inundated, as they do under the current  
12 flooding regime. However, this inundation could reduce the availability of nesting habitat during  
13 years when flooding extends into the nesting season (past March). The periodic inundation of the  
14 Yolo Bypass (CM2) and of other floodplains (CM5) is expected to restore a more natural flood  
15 regime in support of wetland and riparian vegetation types that support nesting habitat. There  
16 would be no expected adverse effect on tricolored blackbird.

17 **NEPA Effects:** Implementation of CM2 and CM5 would result in periodic inundation of nesting and  
18 foraging habitat for tricolored blackbird. Periodic inundation would not result in an adverse effect  
19 on tricolored blackbird because inundation is expected to take place outside of the breeding season.  
20 Although foraging habitat would be temporarily unavailable, tricolored blackbirds are highly  
21 nomadic in winter and wintering birds would be expected to move to adjacent foraging habitat.

22 **CEQA Conclusion:** Implementation of CM2 and CM5 would result in periodic inundation of nesting  
23 and foraging habitat for tricolored blackbird. Periodic inundation would have a less-than-significant  
24 impact on tricolored blackbird because inundation is expected to take place outside of the breeding  
25 season. Although foraging habitat would be temporarily unavailable, tricolored blackbirds are highly  
26 nomadic in winter and wintering birds would be expected to move to adjacent foraging habitat.

27 **Western Burrowing Owl**

28 This section describes the effects of Alternative 1C, including water conveyance facilities  
29 construction and implementation of other conservation components, on western burrowing owl.  
30 Western burrowing owl modeled habitat consisted of high- and low-value habitat for nesting and  
31 foraging. High-value habitat consists of plant alliances within the grassland and vernal pool natural  
32 communities and pasture. Low-value habitat includes plant alliances and crop types from managed  
33 wetland, alkali seasonal wetland, and cultivated lands. Value was determined through reported  
34 species use patterns from the literature.

35 Construction and restoration associated with Alternative 1C conservation measures would result in  
36 both temporary and permanent losses of western burrowing owl modeled habitat as indicated in  
37 Table 12-1C-39. Full implementation of Alternative 1C also include the following conservation  
38 actions over the term of the BDCP to benefit the western burrowing owl (BDCP Chapter 3, Section  
39 3.3, *Biological Goals and Objectives*).

- 40 • Protect at least 1,000 acres of cultivated lands in CZs 1 and 11 that support high-value  
41 burrowing owl habitat and are within 0.5 mile of high-value grassland habitat or occupied low-  
42 value habitat (Objective WBO1.1, associated with CM3).

- 1       ● Protect at least 8,000 acres of grassland with at least 2,000 acres protected in CZ 1, at least 1,000  
2       acres protected in CZ 8, at least 2,000 acres protected in CZ 11, and the remainder distributed  
3       among CZs 1, 2, 4, 5, 7, 8, and 11 (Objective GNC1.1, associated with CM3).
- 4       ● Restore at least 2,000 acres of grasslands (Objective GNC1.2, associated with CM8).
- 5       ● Protect at least 150 acres of alkali seasonal wetland and at least 600 acres of existing vernal pool  
6       complex in CZs 1, 8, and/or 11 (Objectives ASWNC1.1 and VPNC1.1, associated with CM3).
- 7       ● Restore or create alkali seasonal wetlands and vernal pool complex in CZs 1, 8, and/or 11 to  
8       achieve no net loss of wetted acres (Objectives ASWNC1.2 and VPNC1.2, associated with CM9)
- 9       ● Increase burrow availability and prey abundance and accessibility (Objectives ASWNC2.3,  
10       ASWNC2.4, VPNC2.4, VPNC2.5, GNC2.3, and GNC2.4, associated with CM11)
- 11       ● Protect at least 48,600 acres of cultivated lands that provide suitable habitat for covered and  
12       other native wildlife species and maintain and protect the small patches of important wildlife  
13       habitats associated with cultivated lands (Objectives CLNC1.1 and CLNC1.3, associated with  
14       CM3)

15       As explained below, with the restoration or protection of these amounts of habitat, in addition to  
16       management activities that would enhance habitat for the species and the implementation of  
17       AMM1–AMM7, AMM23 *Western Burrowing Owl*, and Mitigation Measures BIO-91 and BIO-91a,  
18       impacts on western burrowing owl would not be adverse for NEPA purposes and would be less than  
19       significant for CEQA purposes.

1 **Table 12-1C-39. Changes in Western Burrowing Owl Modeled Habitat Associated with Alternative**  
2 **1C (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	High-value	1,052	1,052	1,447	1,447	NA	NA
	Low-value	3,067	3,067	3,492	3,492	NA	NA
<b>Total Impacts CM1</b>		<b>4,119</b>	<b>4,119</b>	<b>4,939</b>	<b>4,939</b>		
CM2-CM18	High-value	4,487	11,570	245	328	1,390-3,303	779
	Low-value	3,527	28,506	144	971	1,522-2,927	6,162
<b>Total Impacts CM2-CM18</b>		<b>8,014</b>	<b>40,076</b>	<b>389</b>	<b>1,299</b>	<b>2,912-6,230</b>	<b>6,941</b>
<b>Total High-value</b>		<b>5,539</b>	<b>12,622</b>	<b>1,692</b>	<b>1,775</b>	1,390-3,303	779
<b>Total Low-value</b>		<b>6,594</b>	<b>31,573</b>	<b>3,636</b>	<b>4,463</b>	1,522-2,927	6,162
<b>TOTAL IMPACTS</b>		<b>12,133</b>	<b>44,195</b>	<b>5,328</b>	<b>6,238</b>	<b>2,912-6,230</b>	<b>6,941</b>

<sup>a</sup> See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-91: Loss or Conversion of Habitat for and Direct Mortality of Western Burrowing**  
5 **Owl**

6 Alternative 1C conservation measures would result in the combined permanent and temporary loss  
7 of up to 50,460 acres of modeled habitat for western burrowing owl (of which 14,397 acres is high-  
8 value habitat and 36,063 acres is low-value 14,397, Table 12-1C-39). Conservation measures that  
9 would result in these losses are conveyance facilities and transmission line construction, and  
10 establishment and use of borrow and spoil areas (CM1), *CM2 Yolo Bypass Fisheries Enhancement*,  
11 *CM4 Tidal Natural Communities Restoration*, *CM5 Seasonally Inundated Floodplain Restoration*, *CM7*  
12 *Riparian Natural Community Restoration*, *CM8 Grassland Natural Community Restoration*, *CM10*  
13 *Nontidal Marsh Restoration*, *CM11 Natural Communities Enhancement and Management* and *CM18*  
14 *Conservation Hatcheries*. The majority of habitat loss (29,668 acres) would result from CM4. Habitat  
15 enhancement and management activities (CM11), which include ground disturbance or removal of  
16 nonnative vegetation, could result in local adverse habitat effects. In addition, maintenance activities  
17 associated with the long-term operation of the water conveyance facilities and other BDCP physical  
18 facilities could degrade or eliminate western burrowing owl habitat. Each of these individual  
19 activities is described below. A summary statement of the combined impacts and NEPA effects, and a  
20 CEQA conclusion follow the individual conservation measure discussions.

- 1 • *CM1 Water Facilities and Operation*: Construction of Alternative 1C conveyance facilities would  
2 result in the combined permanent and temporary loss of up to 2,499 acres of acres of modeled  
3 high-value western burrowing owl habitat (1,052 acres of permanent loss, 1,447 acres of  
4 temporary loss) from CZs 3, 5, 6, and 8. In addition, 6,559 acres of low-value burrowing owl  
5 habitat would be removed (3,067 acres of permanent loss, 3,492 acres of temporary loss). The  
6 majority of high-value grassland that would be removed would be in CZ 8, west of the Clifton  
7 Court Forebay. There is a high concentration of CNDDDB and DHCCP survey records for western  
8 burrowing owls in CZ 8 to the west and the south of the Clifton Court Forebay. The loss of high-  
9 value habitat from construction could remove occupied habitat, displace nesting and wintering  
10 owls, and fragment occupied burrowing owl habitat.

11 The footprint of the canal overlaps with five burrowing owl occurrences to the southwest of  
12 Clifton Court Forebay and two occurrences east of the town of Knightsen. In addition, two  
13 occurrences east of Knightsen overlap with a RTM storage area adjacent to the canal. The  
14 footprint of a proposed temporary transmission line south of Dutch Slough also overlaps with  
15 one western burrowing owl occurrence and there are several occurrences west of the new  
16 forebay that could be indirectly affected by construction activities. The implementation of  
17 *AMM23 Western Burrowing Owl* would require breeding season and nonbreeding season  
18 surveys to be conducted where burrowing owl habitat (or sign) was encountered within and  
19 adjacent to (within 150 meters) a proposed project area. Prior to any ground disturbance  
20 related to covered activities, a qualified biologist would conduct preconstruction surveys in  
21 areas identified in the habitat surveys as having suitable burrowing owl burrows. If evidence of  
22 western burrowing owls was found during the breeding season (February 1–August 31), the  
23 project proponent would avoid all nest sites that could be disturbed by project construction  
24 during the remainder of the breeding season or while the nest is occupied by adults or young  
25 (occupation includes individuals or family groups foraging on or near the site following  
26 fledging). Avoidance would include establishment of a 50- to 500-meter nondisturbance buffer  
27 around nests. If evidence of western burrowing owl is detected during the nonbreeding season  
28 (September 1–January 31), the project proponent will establish a 50- to 500-meter  
29 nondisturbance buffer around occupied burrows as determined by a qualified biologist.

30 The implementation of *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and*  
31 *Dredged Material* and *AMM23 Western Burrowing Owl* would require that, to the extent  
32 practicable, the reusable tunnel material storage area footprint avoid locations where active  
33 burrows are present. If avoidance is not possible, such as for those occurrences that overlap  
34 with the footprint of the canal, passive relocation would be considered in consultation with  
35 CDFW. If owls were to be excluded from existing burrows, artificial burrows would be used if it  
36 were possible for them to be installed within 100 meters of the existing burrows on protected  
37 lands. However, if owls were present, relocation could still constitute an adverse effect. A  
38 substantial portion of the high-value grassland protection and enhancement under *CM8*  
39 *Grassland Natural Community Restoration* would be expected to occur to the west and to the  
40 south of these occurrences in CZ 8, which would provide high-value protected lands in close  
41 proximity to the disturbed habitat. Refer to the Terrestrial Biology Map Book for a detailed view  
42 of Alternative 1C construction locations.

- 43 • *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo bypass fisheries enhancement  
44 would result in the combined permanent and temporary loss of up to 1,127 acres of high-value  
45 western burrowing owl habitat (882 acres of permanent loss, 245 acres of temporary loss) in  
46 the Yolo Bypass in CZ 2. In addition, 242 acres of low-value habitat would be removed (98 acres

1 of permanent loss, 144 acres of temporary loss). The loss is expected to occur during the first 10  
2 years of Alternative 1C implementation.

- 3 ● *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and  
4 inundation would permanently remove an estimated 29,668 acres of modeled western  
5 burrowing owl habitat in CZs 1, 2, 4, 5, 6, 7, 8, 10, and 11. The majority of removed or converted  
6 acres (19,739 acres) is composed of low-value habitat. However, 9,929 acres of high-value  
7 habitat would also be lost from tidal restoration actions. Tidal restoration would directly impact  
8 and fragment remaining high-value grassland habitat just north of Rio Vista in and around  
9 French and Prospect Islands, and in an area south of Rio Vista around Threemile Slough. Tidal  
10 natural community restoration efforts would impact one extant record of burrowing owl just  
11 northeast of Oakley along Dutch Slough and one possibly extirpated record in Suisun Marsh.
- 12 ● *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore  
13 seasonally inundated floodplain would permanently and temporarily remove approximately  
14 2,504 acres of modeled western burrowing owl in CZs 2, 4, and 7. This total is comprised of  
15 2,279 acres of low-value habitat. Also, 225 acres of high-value grassland habitat would be  
16 removed (142 permanent, 83 temporary) consisting of small patches of habitat along the San  
17 Joaquin, Old, and Middle Rivers in CZ 7.
- 18 ● *CM6 Channel Margin Enhancement*: Sites for channel margin enhancement would be located  
19 along levees where western burrowing owl could be present. The species is known to use often  
20 the grassland edges along canals and levees in agricultural areas. The implementation of *AMM23*  
21 *Western Burrowing Owl* would reduce the potential for channel margin enhancement activities  
22 to disturb owls or affect active nests.
- 23 ● *CM7 Riparian Natural Community Restoration*: Riparian restoration would permanently remove  
24 approximately 11 acres of high-value burrowing owl habitat as part of tidal restoration. In  
25 addition, 960 acres of low-value habitat would be removed as a part of tidal restoration and  
26 3,991 acres would be removed as part of seasonal floodplain restoration through CM7.
- 27 ● *CM8 Grassland Natural Community Restoration*: Grassland restoration would primarily be  
28 implemented on agricultural lands and would result in the permanent loss of 1,676 acres (362  
29 acres of high-value and 1,314 acres of low-value) of western burrowing owl habitat. The  
30 conversion of 1,676 acres of low-value habitat to high-value grassland, would temporarily  
31 remove available habitat but would ultimately have a beneficial effect on the western burrowing  
32 owl.
- 33 ● *CM10 Nontidal Marsh Restoration*: Implementation would result in the permanent removal of  
34 159 acres of high-value and 952 acres of low-value western burrowing owl habitat.
- 35 ● *CM11 Natural Communities Enhancement and Management*: A variety of habitat management  
36 actions that are designed to enhance wildlife values in restored or protected habitats could  
37 result in localized ground disturbances that could temporarily remove small amounts of  
38 western burrowing owl habitat. The burrowing owl's fossorial habits make the species more  
39 sensitive to the effects of ground disturbance than other raptors. Ground-disturbing activities,  
40 such as removal of nonnative vegetation and road and other infrastructure maintenance  
41 activities, would be expected to have minor adverse effects on available western burrowing owl  
42 habitat and would be expected to result in overall improvements to and maintenance of habitat  
43 values over the term of the BDCP. CM11 would also include the construction of recreational-  
44 related facilities including trails, interpretive signs, and picnic tables (BDCP Chapter 4, *Covered*

1 *Activities and Associated Federal Actions*). The construction of trailhead facilities, signs, staging  
2 areas, picnic areas, bathrooms, etc. would be placed on existing, disturbed areas when and  
3 where possible. However, approximately 50 acres of grassland habitat would be lost from the  
4 construction of trails and facilities.

5 Habitat management- and enhancement-related activities and equipment operation could  
6 destroy nests burrows, and noise and visual disturbances could lead to their abandonment,  
7 resulting in mortality of eggs and nestlings. The potential for these activities to result in nest  
8 failure and mortality or other adverse effects on western burrowing owl would be avoided or  
9 minimized with the incorporation of *AMM23 Western Burrowing Owl* into the BDCP which would  
10 require surveys to determine presence or absence and the establishment of no-disturbance  
11 buffers around active sites.

- 12 ● *CM18 Conservation Hatcheries*: Implementation of CM18 would remove up to 35 acres of high-  
13 value western burrowing owl habitat for the development of a delta and longfin smelt  
14 conservation hatchery in CZ 1.
- 15 ● *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground  
16 water conveyance facilities and restoration infrastructure could result in ongoing but periodic  
17 disturbances that could affect western burrowing owl use of the surrounding habitat.  
18 Maintenance activities would include vegetation management, levee and structure repair, and  
19 re-grading of roads and permanent work areas. These effects, however, would be reduced by  
20 AMMs and conservation actions as described below.
- 21 ● *Injury and Direct Mortality*: Construction would not be expected to result in direct mortality of  
22 western burrowing owl. However, if nest burrows were occupied in the vicinity of construction  
23 activities, equipment operation could destroy nests and noise and visual disturbances could lead  
24 to abandonment. *AMM23 Western Burrowing Owl* would ensure that preconstruction surveys  
25 detected any occupied burrows and no-disturbance buffers would be implemented.

26 The following paragraphs summarize the combined effects discussed above and describe other  
27 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also  
28 included.

### 29 ***Near-Term Timeframe***

30 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
31 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
32 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
33 effects of construction would not be adverse under NEPA. Alternative 1C would remove 5,964 acres  
34 (5,368 acres permanent, 596 acres temporary) of high-value habitat for western burrowing owl in  
35 the study area in the near-term. These effects would result from the construction of the water  
36 conveyance facilities (CM1, 1,232 acres), and implementing other conservation measures (*CM2 Yolo*  
37 *Bypass Fisheries Enhancement*, *CM4 Tidal Natural Communities Restoration*, *CM7 Riparian Natural*  
38 *Community Restoration*, *CM8 Grassland Natural Community Restoration*, *CM9 Vernal Pool and Alkali*  
39 *Seasonal Wetland Complex Restoration*, *CM11 Natural Communities Enhancement and Management*  
40 *and CM18 Conservation Hatcheries*—4,732 acres). In addition, 7,373 acres of low-value habitat  
41 would be removed or converted in the near-term (CM1, 3,702 acres; *CM2 Yolo Bypass Fisheries*  
42 *Enhancement*, *CM4 Tidal Natural Communities Restoration*, *CM7 Riparian Natural Community*  
43 *Restoration*, *CM8 Grassland Natural Community Restoration*, *CM9 Vernal Pool and Alkali Seasonal*

1 *Wetland Complex Restoration, CM11 Natural Communities Enhancement and Management and CM18*  
2 *Conservation Hatcheries—3,671 acres).*

3 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by  
4 CM1 and that are identified in the biological goals and objectives for western burrowing owl in  
5 Chapter 3 of the BDCP would be 2:1 protection for the loss of high-value habitat and 1:1 protection  
6 for the loss of low-value habitat. Using these typical ratios would indicate that 4,998 acres should be  
7 protected to mitigate the CM1 losses of high-value habitat, and 6,559 acres protected to compensate  
8 for loss of low-value western burrowing owl habitat. The near-term effects of other conservation  
9 actions would require the protection of 9,464 acres of high-value habitat 3,671 acres of low-value  
10 habitat using the same typical NEPA and CEQA ratios (2:1 protection for loss of high-value habitat  
11 and 1:1 protection for loss of low-value habitat).

12 The BDCP has committed to near-term goals of protecting 2,000 acres and restoring 1,140 acres of  
13 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of  
14 alkali seasonal wetland complex, and protecting 15,400 acres of non-rice cultivated lands (Table 3-4  
15 in Chapter 3, *Description of Alternatives*). These conservation actions are associated with CM3, CM8,  
16 and CM9 and would occur in the same timeframe as the construction and early restoration losses.

17 The protection of high-value grasslands is essential in order to sustain existing western burrowing  
18 owl populations in the study area. Grassland restoration and protection would occur in CZs 1, 2, 4, 5,  
19 7, 8, and 11 (Objectives GNC1.1 and GNC1.2). Grassland protection in CZs 1, 8, and 11 would be  
20 associated with vernal pool and alkali seasonal wetland complexes (Objectives ASWNC1.1 and  
21 VPNC1.1) and would result in a contiguous matrix of grassland, alkali seasonal wetland, and vernal  
22 pool natural communities which would provide habitat for western burrowing owl and reduce the  
23 effects of current levels of habitat fragmentation. This protection would not only expand the amount  
24 of protected high-value habitat in the study area, but also support existing western burrowing owl  
25 populations that occur to the west of CZ 8 and in the areas surrounding CZs 1 and 11, which would  
26 especially benefit declining populations in the vicinity of Suisun Marsh and San Pablo Bay. Certain  
27 types of cultivated lands such as irrigated pasture, alfalfa and other hay crops, and some row crops  
28 can provide foraging habitat for western burrowing owl. Under appropriate management regimes,  
29 cultivated lands can support breeding and wintering burrowing owls. Under *CM11 Natural*  
30 *Communities Enhancement and Management*, small mammal and insect prey populations would be  
31 increased on protected lands, enhancing the foraging value of these natural communities (Objectives  
32 ASWNC2.4, VPNC2.5, and GNC2.4). In addition, burrow availability would be increased on protected  
33 natural communities by encouraging ground squirrel occupancy and expansion through the creation  
34 of berms, mounds, edges, and through the prohibition of ground squirrel control programs (i.e.,  
35 poisoning, Objectives ASWNC2.3, VPNC2.4, GNC2.3). These Plan objectives represent performance  
36 standards for considering the effectiveness of conservation actions.

37 The combined acres of restoration and protection of 3,660 acres of grassland, vernal pool complex,  
38 and alkali seasonal wetland contained in the near-term Plan goals and the additional detail in the  
39 biological objectives satisfy the typical mitigation that would be applied to the project-level effects of  
40 CM1 and other near-term effects on western burrowing owl high-value habitat with the  
41 consideration that some portion of the 15,400 acres of cultivated lands protected in the near-term  
42 timeframe would be managed in suitable crop types to compensate for the loss of high-value  
43 burrowing owl habitat at a ratio of 2:1. Mitigation Measure BIO-91, *Compensate for the Near-Term*  
44 *Loss of High-Value Burrowing Owl Habitat*, would be available to address the adverse effect of high-  
45 value habitat loss in the near-term.

1 The compensation for the loss of low-value burrowing owl habitat from the other near-term impacts  
2 would be 5,632 acres less than the typical ratio of 1:1 protection. However, 3,636 acres of all near-  
3 term impacts on low-value habitat would be temporary and would be restored within 1 year of the  
4 completion of construction. In addition, a proportion of the loss of low-value habitat would be a  
5 result of the conversion to high-value habitat. The near-term conservation acres would be 1,996  
6 acres short of compensating for the permanent impacts on low-value habitat for the species.  
7 Mitigation Measure BIO-91a, *Compensate for Permanent Loss of Low-Value Western Burrowing Owl*  
8 *Habitat*, would compensate for the loss of permanent low-value habitat in the near-term. The  
9 management and enhancement of cultivated lands and protected grasslands, including prey  
10 enhancement, increasing burrow availability, and reducing existing fragmentation of high-value  
11 habitat, would further compensate for any adverse effect from the near-term loss of low-value  
12 foraging habitat on western-burrowing owl.

13 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
14 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
15 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment and*  
16 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
17 *Material*, *AMM7 Barge Operations Plan*, and *AMM23 Western Burrowing Owl*. All of these AMMs  
18 include elements that avoid or minimize the risk of affecting habitats and species adjacent to work  
19 areas and storage sites. The AMMs are described in detail in BDCP Appendix 3.C.

#### 20 **Late Long-Term Timeframe**

21 Based on the habitat model, the Plan Area supports approximately 128,781 acres of high-value and  
22 234,903 acres of low-value habitat for western burrowing owl. Alternative 1C as a whole would  
23 result in the permanent loss of and temporary effects on 14,397 acres of high-value habitat and  
24 36,063 acres of low-value habitat for western burrowing owl during the term of the Plan (11% of  
25 the total primary habitat in the Plan Area and 15% of the total low-value habitat in the study area).

26 The locations of these losses are described above in the analyses of individual conservation  
27 measures. The Plan includes conservation commitments through *CM3 Natural Communities*  
28 *Protection and Restoration*, *CM8 Grassland Natural Community Restoration*, and *CM9 Vernal Pool and*  
29 *Alkali Seasonal Wetland Complex Restoration* to protect 8,000 acres and restore 2,000 acres of  
30 grassland natural community, protect 600 acres of vernal pool complex, protect 150 acres of alkali  
31 seasonal wetland complex and protect 48,625 acres of cultivated lands that provide suitable habitat  
32 for native wildlife species (Table 3-4 in Chapter 3). Grassland restoration and protection would  
33 occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1 and GNC1.2). Grassland protection in CZs 1, 8,  
34 and 11 would be associated with vernal pool and alkali seasonal wetland complexes (Objectives  
35 ASWNC1.1 and VPNC1.1) and would result in a contiguous matrix of grassland, alkali seasonal  
36 wetland, and vernal pool natural communities which would provide habitat for western burrowing  
37 owl and reduce the effects of current levels of habitat fragmentation. This protection would not only  
38 expand the amount of protected high-value habitat in the study area, but also support existing  
39 western burrowing owl populations that occur to the west of CZ 8 and in the areas surrounding CZs  
40 1 and 11, which would especially benefit declining populations in the vicinity of Suisun Marsh and  
41 San Pablo Bay. Certain types of cultivated lands such as irrigated pasture, alfalfa and other hay  
42 crops, and some row crops can provide foraging habitat for western burrowing owl. Under  
43 appropriate management regimes, cultivated lands can support breeding and wintering burrowing  
44 owls. To ensure that cultivated lands conservation benefits western burrowing owl, the Plan's  
45 biological goals and objectives further specify that, of the cultivated lands protected in the late long-

1 term, at least 1,000 acres would be protected in CZs 1 and 11 that support high-value burrowing owl  
2 habitat and are within 0.5 miles of high-value grassland habitat or occupied low-value habitat  
3 (Objective WBO1.1). Under *CM11 Natural Communities Enhancement and Management*, small  
4 mammal and insect prey populations would be increased on protected lands, enhancing the foraging  
5 value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4). In addition,  
6 burrow availability would be increased on protected natural communities by encouraging ground  
7 squirrel occupancy and expansion through the creation of berms, mounds, edges, and through the  
8 prohibition of ground squirrel control programs (i.e., poisoning, Objectives ASWNC2.3, VPNC2.4,  
9 GNC2.3).

10 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*  
11 *Plant Species*) estimates that the restoration and protection actions discussed above could result in  
12 the protection of an estimated 33,766 acres of western burrowing owl habitat (8,589 acres high-  
13 value and 25,177 acres low-value habitat) and restoration of 1,645 acres of western burrowing owl  
14 habitat (1,642 acres high-value and 3 acres low-value habitat).

15 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
16 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
17 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
18 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
19 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
20 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
21 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

22 **NEPA Effects:** The loss of western burrowing owl habitat and potential for mortality of this special-  
23 status species under Alternative 1C would represent an adverse effect in the absence of other  
24 conservation actions. With habitat protection and restoration associated with CM3, CM8, and CM11,  
25 guided by biological goals and objectives and by AMM1–AMM7 and *AMM23 Western Burrowing Owl*,  
26 and with implementation of Mitigation Measures BIO-91 and BIO-91a, which would be available to  
27 guide the near-term protection and management of cultivated lands, the effects of habitat loss and  
28 potential mortality on western burrowing owl would not be adverse under Alternative 1C.

29 **CEQA Conclusion:**

30 **Near-Term Timeframe**

31 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
32 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
33 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
34 effects of construction would be less than significant under CEQA. Alternative 1C would remove  
35 5,964 acres (5,368 acres permanent, 596 acres temporary) of high-value habitat for western  
36 burrowing owl in the study area in the near-term. These effects would result from the construction  
37 of the water conveyance facilities (CM1, 1,232 acres), and implementing other conservation  
38 measures (*CM2 Yolo Bypass Fisheries Enhancement*, *CM4 Tidal Natural Communities Restoration*, *CM7*  
39 *Riparian Natural Community Restoration*, *CM8 Grassland Natural Community Restoration*, *CM9 Vernal*  
40 *Pool and Alkali Seasonal Wetland Complex Restoration*, *CM11 Natural Communities Enhancement and*  
41 *Management* and *CM18 Conservation Hatcheries*—4,732 acres). In addition, 7,373 acres of low-value  
42 habitat would be removed or converted in the near-term (CM1, 3,702 acres; *CM2 Yolo Bypass*  
43 *Fisheries Enhancement*, *CM4 Tidal Natural Communities Restoration*, *CM7 Riparian Natural*  
44 *Community Restoration*, *CM8 Grassland Natural Community Restoration*, *CM9 Vernal Pool and Alkali*

1 *Seasonal Wetland Complex Restoration, CM11 Natural Communities Enhancement and Management*  
2 *and CM18 Conservation Hatcheries—3,671 acres).*

3 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by  
4 CM1 and that are identified in the biological goals and objectives for western burrowing owl in  
5 Chapter 3 of the BDCP would be 2:1 protection for the loss of high-value habitat and 1:1 protection  
6 for the loss of low-value habitat. Using these typical ratios would indicate that 4,998 acres should be  
7 protected to mitigate the CM1 losses of high-value habitat, and 6,559 acres protected to compensate  
8 for loss of low-value western burrowing owl habitat. The near-term effects of other conservation  
9 actions would require the protection of 9,464 acres of high-value habitat 3,671 acres of low-value  
10 habitat using the same typical NEPA and CEQA ratios (2:1 protection for loss of high-value habitat  
11 and 1:1 protection for loss of low-value habitat).

12 The BDCP has committed to near-term goals of protecting 2,000 acres and restoring 1,140 acres of  
13 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of  
14 alkali seasonal wetland complex, and protecting 15,400 acres of non-rice cultivated lands (Table 3-4  
15 in Chapter 3, *Description of Alternatives*). These conservation actions are associated with CM3, CM8,  
16 and CM9 and would occur in the same timeframe as the construction and early restoration losses.

17 The protection of high-value grasslands is essential in order to sustain existing western burrowing  
18 owl populations in the study area. Grassland restoration and protection would occur in CZs 1, 2, 4, 5,  
19 7, 8, and 11 (Objectives GNC1.1 and GNC1.2). Grassland protection in CZs 1, 8, and 11 would be  
20 associated with vernal pool and alkali seasonal wetland complexes (Objectives ASWNC1.1 and  
21 VPNC1.1) and would result in a contiguous matrix of grassland, alkali seasonal wetland, and vernal  
22 pool natural communities which would provide habitat for western burrowing owl and reduce the  
23 effects of current levels of habitat fragmentation. This protection would not only expand the amount  
24 of protected high-value habitat in the study area, but also support existing western burrowing owl  
25 populations that occur to the west of CZ 8 and in the areas surrounding CZs 1 and 11, which would  
26 especially benefit declining populations in the vicinity of Suisun Marsh and San Pablo Bay. Certain  
27 types of cultivated lands such as irrigated pasture, alfalfa and other hay crops, and some row crops  
28 can provide foraging habitat for western burrowing owl. Under appropriate management regimes,  
29 cultivated lands can support breeding and wintering burrowing owls. Under *CM11 Natural*  
30 *Communities Enhancement and Management*, small mammal and insect prey populations would be  
31 increased on protected lands, enhancing the foraging value of these natural communities (Objectives  
32 ASWNC2.4, VPNC2.5, and GNC2.4). In addition, burrow availability would be increased on protected  
33 natural communities by encouraging ground squirrel occupancy and expansion through the creation  
34 of berms, mounds, edges, and through the prohibition of ground squirrel control programs (i.e.,  
35 poisoning, Objectives ASWNC2.3, VPNC2.4, GNC2.3). These Plan objectives represent performance  
36 standards for considering the effectiveness of conservation actions.

37 The combined acres of restoration and protection of 3,660 acres of grassland, vernal pool complex,  
38 and alkali seasonal wetland contained in the near-term Plan goals and the additional detail in the  
39 biological objectives satisfy the typical mitigation that would be applied to the project-level effects of  
40 CM1 and other near-term effects on western burrowing owl high-value habitat with the  
41 consideration that some portion of the 15,400 acres of cultivated lands protected in the near-term  
42 timeframe would be managed in suitable crop types to compensate for the loss of high-value  
43 burrowing owl habitat at a ratio of 2:1. Mitigation Measure BIO-91, *Compensate for Near-Term Loss*  
44 *of High-Value Western Burrowing Owl Habitat*, would address the impact of high-value habitat loss in  
45 the near-term.

1 The compensation for the loss of low-value burrowing owl habitat from the other near-term impacts  
2 would be 5,632 acres less than the typical ratio of 1:1 protection. However, 3,636 acres of all near-  
3 term impacts on low-value habitat would be temporary and would be restored within 1 year of the  
4 completion of construction. In addition, a proportion of the loss of low-value habitat would be a  
5 result of the conversion to high-value habitat. The near-term conservation acres would be 1,996  
6 acres short of compensating for the permanent impacts on low-value habitat for the species.  
7 Mitigation Measure BIO-91a, *Compensate for Permanent Loss of Low-Value Habitat for Western*  
8 *Burrowing Owl* would compensate for the loss of permanent low-value habitat in the near-term. The  
9 management and enhancement of cultivated lands and protected grasslands, including prey  
10 enhancement, increasing burrow availability, and reducing existing fragmentation of high-value  
11 habitat, would further compensate for any impact from the near-term loss of low-value foraging  
12 habitat on western-burrowing owl.

13 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
14 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
15 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment and*  
16 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
17 *Material*, *AMM7 Barge Operation Plan*, and *AMM23 Western Burrowing Owl*. All of these AMMs  
18 include elements that avoid or minimize the risk of affecting habitats and species adjacent to work  
19 areas and storage sites. The AMMs are described in detail in BDCP Appendix 3.C.

#### 20 **Late Long-Term Timeframe**

21 Based on the habitat model, the Plan Area supports approximately 128,781 acres of high-value and  
22 234,903 acres of low-value habitat for western burrowing owl. Alternative 1C as a whole would  
23 result in the permanent loss of and temporary effects on 14,397 acres of high-value habitat and to  
24 36,063 acres of low-value habitat for western burrowing owl during the term of the Plan (11% of  
25 the total primary habitat in the Plan Area and 15% of the total low-value habitat in the study area).

26 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*  
27 *Restoration*, *CM8 Grassland Natural Community Restoration*, and *CM9 Vernal Pool and Alkali Seasonal*  
28 *Wetland Complex Restoration* to protect 8,000 acres and restore 2,000 acres of grassland natural  
29 community, protect 600 acres of vernal pool complex, protect 150 acres of alkali seasonal wetland  
30 complex and protect 48,625 acres of cultivated lands that provide suitable habitat for native wildlife  
31 species (Table 3-4 in Chapter 3). Grassland restoration and protection would occur in CZs 1, 2, 4, 5,  
32 7, 8, and 11 (Objectives GNC1.1 and GNC1.2). Grassland protection in CZs 1, 8, and 11 would be  
33 associated with vernal pool and alkali seasonal wetland complexes (Objectives ASWNC1.1 and  
34 VPNC1.1) and would result in a contiguous matrix of grassland, alkali seasonal wetland, and vernal  
35 pool natural communities which would provide habitat for western burrowing owl and reduce the  
36 effects of current levels of habitat fragmentation. This protection would not only expand the amount  
37 of protected high-value habitat in the study area, but also support existing western burrowing owl  
38 populations that occur to the west of CZ 8 and in the areas surrounding CZs 1 and 11, which would  
39 especially benefit declining populations in the vicinity of Suisun Marsh and San Pablo Bay. Certain  
40 types of cultivated lands such as irrigated pasture, alfalfa and other hay crops, and some row crops  
41 can provide foraging habitat for western burrowing owl. Under appropriate management regimes,  
42 cultivated lands can support breeding and wintering burrowing owls. To ensure that cultivated  
43 lands conservation benefits western burrowing owl, the Plan's biological goals and objectives  
44 further specify that, of the cultivated lands protected in the late long-term, at least 1,000 acres  
45 would be protected in CZs 1 and 11 that support high-value burrowing owl habitat and are within

1 0.5 miles of high-value grassland habitat or occupied low-value habitat (Objective WBO1.1). Under  
2 *CM11 Natural Communities Enhancement and Management*, small mammal and insect prey  
3 populations would be increased on protected lands, enhancing the foraging value of these natural  
4 communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4). In addition, burrow availability would  
5 be increased on protected natural communities by encouraging ground squirrel occupancy and  
6 expansion through the creation of berms, mounds, edges, and through the prohibition of ground  
7 squirrel control programs (i.e., poisoning, Objectives ASWNC2.3, VPNC2.4, GNC2.3).

8 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*  
9 *Plant Species*) estimates that the restoration and protection actions discussed above could result in  
10 the protection of an estimated 33,766 acres of western burrowing owl habitat (8,589 acres high-  
11 value and 25,177 acres low-value habitat) and restoration of 1,645 acres of western burrowing owl  
12 habitat (1,642 acres high-value and 3 acres low-value habitat).

13 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
14 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
15 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
16 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
17 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
18 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
19 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

20 Considering Alternative 1C's protection and restoration provisions, which would provide acreages  
21 of new high-value or enhanced habitat in amounts suitable to compensate for habitats lost to  
22 construction and restoration activities, and implementation of AMM1–AMM7, *AMM23 Western*  
23 *Burrowing Owl*, and Mitigation Measures BIO-91 and BIO-91a, which would be available to guide the  
24 near-term protection and management of cultivated lands, the loss of habitat or direct mortality  
25 through implementation of Alternative 1C would not result in a substantial adverse effect through  
26 habitat modifications and would not substantially reduce the number or restrict the range of the  
27 species. Therefore, the loss of habitat or potential mortality under this alternative would have a less-  
28 than-significant impact on western burrowing owl.

29 **Mitigation Measure BIO-91: Compensate for Near-Term Loss of High-Value Western**  
30 **Burrowing Owl Habitat**

31 Because the BDCP lacks acreage commitment for crop types that would be protected and  
32 managed within the 15,400 acres of cultivated lands protected in the near-term time period,  
33 DWR will compensate for the loss of high-value burrowing owl habitat with high-value natural  
34 communities or cultivated crop types a ratio of 2:1 in the near-term time period.

35 **Mitigation Measure BIO-91a: Compensate for Permanent Loss of Low-Value Western**  
36 **Burrowing Owl Habitat**

37 DWR will compensate for the near-term permanent loss of low-value habitat at a ratio of 1:1.

38 **Impact BIO-92: Effects on Western Burrowing Owl Associated with Electrical Transmission**  
39 **Facilities**

40 New transmission lines would increase the risk for bird-power line strikes and/or electrocution,  
41 which could result in injury or mortality of western burrowing owl. The species is large-bodied but

1 with relatively long and rounded wings, making it moderately maneuverable. While burrowing owls  
2 may nest in loose colonies, they do not flock or congregate in roosts or foraging groups. Collectively,  
3 the species' keen eyesight and largely ground-based hunting behavior make it a relatively low-risk  
4 species for powerline collision. While the species is not widespread in the study area, it may become  
5 more widely distributed as grassland enhancement improves habitat for the species. Even so, the  
6 risk of effects on the population are low, given its physical and behavioral characteristics (BDCP  
7 Attachment 5J.C, *Analysis of Potential Bird Collisions at Proposed BDCP Transmission Lines*). and new  
8 transmission lines would not be expected to have an adverse effect on the species.

9 **NEPA Effects:** The construction and presence of new transmission lines would not result in an  
10 adverse effect on western burrowing owl because the risk of bird strike is considered to be minimal  
11 based on the owl's physical and behavioral characteristics.

12 **CEQA Conclusion:** The construction and presence of new transmission lines would have a less-than-  
13 significant impact on western burrowing owl because the risk of bird strike is considered to be  
14 minimal based on the owl's physical and behavioral characteristics.

### 15 **Impact BIO-93: Indirect Effects of Plan Implementation on Western Burrowing Owl**

16 Noise and visual disturbances associated with construction-related activities could result in  
17 temporary disturbances that affect western burrowing owl use of up to 13,922 acres of modeled  
18 burrowing owl habitat (6,113 acres of high-value habitat) within 500 feet of covered activities will  
19 temporarily be made less suitable as a result of construction noise and visual disturbances adjacent  
20 to proposed construction areas. Indirect effects associated with construction include noise, dust, and  
21 visual disturbance caused by grading, filling, contouring, and other ground-disturbing operations.  
22 Any disturbance within 250 feet of a burrow occupied by burrowing owl during the breeding season  
23 (February 1–August 31) and within 160 feet during the nonbreeding season (September 1–January  
24 31) could potential displace winter owls or cause abandonment of active nests. These potential  
25 effects would be minimized with incorporation of *AMM23 Western Burrowing Owl* into the BDCP,  
26 which would require preconstruction surveys and establish no-disturbance buffers around active  
27 burrows. Construction noise above background noise levels (greater than 50 dBA) could extend  
28 1,900 to 5,250 feet from the edge of construction activities (BDCP Appendix 5.J, Attachment 5J.D,  
29 *Indirect Effects of the Construction of the BDCP Conveyance Facility on Sandhill Crane*, Table 4),  
30 although there are no available data to determine the extent to which these noise levels could affect  
31 western burrowing owl.

32 The use of mechanical equipment during water conveyance facilities construction could cause the  
33 accidental release of petroleum or other contaminants that could affect western burrowing owl in  
34 the surrounding habitat. The inadvertent discharge of sediment or excessive dust adjacent to  
35 western burrowing owl habitat could also affect the species. *AMM1–AMM7* in addition to *AMM23*  
36 *Western Burrowing Owl* would minimize the likelihood of such spills from occurring and ensure that  
37 measures were in place to prevent runoff from the construction area and any adverse effects of dust  
38 on active nests.

39 **NEPA Effects:** Indirect effects on western burrowing owl as a result of Alternative 1C  
40 implementation could have adverse effects on this species through the modification of habitat and  
41 potential for direct mortality. Construction of the new forebay in CZ 8 would have the potential to  
42 disrupt nesting owls or active burrows in the high-value grassland habitat surrounding Clifton Court  
43 Forebay and adjacent to work area. With the implementation of *AMM1–AMM7*, and *AMM23 Western*

1 *Burrowing Owl*, the indirect effects from Alternative 1C implementation would not be adverse under  
2 NEPA.

3 **CEQA Conclusion:** Indirect effects on western burrowing owl as a result of Alternative 1C  
4 implementation could have significant impacts on these species through the modification of habitat  
5 and potential for direct mortality. Construction of the new forebay in CZ 8 would have the potential  
6 to disrupt nesting owls or active burrows in the high-value grassland habitat surrounding Clifton  
7 Court Forebay and adjacent to work areas. With the implementation of AMM1–AMM7 and AMM23  
8 *Western Burrowing Owl*, the indirect effects resulting from Alternative 1C implementation would  
9 have a less-than-significant impact on western burrowing owl.

#### 10 **Impact BIO-94: Periodic Effects of Inundation on Western Burrowing Owl Habitat as a Result** 11 **of Implementation of Conservation Components**

12 Flooding of the Yolo Bypass from Fremont Weir operations (*CM2 Yolo Bypass Fisheries*  
13 *Enhancement*) would increase the frequency and duration of inundation on approximately 1,390–  
14 3,303 acres of high-value habitat and 1,522–2,927 acres of low-value habitat (Table 12-1C-39).

15 Based on hypothetical footprints, implementation of *CM5 Seasonally Inundated Floodplain*  
16 *Restoration*, could result in the periodic inundation of up to approximately 6,941 acres of modeled  
17 habitat (6,162 acres, of which would be low-value foraging habitat; Table 12-1C-39).

18 Burrowing owls cannot use inundated areas for foraging or nesting, and increased inundation  
19 frequency and duration of cultivated lands and grassland habitats may affect prey populations that  
20 have insufficient time to recover following inundation events. Depending on timing, seasonal  
21 inundation of western burrowing owl habitat could result in displacement from nesting burrows or  
22 drowning of individuals. The potential for this effect is considered low because suitable burrow sites  
23 would most likely be located along setback levees, which are expected to be subject to inundation  
24 less frequently than floodplain surfaces that would be less likely to support suitable nesting  
25 burrows.

26 **NEPA Effects:** The periodically inundated habitat would not be expected to have an adverse effect on  
27 the population. The potential for direct mortality of western burrowing owl caused by inundation  
28 would be low because the locations of burrows would likely be above elevations consistently subject  
29 to inundation; therefore, the potential impact would not be adverse.

30 **CEQA Conclusion:** The potential for direct mortality of western burrowing owl caused by inundation  
31 would be low because the locations of burrows would likely be above elevations consistently subject  
32 to inundation. Therefore, periodic inundation would be expected to have a less-than-significant  
33 impact on the population.

#### 34 **Western Yellow-Billed Cuckoo**

35 This section describes the effects of Alternative 1C, including water conveyance facilities  
36 construction and implementation of other conservation components, on western yellow-billed  
37 cuckoo. The habitat model for western yellow-billed cuckoo includes potential breeding habitat,  
38 which includes plant alliances from the valley/foothill riparian modeled habitat that contain a dense  
39 forest canopy for foraging with understory willow for nesting, and a minimum patch size of 50 acres.  
40 Modeled habitat also includes migratory habitat, which contains the same plant alliances as  
41 breeding habitat but without the minimum 50-acre patch size requirement.

1 The western yellow-billed cuckoo is uncommon in the Plan Area at present, and the likelihood that it  
2 would be found using the modeled habitat is low relative to more abundant riparian species. Nesting  
3 of the species in the plan area has not been confirmed for approximately 100 years. Western yellow-  
4 billed cuckoo was detected in the study area during 2009 DHCCP surveys, but nesting was not  
5 confirmed and the bird is suspected to have been a migrant (Appendix 12C, *2009 to 2011 Bay Delta*  
6 *Conservation Plan EIR/EIS Environmental Data Report*). Construction and restoration associated  
7 with Alternative 1C conservation measures would result in both temporary and permanent losses of  
8 Western yellow-billed cuckoo modeled habitat as indicated in Table 12-1C-40. Full implementation  
9 of Alternative 1C would also include the following conservation actions over the term of the BDCP to  
10 benefit the western yellow-billed cuckoo (BDCP Chapter 3, Section 3.3, *Biological Goals and*  
11 *Objectives*).

- 12 ● Restore or create at least 5,000 acres of valley/foothill riparian natural community, with at least  
13 3,000 acres occurring on restored seasonally inundated floodplain (Objective VFRNC1.1,  
14 associated with CM7).
- 15 ● Protect at least 750 acres of existing valley/foothill riparian natural community in CZ 7 by year  
16 10 (Objective VFRNC1.2, associated with CM3).
- 17 ● Maintain at least 500 acres of mature riparian forest in CZ 4 or CZ 7 (Objective VFRNC2.3,  
18 associated with CM3 and CM7).
- 19 ● Maintain the at least 500 acres of mature riparian forest (VFRNC2.3) intermixed with a portion  
20 of the early- to mid-successional riparian vegetation (VFRNC2.2) in large blocks with a  
21 minimum patch size of 50 acres and minimum width of 330 feet (Objective VFRNC2.4,  
22 associated with CM3 and CM7).

23 As explained below, with the restoration or protection of these amounts of habitat, in addition to  
24 management activities that would enhance these natural communities for the species and the  
25 implementation of AMM1–AMM7 and AMM22 *Suisun Song Sparrow, Yellow-Breasted Chat, Least*  
26 *Bell's Vireo, Western Yellow-Billed Cuckoo*, impacts on western yellow-billed cuckoo would not be  
27 adverse for NEPA purposes and would be less than significant for CEQA purposes.

1 **Table 12-1C-40. Changes in Western Yellow-Billed Cuckoo Modeled Habitat Associated with**  
2 **Alternative 1C (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	Breeding	0	0	0	0	NA	NA
	Migratory	13	13	35	35	NA	NA
<b>Total Impacts CM1</b>		<b>13</b>	<b>13</b>	<b>35</b>	<b>35</b>		
CM2-CM18	Breeding	29	142	5	10	11-20	17
	Migratory	278	383	83	94	37-64	125
<b>Total Impacts CM2-CM18</b>		<b>307</b>	<b>525</b>	<b>88</b>	<b>104</b>	<b>48-84</b>	<b>142</b>
<b>Total Breeding</b>		<b>29</b>	<b>142</b>	<b>5</b>	<b>10</b>	11-20	17
<b>Total Migratory</b>		<b>291</b>	<b>396</b>	<b>118</b>	<b>129</b>	37-64	125
<b>TOTAL IMPACTS</b>		<b>320</b>	<b>538</b>	<b>123</b>	<b>139</b>	<b>48-84</b>	<b>142</b>

<sup>a</sup> See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-95: Loss or Conversion of Habitat for and Direct Mortality of Western Yellow-**  
5 **Billed Cuckoo**

6 Alternative 1C conservation measures would result in the combined permanent and temporary loss  
7 of up to 677 acres of modeled habitat for western yellow-billed cuckoo (152 acres of breeding  
8 habitat, 525 acres of migratory habitat, Table 12-1C-40). Conservation measures that would result  
9 in these losses are conveyance facilities and transmission line construction, and establishment and  
10 use of borrow and spoil areas (CM1), *CM2 Yolo Bypass Fisheries Enhancement*, *CM4 Tidal Natural*  
11 *Communities Restoration*, and *CM5 Seasonally Inundated Floodplain Restoration*. Habitat  
12 enhancement and management activities (CM11) which include ground disturbance or removal of  
13 nonnative vegetation, could result in local adverse habitat effects. In addition, maintenance activities  
14 associated with the long-term operation of the water conveyance facilities and other BDCP physical  
15 facilities could degrade or eliminate western yellow-billed cuckoo modeled habitat. Each of these  
16 individual activities is described below. A summary statement of the combined impacts and NEPA  
17 effects and a CEQA conclusion follow the individual conservation measure discussions.

- 18 • *CM1 Water Facilities and Operation*: Construction of Alternative 1C water conveyance facilities  
19 would result in the combined permanent and temporary loss of up to 48 acres of modeled  
20 western yellow-billed cuckoo migratory habitat (Table 12-1C-40). Of the 48 acres of migratory  
21 habitat that would be removed for the construction of the conveyance facilities, 13 acres would

1 be a permanent loss and 35 acres would be a temporary loss. There are no extant occurrences of  
2 yellow-billed cuckoo nests in the study area. However, this loss would have the potential to  
3 displace individuals, if present, and remove the functions and value of potentially suitable  
4 habitat for resting, protection, or foraging. Most of the permanent loss of nesting habitat would  
5 occur where Intakes 1–5 impact the Sacramento River’s west bank between just north of  
6 Clarksburg and Courtland. The riparian areas here are very small patches, dominated by valley  
7 oak, scrub vegetation, and nonnative trees. Temporary impacts would occur from the footprint  
8 of proposed temporary transmission lines, siphon work areas, a barge unloading facility east of  
9 Rio Vista, and a safe haven work area south of Piper Slough. Refer to the Terrestrial Biology Map  
10 Book for a detailed view of Alternative 1C construction locations.

11 There would be a 6 acre increase in the combined permanent and temporary loss of western  
12 yellow-billed cuckoo breeding habitat, and a 3 acre decrease in the loss of migratory habitat  
13 (resulting in a net 3 acre increase of modeled habitat) associated with the construction of the  
14 eastern transmission line for the Alternative 1C water conveyance facility rather than the north-  
15 south transmission line.

- 16 ● *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo bypass fisheries enhancement  
17 would result in the loss of approximately 31 acres of breeding habitat (26 acres of permanent  
18 loss and 5 acres of temporary loss) and 140 acres of migratory habitat (57 acres of permanent  
19 loss and 83 acres of temporary loss) for yellow-billed cuckoo in the Yolo Bypass in CZ 2. The loss  
20 is expected to occur during the first 10 years of Alternative 1C implementation. There are no  
21 extant occurrences of yellow-billed cuckoo nesting in the study area.
- 22 ● *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and  
23 inundation would permanently remove an estimated 110 acres of modeled yellow-billed cuckoo  
24 breeding habitat and 310 acres of modeled migratory habitat in CZ 1, 2, 6, and 11. There are no  
25 extant nesting records of yellow-billed cuckoo in the study area. However, a yellow-billed  
26 cuckoo detection was recorded during DHCCP surveys in 2009 (Appendix 12C, *2009 to 2011 Bay  
27 Delta Conservation Plan EIR/EIS Environmental Data Report*) in CZ 5 between Twin Cities Road  
28 and Walnut Grove. These detections do not overlap with the hypothetical restoration areas for  
29 CM4.
- 30 ● *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore  
31 seasonally inundated floodplain would permanently and temporarily remove approximately 11  
32 acres of modeled yellow-billed cuckoo breeding habitat (6 acres of permanent loss and 5 acres  
33 of temporary loss) and 27 acres of migratory habitat (16 acres of permanent loss and 11 acres of  
34 temporary loss) in CZ 7. Based on the riparian habitat restoration assumptions, approximately  
35 3,000 acres of valley/foothill riparian habitat would be restored as a component of seasonally  
36 inundated floodplain restoration actions. The actual number of acres that would be restored  
37 may differ from these estimates, depending on how closely the outcome of seasonally inundated  
38 floodplain restoration approximates the assumed outcome. Once this restored riparian  
39 vegetation has developed habitat functions, a portion of it would be suitable to support western  
40 yellow-billed cuckoo habitat once the riparian vegetation has developed habitat functions for  
41 the cuckoo.
- 42 ● *CM11 Natural Communities Enhancement and Management*: Habitat protection and management  
43 activities that could be implemented in protected western yellow-billed cuckoo habitats would  
44 maintain and improve the functions of the habitat over the term of the BDCP. With conditions  
45 favorable for its future establishment in the study area, western yellow-billed cuckoo would be

1 expected to benefit from the increase in protected habitat. However, habitat management- and  
2 enhancement-related activities could disturb western yellow-billed cuckoo nests if they were  
3 present near work sites. *CM11 Natural Communities Enhancement and Management* actions  
4 designed to enhance wildlife values in restored riparian habitats may result in localized ground  
5 disturbances that could temporarily remove small amounts of western yellow-billed cuckoo  
6 habitat. Ground-disturbing activities, such as removal of nonnative vegetation and road and  
7 other infrastructure maintenance activities, would be expected to have minor adverse effects on  
8 available western yellow-billed cuckoo habitat and would be expected to result in overall  
9 improvements and maintenance of western yellow-billed cuckoo habitat values over the term of  
10 the BDCP.

- 11 ● Permanent and temporary habitat losses from the above CMs, would primarily consist of small,  
12 fragmented riparian stands in CZ 2–CZ 8 that do not provide high-value habitat for the species.  
13 Temporarily affected areas would be restored as riparian habitat within 1 year following  
14 completion of construction activities. Although the effects are considered temporary, the  
15 restored riparian habitat would require 5 years to several decades, for ecological succession to  
16 occur and for restored riparian habitat to functionally replace habitat that has been affected. The  
17 majority of the riparian vegetation to be temporarily removed is early- to mid-successional;  
18 therefore, the replaced riparian vegetation would be expected to have structural components  
19 comparable to the temporarily removed vegetation within the first 5 to 10 years after the initial  
20 restoration activities are complete.
- 21 ● Operations and Maintenance: Postconstruction operation and maintenance of the above-ground  
22 water conveyance facilities and restoration infrastructure could result in ongoing but periodic  
23 disturbances that could affect western yellow-billed cuckoo use of the surrounding habitat.  
24 Maintenance activities would include vegetation management, levee and structure repair, and  
25 re-grading of roads and permanent work areas. These effects, however, would be reduced by  
26 AMMs and conservation actions as described below.
- 27 ● Injury and Direct Mortality: Western yellow-billed cuckoo nesting has not been confirmed in the  
28 Delta for approximately 100 years. However, an unconfirmed breeding detection in 2009 in  
29 DHCCP surveys (*Appendix 12C, 2009 to 2011 Bay Delta Conservation Plan EIR/EIS Environmental*  
30 *Data Report*) and the present of suitable habitat indicates that the species is potentially breeding  
31 in the study area, or may nest there in the future. Construction-related activities would not be  
32 expected to result in direct mortality of adult or fledged western yellow-billed cuckoo if they  
33 were present in the study area, because they would be expected to avoid contact with  
34 construction and other equipment. If western yellow-billed cuckoo were to nest in the  
35 construction area, construction-related activities, including equipment operation, noise and  
36 visual disturbances could destroy nests or lead to their abandonment, resulting in mortality of  
37 eggs and nestlings. These effects would be avoided and minimized with the incorporation of  
38 *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed*  
39 *Cuckoo* into the BDCP.

40 The following paragraphs summarize the combined effects discussed above and describe other  
41 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also  
42 included.

1 **Near-Term Timeframe**

2 Because the water conveyance facilities construction is being evaluated at the project level, the near-  
3 term BDCP conservation strategy has been evaluated to determine whether it would provide  
4 sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that the  
5 effects of construction would not be adverse under NEPA. Alternative 1C would remove 443 acres of  
6 modeled habitat for yellow-billed cuckoo in the study area in the near-term. These effects would  
7 result from the construction of the water conveyance facilities (CM1, 48 acres of modeled migratory  
8 habitat), and implementing other conservation measures (CM2 *Yolo Bypass Fisheries Enhancement*,  
9 CM4 *Tidal Natural Communities Restoration*, and CM5 *Seasonally Inundated Floodplain Restoration*—  
10 395 acres of modeled nesting and migratory habitat). These habitat losses would primarily consist  
11 of small, fragmented riparian stands in CZ 2-CZ 8 that do not provide high-value habitat for the  
12 species.

13 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by  
14 CM1 and that are identified in the biological goals and objectives for yellow-billed cuckoo in Chapter  
15 3 of the BDCP would be 1:1 for restoration/creation and 1:1 protection of valley/foothill riparian  
16 habitat. Using these ratios would indicate that 48 acres of valley/foothill riparian habitat should be  
17 restored/created and 48 acres should be protected to compensate for the CM1 losses of yellow-  
18 billed cuckoo habitat. The near-term effects of other conservation actions would remove 395 acres  
19 of modeled habitat, and therefore require 395 acres of restoration and 395 acres of protection of  
20 valley/foothill riparian using the same typical NEPA and CEQA ratios (1:1 for restoration and 1:1 for  
21 protection).

22 The BDCP has committed to near-term goals of protecting 750 acres and restoring 800 acres of the  
23 valley/foothill riparian natural community in the Plan Area (Table 3-4 in Chapter 3, *Description of*  
24 *Alternatives*). These conservation actions are associated with CM3 and CM7 and would occur in the  
25 same timeframe as the construction and early restoration losses, thereby avoiding adverse effects of  
26 habitat loss on yellow-billed cuckoo. The majority of the riparian restoration acres would occur in  
27 CZ 7 as part of a reserve system with extensive wide bands or large patches of valley/foothill  
28 riparian natural community (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation*  
29 *Strategy*). Goals and objectives in the Plan for riparian restoration also include the restoration,  
30 maintenance and enhancement of structural heterogeneity with adequate vertical and horizontal  
31 overlap among vegetation components and over adjacent riverine channels, freshwater emergent  
32 wetlands, and grasslands (Objective VFRNC2.1). These natural community biological goals and  
33 objectives would inform the near-term protection and restoration efforts and represent  
34 performance standards for considering the effectiveness of conservation actions for the species.

35 The acres of protection contained in the near-term Plan goals satisfy the typical mitigation ratios  
36 that would be applied to the project-level effects of CM1 and other near-term impacts. However, the  
37 restored riparian habitat would require several years (early-mid successional) and several decades  
38 (mature riparian forest), for ecological succession to occur and for restored riparian habitat to  
39 functionally replace habitat that has been affected. Because the western yellow-billed cuckoo is not  
40 known to be an established breeder in the Plan Area, the time lag in riparian restoration from BDCP  
41 actions would not be expected to have an adverse population-level effect on the species. Overall,  
42 BDCP riparian habitat restoration actions would be expected to benefit western yellow-billed  
43 cuckoo by increasing opportunities for a breeding population to become reestablished in the study  
44 area.

1 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*  
2 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*  
3 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
4 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
5 *Material, AMM7 Barge Operations Plan, and AMM22 Suisun Song Sparrow, Yellow-Breasted Chat,*  
6 *Least Bell's Vireo, Western Yellow-Billed Cuckoo.* All of these AMMs include elements that would  
7 avoid or minimize the risk of affecting individuals and species habitats adjacent to work areas and  
8 storage sites. The AMMs are described in detail in BDCP Appendix 3.C, *Avoidance and Minimization*  
9 *Measures.*

#### 10 **Late Long-Term Timeframe**

11 The habitat model indicates that the study area supports approximately 12,395 acres of modeled  
12 breeding and migratory habitat for yellow-billed cuckoo. Alternative 1C as a whole would result in  
13 the permanent loss of and temporary effects on 677 acres of modeled habitat (5% of the modeled  
14 habitat in the Plan Area). These losses would occur from the construction of the water conveyance  
15 facilities (CM1) and from *CM2 Yolo Bypass Fisheries Enhancement, CM4 Tidal Natural Communities*  
16 *Restoration, and CM5 Seasonally Inundated Floodplain Restoration.* The locations of these losses  
17 would be in fragmented riparian habitat throughout the study area.

18 The Plan includes conservation commitments through *CM7 Riparian Natural Community Restoration*  
19 *and CM3 Natural Communities Protection and Restoration* to restore or create at least 5,000 acres  
20 and protect at least 750 acres of valley/foothill riparian woodland. Of the 5,000 acres of restored  
21 riparian natural communities, a minimum of 3,000 acres of valley/foothill riparian would be  
22 restored within the seasonally inundated floodplain, and 1,000 acres would be managed as dense  
23 early to mid-successional riparian forest (Objectives VFRNC1.1 and VFRNC1.2). In addition, at least  
24 500 acres of mature riparian forest would be maintained in CZ 4 or CZ 7 (Objective VFRNC2.3). This  
25 mature, riparian forest would be mixed with a portion of the early- to mid-successional riparian  
26 vegetation in large blocks with a minimum patch size of 50 acres and a minimum width of 330 feet  
27 (Objective VFRNC2.2 and VFRNC2.4), which would provide suitable nesting habitat for the cuckoo.  
28 The protection of 750 acres of existing valley/foothill riparian forest in CZ 7 would not provide in its  
29 entirety the vegetative structure needed to support these species, because patch sizes may not be  
30 large enough to support yellow-billed cuckoo breeding habitat. However, a portion of the protected  
31 habitat would provide suitable habitat for the species. Restoration actions through CM7 and CM11  
32 would expand the patches of existing riparian forest in order to support the species should they  
33 become established breeders in the study area.

34 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*  
35 *Plant Species*) estimates that the restoration and protection actions discussed above could result in  
36 the restoration of 3,397 acres and the protection of 517 acres of habitat for the yellow-billed cuckoo.

37 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*  
38 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*  
39 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
40 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
41 *Material, AMM7 Barge Operations Plan, and AMM22 Suisun Song Sparrow, Yellow-Breasted Chat,*  
42 *Least Bell's Vireo, Western Yellow-Billed Cuckoo.* All of these AMMs include elements that would  
43 avoid or minimize the risk of affecting individuals and species habitats adjacent to work areas and

1 storage sites. The AMMs are described in detail in BDCP Appendix 3.C, *Avoidance and Minimization*  
2 *Measures*.

3 **NEPA Effects:** The loss of western yellow-billed cuckoo habitat associated with Alternative 1C would  
4 represent an adverse effect in the absence of other conservation actions. However, the species is not  
5 an established breeder in the study area and its current presence is limited to migrants. In addition,  
6 the habitat lost would consist of small, fragmented riparian stands that would not provide high-  
7 value habitat for the species. With habitat protection and restoration associated with CM3, CM7, and  
8 CM11, guided by biological goals and objectives and by AMM1–AMM7 and *AMM22 Suisun Song*  
9 *Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo*, which would be in  
10 place throughout the construction phase, the effects of habitat loss and potential mortality under  
11 Alternative 1C on western yellow-billed cuckoo would not be adverse.

12 **CEQA Conclusion:**

13 **Near-Term Timeframe**

14 Because the water conveyance facilities construction is being evaluated at the project level, the near-  
15 term BDCP conservation strategy has been evaluated to determine whether it would provide  
16 sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that the  
17 effects of construction would be less than significant under CEQA. Alternative 1C would remove 443  
18 acres of modeled habitat for yellow-billed cuckoo in the study area in the near-term. These effects  
19 would result from the construction of the water conveyance facilities (CM1, 48 acres of modeled  
20 migratory habitat), and implementing other conservation measures (*CM2 Yolo Bypass Fisheries*  
21 *Enhancement, CM4 Tidal Natural Communities Restoration, and CM5 Seasonally Inundated Floodplain*  
22 *Restoration*—395 acres of modeled nesting and migratory habitat). These habitat losses would  
23 primarily consist of small, fragmented riparian stands in CZ 2–CZ 8 that do not provide high-value  
24 habitat for the species.

25 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by  
26 CM1 and that are identified in the biological goals and objectives for yellow-billed cuckoo in Chapter  
27 3 of the BDCP would be 1:1 for restoration/creation and 1:1 protection of valley/foothill riparian  
28 habitat. Using these ratios would indicate that 48 acres of valley/foothill riparian habitat should be  
29 restored/created and 48 acres should be protected to compensate for the CM1 losses of yellow-  
30 billed cuckoo habitat. The near-term effects of other conservation actions would remove 395 acres  
31 of modeled habitat, and therefore require 395 acres of restoration and 395 acres of protection of  
32 valley/foothill riparian using the same typical NEPA and CEQA ratios (1:1 for restoration and 1:1 for  
33 protection).

34 The BDCP has committed to near-term goals of protecting 750 acres and restoring 800 acres of the  
35 valley/foothill riparian natural community in the Plan Area (Table 3-4 in Chapter 3, *Description of*  
36 *Alternatives*). These conservation actions are associated with CM3 and CM7 and would occur in the  
37 same timeframe as the construction and early restoration losses, thereby avoiding adverse effects of  
38 habitat loss on yellow-billed cuckoo. The majority of the riparian restoration acres would occur in  
39 CZ 7 as part of a reserve system with extensive wide bands or large patches of valley/foothill  
40 riparian natural community (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation*  
41 *Strategy*). Goals and objectives in the Plan for riparian restoration also include the restoration,  
42 maintenance and enhancement of structural heterogeneity with adequate vertical and horizontal  
43 overlap among vegetation components and over adjacent riverine channels, freshwater emergent  
44 wetlands, and grasslands (Objective VFRNC2.1). These natural community biological goals and

1 objectives would inform the near-term protection and restoration efforts and represent  
2 performance standards for considering the effectiveness of conservation actions for the species.

3 The acres of protection contained in the near-term Plan goals satisfy the typical mitigation ratios  
4 that would be applied to the project-level effects of CM1 and other near-term impacts. However, the  
5 restored riparian habitat would require several years (early-mid successional) and several decades  
6 (mature riparian forest), for ecological succession to occur and for restored riparian habitat to  
7 functionally replace habitat that has been affected. Because the western yellow-billed cuckoo is not  
8 known to be an established breeder in the Plan Area, the time lag in riparian restoration from BDCP  
9 actions would not be expected to have an adverse population-level effect on the species. Overall,  
10 BDCP riparian habitat restoration actions would be expected to benefit western yellow-billed  
11 cuckoo by increasing opportunities for a breeding population to become reestablished in the study  
12 area.

13 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
14 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
15 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
16 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
17 *Material*, *AMM7 Barge Operations Plan*, and *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat,*  
18 *Least Bell's Vireo, Western Yellow-Billed Cuckoo*. All of these AMMs include elements that would  
19 avoid or minimize the risk of affecting individuals and species habitats adjacent to work areas and  
20 storage sites. The AMMs are described in detail in BDCP Appendix 3.C, *Avoidance and Minimization*  
21 *Measures*.

### 22 **Late Long-Term Timeframe**

23 The habitat model indicates that the study area supports approximately 12,395 acres of modeled  
24 breeding and migratory habitat for yellow-billed cuckoo. Alternative 1C as a whole would result in  
25 the permanent loss of and temporary effects on 677 acres of modeled habitat (5% of the modeled  
26 habitat in the Plan Area). These losses would occur from the construction of the water conveyance  
27 facilities (CM1) and from *CM2 Yolo Bypass Fisheries Enhancement*, *CM4 Tidal Natural Communities*  
28 *Restoration*, and *CM5 Seasonally Inundated Floodplain Restoration*. The locations of these losses  
29 would be in fragmented riparian habitat throughout the study area.

30 The Plan includes conservation commitments through *CM7 Riparian Natural Community Restoration*  
31 and *CM3 Natural Communities Protection and Restoration* to restore or create at least 5,000 acres  
32 and protect at least 750 acres of valley/foothill riparian woodland. Of the 5,000 acres of restored  
33 riparian natural communities, a minimum of 3,000 acres of valley/foothill riparian would be  
34 restored within the seasonally inundated floodplain, and 1,000 acres would be managed as dense  
35 early to mid-successional riparian forest (Objectives VFRNC1.1 and VFRNC1.2). In addition, at least  
36 500 acres of mature riparian forest would be maintained in CZ 4 or CZ 7 (Objective VFRNC2.3). This  
37 mature, riparian forest would be mixed with a portion of the early- to mid-successional riparian  
38 vegetation in large blocks with a minimum patch size of 50 acres and a minimum width of 330 feet  
39 (Objective VFRNC2.2 and VFRNC2.4), which would provide suitable nesting habitat for the cuckoo.  
40 The protection of 750 acres of existing valley/foothill riparian forest in CZ 7 would not provide in its  
41 entirety the vegetative structure needed to support these species, because patch sizes may not be  
42 large enough to support yellow-billed cuckoo breeding habitat. However, a portion of the protected  
43 habitat would provide suitable habitat for the species. Restoration actions through CM7 and CM11

1 would expand the patches of existing riparian forest in order to support the species should they  
2 become established breeders in the study area.

3 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*  
4 *Plant Species*) estimates that the restoration and protection actions discussed above could result in  
5 the restoration of 3,397 acres and the protection of 517 acres of habitat for the yellow-billed cuckoo.

6 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*  
7 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*  
8 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
9 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
10 *Material, AMM7 Barge Operations Plan, and AMM22 Suisun Song Sparrow, Yellow-Breasted Chat,*  
11 *Least Bell's Vireo, Western Yellow-Billed Cuckoo.* All of these AMMs include elements that would  
12 avoid or minimize the risk of affecting individuals and species habitats adjacent to work areas and  
13 storage sites. The AMMs are described in detail in BDCP Appendix 3.C, *Avoidance and Minimization*  
14 *Measures.*

15 Considering Alternative 1C's protection and restoration provisions, which would provide acreages  
16 of new or enhanced habitat in amounts greater than necessary to compensate for the time lag of  
17 restoring habitats lost to construction and restoration activities, and with implementation of  
18 AMM1–AMM7 and AMM22 *Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western*  
19 *Yellow-Billed Cuckoo,* the loss of habitat or direct mortality through implementation of Alternative  
20 1C would not result in a substantial adverse effect through habitat modifications and would not  
21 substantially reduce the number or restrict the range of the species. Therefore, the loss of habitat or  
22 potential mortality under this alternative would have a less-than-significant impact on western  
23 yellow-billed cuckoo.

#### 24 **Impact BIO-96: Fragmentation of Western Yellow-Billed Cuckoo Habitat as a Result of** 25 **Constructing the Water Conveyance Facilities**

26 Grading, filling, contouring, and other initial ground-disturbing operations for water conveyance  
27 facilities construction may temporarily fragment modeled western yellow-billed cuckoo habitat.  
28 This could temporarily reduce the extent and functions supported by the affected habitat. Because  
29 western yellow-billed cuckoo is not currently present in the study area, and because the  
30 implementation of *CM5 Seasonally Inundated Floodplain Restoration* would protect and create  
31 contiguous high-value riparian habitat, any such habitat fragmentation is expected to have no or  
32 minimal effect on the species.

33 **NEPA Effects:** Fragmentation of habitat would not have an adverse effect on western yellow-billed  
34 cuckoo. The habitat functions in the study area for the species would be greatly improved through  
35 the implementation of CM5, which would restore and protect large contiguous patches of riparian  
36 habitat.

37 **CEQA Conclusion:** Fragmentation of habitat would have a less-than-significant impact on western  
38 yellow-billed cuckoo. The habitat functions in the study area for the species would be greatly  
39 improved through the implementation of CM5, which would restore and protect large contiguous  
40 patches of riparian habitat.

1 **Impact BIO-97: Effects on Western Yellow-Billed Cuckoo Associated with Electrical**  
2 **Transmission Facilities**

3 New transmission lines would increase the risk for bird-power line strikes, which could result in  
4 injury or mortality of western yellow-billed cuckoo. Because the western yellow-billed cuckoo uses  
5 riparian forests to meet all of its breeding and wintering life requisites, the species remains  
6 primarily within the canopy of riparian forests and rarely ventures into open spaces except during  
7 migration, limiting its opportunity to encounter the proposed transmission lines. As a summer  
8 resident, the species occurs in the study area during periods of relatively high visibility and clear  
9 weather conditions, thus further reducing collision risk from daily use patterns or seasonal  
10 migration flights. Finally, western yellow-billed cuckoo wing shape is characterized by low wing  
11 loading and a moderate aspect ratio, making the species moderately maneuverable and presumably  
12 able to avoid collisions, especially during high-visibility conditions (BDCP Attachment 5J.C, *Analysis*  
13 *of Potential Bird Collisions at Proposed BDCP Transmission Lines*). Transmission line poles and  
14 towers also provide perching substrate for raptors, which could result in increased predation  
15 pressure on western yellow-billed cuckoo if they were to use habitat adjacent to lines.

16 **NEPA Effects:** The risk of bird-strike is considered to be minimal based on the species' rarity in the  
17 study area, its proclivity to remain in the riparian canopy, its presence in the study area during  
18 periods of relative high visibility, and its overall ability to successfully negotiate around overhead  
19 wires that it may encounter. Transmission line poles and towers also provide perching substrate for  
20 raptors, which could result in increased predation pressure on western yellow-billed cuckoo. This  
21 would not be expected to have an adverse effect on the western yellow-billed cuckoo population.

22 **CEQA Conclusion:** The construction and presence of new transmission lines would have a less-than-  
23 significant impact on western yellow-billed cuckoo because the risk of bird-strike is considered to  
24 be minimal based on the species' rarity in the study area, its proclivity to remain in the riparian  
25 canopy, its presence during periods of relative high visibility, and its overall ability to successfully  
26 negotiate around overhead wires that it may encounter. Transmission line poles and towers also  
27 provide perching substrate for raptors, which could result in increased predation pressure on  
28 western yellow-billed cuckoo. This would be expected to have a less-than-significant impact on the  
29 western yellow-billed cuckoo population.

30 **Impact BIO-98: Indirect Effects of Plan Implementation on Western Yellow-Billed Cuckoo**

31 **Indirect construction- and operation-related effects:** Noise and visual disturbances associated  
32 with construction-related activities could result in temporary disturbances that affect western  
33 yellow-billed cuckoo use of modeled habitat adjacent to proposed construction areas. Construction  
34 noise above background noise levels (greater than 50 dBA) could extend 1,900 to 5,250 feet from  
35 the edge of construction activities (BDCP Appendix 5.J, Attachment 5J.D, *Indirect Effects of the*  
36 *Construction of the BDCP Conveyance Facility on Sandhill Crane*, Table 4), although there are no  
37 available data to determine the extent to which these noise levels could affect western yellow-billed  
38 cuckoo. Indirect effects associated with construction include noise, dust, and visual disturbance  
39 caused by grading, filling, contouring, and other ground-disturbing operations outside the project  
40 footprint but within 1,300 feet from the construction edge. If western yellow-billed cuckoo were to  
41 nest in or adjacent to work areas, construction and subsequent maintenance-related noise and  
42 visual disturbances could mask calls, disrupt foraging and nesting behaviors, and reduce the  
43 functions of suitable nesting habitat for these species. These potential effects would be minimized  
44 with incorporation of *AMM22 Suisun Song Sparrow*, *Yellow-Breasted Chat*, *Least Bell's Vireo*, *Western*

1 *Yellow-Billed Cuckoo* into the BDCP. The use of mechanical equipment during water conveyance  
2 facilities construction could cause the accidental release of petroleum or other contaminants that  
3 could affect western yellow-billed cuckoo in the surrounding habitat. The inadvertent discharge of  
4 sediment or excessive dust adjacent to western yellow-billed cuckoo habitat could also affect the  
5 species. AMM1–AMM7, including *AMM2 Construction BMPs and Monitoring*, in addition to *AMM22*  
6 *Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo* would  
7 minimize the likelihood of such spills from occurring and ensure that measures were in place to  
8 prevent runoff from the construction area and any adverse effects of dust on active nests.

9 **NEPA Effects:** Indirect effects on western yellow-billed cuckoo as a result of Plan implementation  
10 could have adverse effects on the species through the modification of habitat and potential for direct  
11 mortality. However, due to the species' minimal presence in the study area, and with the  
12 incorporation of AMM1–AMM7 and *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's*  
13 *Vireo, Western Yellow-Billed Cuckoo* into the BDCP, indirect effects would not have an adverse effect  
14 on western yellow-billed cuckoo.

15 **CEQA Conclusion:** Indirect effects on western yellow-billed cuckoo as a result of Alternative 1C  
16 implementation could have a significant impact on the species from modification of habitat. With the  
17 incorporation of AMM1–AMM7 and *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's*  
18 *Vireo, Western Yellow-Billed Cuckoo* into the BDCP, indirect effects as a result of Alternative 1C  
19 implementation would have a less-than-significant impact on western yellow-billed cuckoo.

#### 20 **Impact BIO-99: Periodic Effects of Inundation of Western Yellow-Billed Cuckoo Habitat as a** 21 **Result of Implementation of Conservation Components**

22 Flooding of the Yolo Bypass from Fremont Weir operations (CM2) would increase the frequency and  
23 duration of inundation of approximately 11-20 acres of modeled western yellow-billed cuckoo  
24 breeding habitat and 37–64 acres of modeled migratory habitat. No adverse effects of increased  
25 inundation frequency on western yellow-billed cuckoo or its habitat are expected because the  
26 cuckoo breeding period is outside the period the weir would be operated. In addition, riparian  
27 vegetation supporting habitat has persisted under the existing Yolo Bypass flooding regime, and  
28 changes to frequency and inundation would be within the tolerance of these vegetation types.

29 Based on hypothetical floodplain restoration, CM5 implementation could result in periodic  
30 inundation of up to 142 acres of modeled western yellow-billed cuckoo habitat (17 acres of breeding  
31 habitat, 125 acres of migratory habitat). Inundation of restored floodplains is not expected to affect  
32 western yellow-billed cuckoo or its habitat adversely because the cuckoo breeding period is outside  
33 the period the floodplains would likely be inundated, and periodic inundation of floodplains is  
34 expected to restore a more natural flood regime in support of riparian vegetation types that provide  
35 nesting and migratory habitat for western yellow-billed cuckoo. The overall effect of seasonal  
36 inundation in existing riparian natural communities is likely to be beneficial for western yellow-  
37 billed cuckoo, because, historically, flooding was the main natural disturbance regulating ecological  
38 processes in riparian areas, and flooding promotes the germination and establishment of many  
39 native riparian plants.

40 **NEPA Effects:** Periodic inundation would not have an adverse on yellow-billed cuckoos if they were  
41 to establish as breeders in the study area, because flooding is expected to occur outside of the  
42 breeding season.

1 **CEQA Conclusion:** Periodic effects of inundation would have a less-than-significant impact on  
2 yellow-billed cuckoos if they were to establish as breeders in the study area, because flooding is  
3 expected to occur outside of the breeding season.

#### 4 **White-Tailed Kite**

5 This section describes the effects of Alternative 1C, including water conveyance facilities  
6 construction and implementation of other conservation components, on white-tailed kite. The  
7 habitat model used to assess impacts on white-tailed kite includes nesting habitat and foraging  
8 habitat. Most white-tailed kites in the Sacramento Valley are found in oak and cottonwood riparian  
9 forests, valley oak woodlands, or other groups of trees and are usually associated with compatible  
10 foraging habitat for the species in patches greater than 1,500 square meters (Erichsen et al. 1996).  
11 Modeled foraging habitat for white-tailed kite consists of pasture and hay crops, compatible row and  
12 grain crops and natural vegetation such as seasonal wetlands and annual grasslands (Erichsen  
13 1995).

14 Construction and restoration associated with Alternative 1C conservation measures would result in  
15 both temporary and permanent losses of white-tailed kite modeled habitat as indicated in Table 12-  
16 1C-41. The majority of the losses would take place over an extended period of time as tidal marsh is  
17 restored in the study area. Although restoration for the loss of nesting and foraging habitat would be  
18 initiated in the same timeframe as the losses, it could take one or more decades (for nesting habitat)  
19 for restored habitats to replace the functions of habitat lost. This time lag between impacts and  
20 restoration of habitat function would be minimized by specific requirements of *AMM18 Swainson's*  
21 *Hawk and White-Tailed Kite*, including the planting of mature trees in the near-term time period. Full  
22 implementation of Alternative 1C would also include the following biological objectives over the  
23 term of the BDCP to benefit the white-tailed kite (BDCP Chapter 3, *Conservation Strategy*).

- 24 ● Restore or create at least 5,000 acres of valley/foothill riparian natural community, with at least  
25 3,000 acres occurring on restored seasonally inundated floodplain (Objective VFRNC1.1,  
26 associated with CM7).
- 27 ● Protect at least 750 acres of existing valley/foothill riparian natural community in CZ 7 by year  
28 10 (Objective VFRNC1.2, associated with CM3).
- 29 ● Protect at least 8,000 acres of grassland with at least 2,000 acres protected in CZ 1, at least 1,000  
30 acres protected in CZ 8, at least 2,000 acres protected in CZ 11, and the remainder distributed  
31 among CZs 1, 2, 4, 5, 7, 8, and 11 (Objective GNC1.1, associated with CM3).
- 32 ● Restore at least 2,000 acres of grasslands (Objective GNC1.2, associated with CM8).
- 33 ● Protect at least 150 acres of alkali seasonal wetland and at least 600 acres of existing vernal pool  
34 complex in CZs 1, 8, and/or 11 (Objectives ASWNC1.1 and VPNC1.1, associated with CM3).
- 35 ● Protect and enhance at least 8,100 acres of managed wetland, at least 1,500 acres of which are  
36 in the Grizzly Island Marsh Complex (Objective MWNC1.1, associated with CM3).
- 37 ● Increase prey availability and accessibility for grassland-foraging species (Objectives ASWNC2.4,  
38 VPNC2.5, and GNC2.4, associated with CM11).
- 39 ● Protect at least 48,625 acres of cultivated lands that provide suitable habitat for covered and  
40 other native wildlife species (Objective CLNC1.1, associated with CM3).

- 1 • Plant and maintain native trees along roadsides and field borders within protected cultivated  
2 lands at a rate of one tree per 10 acres (Objective SH2.1, associated with CM3 and CM11).
- 3 • Maintain and protect the small patches of important wildlife habitats associated with cultivated  
4 lands within the reserve system including isolated valley oak trees, trees and shrubs along field  
5 borders and roadsides, remnant groves, riparian corridors, water conveyance channels,  
6 grasslands, ponds, and wetlands (Objective CLNC1.3, associated with CM3).
- 7 • Establish 20- to 30- foot-wide hedgerows along fields and roadsides to promote prey  
8 populations throughout protected cultivated lands (Objective SH2.2, associated with CM3 and  
9 CM11)

10 As explained below, with the restoration or protection of these amounts of habitat, in addition to  
11 management activities that would enhance these natural communities for the species and the  
12 implementation of AMM1–AMM7 and AMM18 *Swainson’s Hawk and White-Tailed Kite*, impacts on  
13 white-tailed kite would not be adverse for NEPA purposes and would be less than significant for  
14 CEQA purposes.

15 **Table 12-1C-41. Changes in White-Tailed Kite Modeled Habitat Associated with Alternative 1C**  
16 **(acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	Nesting	33	33	71	71	NA	NA
	Foraging	4,787	4,787	6,603	6,603	NA	NA
<b>Total Impacts CM1</b>		<b>4,820</b>	<b>4,820</b>	<b>6,674</b>	<b>6,674</b>	<b>NA</b>	<b>NA</b>
CM2–CM18	Nesting	312	507	88	121	48–82	230
	Foraging	8,723	52,675	516	1,484	3,030–6,651	7,402
<b>Total Impacts CM2–CM18</b>		<b>9,035</b>	<b>53,182</b>	<b>604</b>	<b>1,605</b>	<b>3,078–6,733</b>	<b>7,632</b>
<b>Total Nesting</b>		<b>345</b>	<b>540</b>	<b>159</b>	<b>192</b>	<b>48–82</b>	<b>230</b>
<b>Total Foraging</b>		<b>13,510</b>	<b>57,462</b>	<b>7,119</b>	<b>8,087</b>	<b>3,030–6,651</b>	<b>7,402</b>
<b>TOTAL IMPACTS</b>		<b>13,855</b>	<b>58,002</b>	<b>7,278</b>	<b>8,279</b>	<b>3,078–6,733</b>	<b>7,632</b>

<sup>a</sup> See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

17

18 **Impact BIO-100: Loss or Conversion of Habitat for and Direct Mortality of White-Tailed Kite**

19 Alternative 1C conservation measures would result in the combined permanent and temporary loss  
20 of up to 66,281 acres of modeled habitat for white-tailed kite (732 acres of nesting habitat, 65,549

1 acres of foraging habitat; Table 12-1C-41). Conservation measures that would result in these losses  
 2 are conveyance facilities and transmission line construction, and establishment and use of borrow  
 3 and spoil areas (CM1), Yolo Bypass fisheries improvements (CM2), tidal habitat restoration (CM4),  
 4 floodplain restoration (CM5), riparian habitat restoration, (CM7), grassland restoration (CM8),  
 5 vernal pool and wetland restoration (CM9), nontidal marsh restoration (CM10), and construction of  
 6 conservation hatcheries (CM18). Habitat enhancement and management activities (CM11), which  
 7 include ground disturbance or removal of nonnative vegetation, could result in local habitat effects.  
 8 In addition, maintenance activities associated with the long-term operation of the water conveyance  
 9 facilities and other BDCP physical facilities could affect white-tailed kite modeled habitat. Each of  
 10 these individual activities is described below. A summary statement of the combined impacts and  
 11 NEPA effects, and a CEQA conclusion follow the individual conservation measure discussions.

- 12 ● *CM1 Water Facilities and Operation*: Construction of Alternative 1C water conveyance facilities  
 13 would result in the combined permanent and temporary loss of up to 104 acres of white-tailed  
 14 kite nesting habitat (33 acres of permanent loss and 71 acres of temporary loss). Most of the  
 15 permanent loss of nesting habitat would occur where Intakes 1–5 impact the Sacramento River’s  
 16 west bank between just north of Clarksburg and Courtland. The riparian areas here are very  
 17 small patches, dominated by valley oak, scrub vegetation, and nonnative trees. Temporary  
 18 impacts would occur from the footprint of proposed temporary transmission lines, siphon work  
 19 areas, a barge unloading facility east of Rio Vista, and a safe haven work area south of Piper  
 20 Slough. In addition, 11,390 acres of foraging habitat would be removed (4,787 acres of  
 21 permanent loss, 6,603 acres of temporary loss, Table 12-1C-41). The permanent losses of  
 22 foraging habitat would occur at various locations along the western canal route, at the intake  
 23 sites along the Sacramento River, construction of the new forebay, and associated RTM storage  
 24 areas. Both temporary and permanent losses of foraging habitat would occur from the  
 25 transmission line corridors west of the study area and along the tunnel alignment in the west  
 26 Delta. Temporary losses would occur from siphon construction areas, safe haven work areas,  
 27 railroad work areas, and potential borrow and spoil sites along the canal alignment. There are  
 28 no occurrences of nesting white-tailed kite that overlap with the construction footprint of CM1.  
 29 However, the implementation of *AMM18 Swainson’s Hawk and White-Tailed Kite* would  
 30 minimize effects on white-tailed kites if they were to nest within or adjacent to the construction  
 31 footprint. Refer to the Terrestrial Biology Map Book for a detailed view of Alternative 1C  
 32 construction locations.
- 33 ● *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo bypass fisheries enhancement  
 34 would result in the combined permanent and temporary loss of up to 170 acres of nesting  
 35 habitat (82 acres of permanent loss, 88 acres of temporary loss) in the Yolo Bypass in CZ 2. In  
 36 addition, 1,525 acres of foraging habitat would be removed (1,008 acres of permanent loss, 516  
 37 acres of temporary loss). Activities through CM2 could involve excavation and grading in  
 38 valley/foothill riparian areas to improve passage of fish through the bypasses. Most of the  
 39 riparian losses would occur at the north end of Yolo Bypass where major fish passage  
 40 improvements are planned. Excavation to improve water movement in the Toe Drain and in the  
 41 Sacramento Weir would also remove white-tailed kite habitat. The loss is expected to occur  
 42 during the first 10 years of Alternative 1C implementation.
- 43 ● *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and  
 44 inundation would permanently remove an estimated 383 acres of white-tailed kite nesting  
 45 habitat and 41,625 acres of foraging habitat. The majority of the acres lost would consist of  
 46 cultivated lands in CZs 1, 2, 4, 5, 6, and/or 7. Grassland losses would likely occur in the vicinity

1 of Cache Slough, on Decker Island in the West Delta ROA, on the upslope fringes of Suisun Marsh,  
2 and along narrow bands adjacent to waterways in the South Delta ROA. Tidal restoration would  
3 directly impact and fragment grassland just north of Rio Vista in and around French and  
4 Prospect Islands, and in an area south of Rio Vista around Threemile Slough. Losses of alkali  
5 seasonal wetland complex habitat would likely occur in the south end of the Yolo Bypass and on  
6 the northern fringes of Suisun Marsh. The conversion of cultivated lands to tidal wetlands over  
7 fairly broad areas within the tidal restoration footprints could result in the removal or  
8 abandonment of nesting territories that occur within or adjacent to the restoration areas. Trees  
9 would not be actively removed but tree mortality would be expected over time as areas became  
10 tidally inundated. Depending on the extent and value of remaining habitat, this could reduce the  
11 local nesting population.

- 12 ● *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore  
13 seasonally inundated floodplain and riparian restoration actions would remove approximately  
14 75 acres of white-tailed kite nesting habitat (42 acres of permanent loss, 33 acres of temporary  
15 loss) and 2,675 acres of foraging habitat (1,706 acres of permanent loss, 968 acres of temporary  
16 loss). These losses would be expected after the first 10 years of Alternative 1C implementation  
17 along the San Joaquin River and other major waterways in CZ 7.
- 18 ● *CM7 Riparian Natural Community Restoration*: Riparian restoration would permanently remove  
19 approximately 971 acres of white-tailed kite foraging habitat as part of tidal restoration and  
20 3,991 acres as part of seasonal floodplain restoration through CM7.
- 21 ● *CM8 Grassland Natural Community Restoration*: Restoration of grassland is expected to be  
22 implemented on agricultural lands and would result in the conversion of 1,849 acres of white-  
23 tailed kite agricultural foraging habitat to grassland foraging habitat in CZs 1, 2, 4, 5, 7, 8, and 11.  
24 If agricultural lands supporting higher value foraging habitat than the restored grassland were  
25 removed, there would be a loss of white-tailed kite foraging habitat value.
- 26 ● *CM10 Nontidal Marsh Restoration*: Restoration and creation of nontidal freshwater marsh  
27 (CM10) would result in the permanent conversion of 1,440 acres of cultivated lands to nontidal  
28 marsh in CZ 2 and CZ 4. This would not result in a loss of foraging habitat as both natural  
29 communities are foraging habitat for white-tailed kite. Small patches of riparian vegetation that  
30 support White-tailed kite nesting habitat may develop along the margins of restored nontidal  
31 marsh restoration would also provide foraging habitat for the species.
- 32 ● *CM11 Natural Communities Enhancement and Management*: Habitat management- and  
33 enhancement-related activities could disturb white-tailed kite nests if they were present near  
34 work sites. A variety of habitat management actions that are designed to enhance wildlife values  
35 in BDCP-protected habitats may result in localized ground disturbances that could temporarily  
36 remove small amounts of white-tailed kite habitat and reduce the functions of habitat until  
37 restoration is complete. Ground-disturbing activities, such as removal of nonnative vegetation  
38 and road and other infrastructure maintenance, are expected to have minor effects on available  
39 white-tailed kite habitat and are expected to result in overall improvements to and maintenance  
40 of habitat values over the term of the BDCP. These effects cannot be quantified, but are expected  
41 to be minimal and would be avoided and minimized by the AMMs listed below. CM11 would also  
42 include the construction of recreational-related facilities including trails, interpretive signs, and  
43 picnic tables (BDCP Chapter 4, *Covered Activities and Associated Federal Actions*). The  
44 construction of trailhead facilities, signs, staging areas, picnic areas, bathrooms, etc. would be  
45 placed on existing, disturbed areas when and where possible. However, approximately 50 acres

1 of white-tailed kite grassland foraging habitat would be lost from the construction of trails and  
2 facilities.

- 3 • *CM18 Conservation Hatcheries*: Implementation of CM18 would remove up to 35 acres of high-  
4 white-tailed kite foraging habitat for the development of a delta and longfin smelt conservation  
5 hatchery in CZ 1. The loss is expected to occur during the first 10 years of Alternative 1C  
6 implementation.

7 Permanent and temporary white-tailed kite nesting habitat losses from the above conservation  
8 measures, would primarily consist of small, fragmented riparian stands. Temporarily affected  
9 nesting habitat would be restored as riparian habitat within 1 year following completion of  
10 construction activities. The restored riparian habitat would require 1 to several decades to  
11 functionally replace habitat that has been affected and for trees to attain sufficient size and  
12 structure suitable for nesting by white-tailed kite. *AMM18 Swainson's Hawk and White-Tailed*  
13 *Kite* contains actions described below to reduce the effect of temporal loss of nesting habitat,  
14 including the transplanting of mature trees and planting of trees near high-value foraging  
15 habitat. The functions of agricultural and grassland communities that provide foraging habitat  
16 for white-tailed kite are expected to be restored relatively quickly.

- 17 • *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground  
18 water conveyance facilities and restoration infrastructure could result in ongoing but periodic  
19 disturbances that could affect white-tailed kite use of the surrounding habitat. Maintenance  
20 activities would include vegetation management, levee and structure repair, and re-grading of  
21 roads and permanent work areas. These effects, however, would be reduced by AMM1–AMM7  
22 and *AMM18 Swainson's Hawk and White-Tailed Kite* in addition to conservation actions as  
23 described below.
- 24 • *Injury and Direct Mortality*: Construction-related activities would not be expected to result in  
25 direct mortality of adult or fledged white-tailed kite if they were present in the study area,  
26 because they would be expected to avoid contact with construction and other equipment.  
27 However, if white-tailed kite were to nest in the construction area, construction-related  
28 activities, including equipment operation, noise and visual disturbances could affect nests or  
29 lead to their abandonment, potentially resulting in mortality of eggs and nestlings. These effects  
30 would be avoided and minimized with the incorporation of *AMM18 Swainson's Hawk and White-*  
31 *Tailed Kite* into the BDCP.

32 The following paragraphs summarize the combined effects discussed above and describe other  
33 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also  
34 included.

### 35 ***Near-Term Timeframe***

36 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
37 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
38 provide sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that  
39 the effect of construction would not be adverse under NEPA. Alternative 1C would remove 504 acres  
40 (345 acres of permanent loss, 159 acres of temporary loss) of white-tailed kite nesting habitat in the  
41 study area in the near-term. These effects would result from the construction of the water  
42 conveyance facilities (CM1, 104 acres), and implementing other conservation measures (*CM2 Yolo*  
43 *Bypass Fisheries Enhancement*, *CM4 Tidal Natural Communities Restoration*, and *CM5 Seasonally*  
44 *Inundated Floodplain Restoration*—400 acres). In addition, 21,229 acres of white-tailed kite foraging

1 habitat would be removed or converted in the near-term (CM1, 11,390 acres; CM2 *Yolo Bypass*  
2 *Fisheries Enhancement*, CM4 *Tidal Natural Communities Restoration*, CM5, *Seasonally Inundated*  
3 *Floodplain Restoration*, CM7 *Riparian Natural Community Restoration*, CM8 *Grassland Natural*  
4 *Community Restoration*, CM9 *Vernal Pool and Alkali Seasonal Wetland Complex Restoration*, CM11  
5 *Natural Communities Enhancement and Management* and CM18 *Conservation Hatcheries*—9,239  
6 acres).

7 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by  
8 CM1 and that are identified in the biological goals and objectives for white-tailed kite in Chapter 3 of  
9 the BDCP would be 1:1 for restoration/creation and 1:1 protection of valley/foothill riparian habitat  
10 for nesting habitat, and 1:1 protection for foraging habitat. Using these ratios would indicate that  
11 104 acres of nesting habitat should be restored/ created and 104 acres should be protected to  
12 mitigate the CM1 losses of white-tailed kite nesting habitat. In addition, 11,390 acres of foraging  
13 habitat should be protected to compensate for the CM1 losses of white-tailed kite foraging habitat.  
14 The near-term effects of other conservation actions would remove 400 acres of modeled nesting  
15 habitat, and therefore require 400 acres of restoration and 400 acres of protection of nesting  
16 habitat. Similarly, the near-term effects of other conservation actions would result in the loss or  
17 conversion of 9,239 acres of modeled foraging habitat, and therefore require 9,239 acres of  
18 protection of foraging habitat using the same typical NEPA and CEQA ratios (1:1 for restoration and  
19 1:1 for protection of nesting habitat; 1:1 for protection of foraging habitat).

20 The BDCP has committed to near-term goals of protecting 750 acres and restoring 800 acres of  
21 valley/foothill riparian natural community, protecting 2,000 acres and restoring 1,140 acres of  
22 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of  
23 alkali seasonal wetland complex, protecting 4,800 acres of managed wetland natural community,  
24 protecting 15,400 acres of non-rice cultivated lands, protecting 900 acres of rice or rice equivalent  
25 habitat, and restoring 19,150 acres of tidal wetlands (Table 3-4 in Chapter 3, *Description of*  
26 *Alternatives*). These conservation actions are associated with CM3, CM4, CM7, and CM8 and would  
27 occur in the same timeframe as the construction and early restoration losses.

28 The majority of riparian protection and restoration acres would occur in CZ 7 as part of a reserve  
29 system with extensive wide bands or large patches of valley/foothill riparian natural community  
30 (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*). Riparian  
31 restoration would expand the patches of existing riparian forest in order to support nesting habitat  
32 for the species. White-tailed kite is excluded from narrow bands of riparian vegetation by  
33 Swainson's hawks and therefore requires wide patches of nesting habitat where its range overlaps  
34 with Swainson's hawk. The distribution and abundance of potential white-tailed kite nest trees  
35 would be increased by planting and maintaining native trees along roadsides and field borders  
36 within protected cultivated lands at a rate of one tree per 10 acres (Objective SWHA2.1). In addition,  
37 small but essential nesting habitat associated with cultivated lands would also be maintained and  
38 protected such as isolated trees, tree rows along field borders or roads, or small clusters of trees in  
39 farmyards or at rural residences (Objective CLNC1.3).

40 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1  
41 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali  
42 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous  
43 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would  
44 provide foraging habitat for white-tailed kite and reduce the effects of current levels of habitat  
45 fragmentation. Small mammal populations would also be increased on protected lands, enhancing

1 the foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4).  
2 Foraging opportunities would also be improved by enhancing prey populations through the  
3 establishment of 20- to 30-foot-wide hedgerows along field borders and roadsides within protected  
4 cultivated lands (Objective SWHA2.2). Remnant patches of grassland or other uncultivated areas  
5 would also be protected and maintained as part of the cultivated lands reserve system which would  
6 provide additional foraging habitat and a source of rodent prey that could recolonize cultivated  
7 fields (Objective CLNC1.3). The protection of managed wetlands (including upland grassland  
8 components) that dry during the spring would also serve as foraging habitat for white-tailed kite as  
9 prey species recolonize the fields (Objective MWNC1.1). In addition, the restoration of 19,150 acres  
10 of tidal natural communities, including transitional uplands would provide high-value foraging  
11 habitat for the white-tailed kite. At least 15,400 acres of cultivated lands that provide habitat for  
12 covered and other native wildlife species would be protected in the near-term time period  
13 (Objective CLNC1.1). These biological goals and objectives would inform the near-term protection  
14 and restoration efforts and represent performance standards for considering the effectiveness of  
15 restoration actions. The acres of restoration and protection contained in the near-term Plan goals  
16 and the additional detail in the biological objectives satisfy the typical mitigation that would be  
17 applied to the project-level effects of CM1 on white-tailed kite foraging habitat, as well as mitigate  
18 the near-term effects of the other conservation measures.

19 The 750 acres of protection and 800 acres of restoration contained in the near-term Plan goals  
20 satisfy the typical mitigation ratios that would be applied to the project-level effects of CM1 and  
21 other near-term impacts on white-tailed kite nesting habitat. The 800 acres of restored riparian  
22 habitat would be initiated in the near-term to offset the loss of modeled nesting habitat, but would  
23 require one to several decades to functionally replace habitat that has been affected and for trees to  
24 attain sufficient size and structure suitable for nesting by white-tailed kites. This time lag between  
25 the removal and restoration of nesting habitat could have a substantial impact on white-tailed kite  
26 in the near-term time period. Nesting habitat is limited throughout much of the Plan Area, consisting  
27 mainly of intermittent riparian, isolated trees, small groves, tree rows along field borders, roadside  
28 trees, and ornamental trees near rural residences. The removal of nest trees or nesting habitat  
29 would further reduce this limited resource and could reduce or restrict the number of active white-  
30 tailed kite nests within the Plan Area until restored riparian habitat is sufficiently developed.

31 *AMM18 Swainson's Hawk and White-Tailed Kite* would implement a program to plant large mature  
32 trees, including transplanting trees scheduled for removal. These would be supplemented with  
33 additional saplings and would be expected to reduce the temporal effects of loss of nesting habitat.  
34 The plantings would occur prior to or concurrent with (in the case of transplanting) the loss of trees.  
35 In addition, at least five trees (5-gallon container size) would be planted within the BDCP reserve  
36 system for every tree 20 feet or taller anticipated to be removed by construction during the near-  
37 term period. A variety of native tree species would be planted to provide trees with differing growth  
38 rates, maturation, and life span. Trees would be planted within the BDCP reserve system in areas  
39 that support high value foraging habitat in clumps of at least three trees each at appropriate sites  
40 within or adjacent to conserved cultivated lands, or they could be incorporated as a component of  
41 the riparian restoration (CM5, CM7) where they are in close proximity to suitable foraging habitat.  
42 Replacement trees that were incorporated into the riparian restoration would not be clustered in a  
43 single region of the Plan Area, but would be distributed throughout the lands protected as foraging  
44 habitat for white-tailed kite. With this program in place, Alternative 1C would not have a substantial  
45 adverse effect on white-tailed kite in the near-term timeframe, either through direct mortality or  
46 through habitat modifications.

1 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*  
2 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*  
3 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
4 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
5 *Material, and AMM7 Barge Operations Plan. All of these AMMs include elements that would avoid or*  
6 *minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are*  
7 *described in detail in BDCP Appendix 3.C, Avoidance and Minimization Measures.*

### 8 ***Late Long-Term Timeframe***

9 The study area supports approximately 14,069 acres of modeled nesting habitat and 507,922 acres  
10 of modeled foraging habitat for white-tailed kite. Alternative 1C as a whole would result in the  
11 permanent loss of and temporary effects on 732 acres of potential nesting habitat (5% of the  
12 potential nesting habitat in the study area) and the loss or conversion of 65,549 acres of foraging  
13 habitat (13% of the foraging habitat in the study area). The locations of these losses are described  
14 above in the analyses of individual conservation measures.

15 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*  
16 *Restoration, CM4 Tidal Natural Communities Restoration, CM5 Seasonally Inundated Floodplain*  
17 *Restoration, CM7 Riparian Natural Community Restoration, and CM8 Grassland Natural Community*  
18 *Restoration, to restore or create at least 5,000 acres and protect at least 750 acres of valley/foothill*  
19 *riparian natural community, protect 8,000 acres and restore 2,000 acres of grassland natural*  
20 *community, protect 600 acres of vernal pool complex, protect 150 acres of alkali seasonal wetland*  
21 *complex, protect 8,100 acres of managed wetland, protect 48,625 acres of cultivated lands that*  
22 *provide suitable habitat for native wildlife species, and restore at least 65,000 acres of tidal*  
23 *wetlands (Table 3-4 in Chapter 3, Description of Alternatives).*

24 The majority of riparian protection and restoration acres would occur in CZ 7 as part of a reserve  
25 system with extensive wide bands or large patches of valley/foothill riparian natural community  
26 (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*). Riparian  
27 restoration would expand the patches of existing riparian forest in order to support nesting habitat  
28 for the species. White-tailed kite is excluded from narrow bands of riparian vegetation by  
29 Swainson's hawks and therefore requires wide patches of nesting habitat where its range overlaps  
30 with Swainson's hawk. The distribution and abundance of potential white-tailed kite nest trees  
31 would be increased by planting and maintaining native trees along roadsides and field borders  
32 within protected cultivated lands at a rate of one tree per 10 acres (Objective SWHA2.1). In addition,  
33 small but essential nesting habitat associated with cultivated lands would also be maintained and  
34 protected such as isolated trees, tree rows along field borders or roads, or small clusters of trees in  
35 farmyards or at rural residences (Objective CLNC1.3).

36 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1  
37 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali  
38 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous  
39 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would  
40 provide foraging habitat for white-tailed kite and reduce the effects of current levels of habitat  
41 fragmentation. Small mammal populations would also be increased on protected lands, enhancing  
42 the foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4).  
43 Foraging opportunities would also be improved by enhancing prey populations through the  
44 establishment of 20- to 30-foot-wide hedgerows along field borders and roadsides within protected

1 cultivated lands (Objective SWHA2.2). Remnant patches of grassland or other uncultivated areas  
2 would also be protected and maintained as part of the cultivated lands reserve system which would  
3 provide additional foraging habitat and a source of rodent prey that could recolonize cultivated  
4 fields (Objective CLNC1.3). The protection of managed wetlands (including upland grassland  
5 components) that dry during the spring would also serve as foraging habitat for white-tailed kite as  
6 prey species recolonize the fields (Objective MWNC1.1). In addition, the restoration of at least  
7 65,000 acres of tidal natural communities, including transitional uplands would provide high-value  
8 foraging habitat for the white-tailed kite. At least 45,405 acres of cultivated lands that provide  
9 foraging habitat for white-tailed kite would be protected by the late long-term time period  
10 (Objective CLNC1.1).

11 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*  
12 *Plant Species*) estimates that the restoration and protection actions discussed above could result in  
13 the restoration of 3,800 acres and the protection of 570 acres of nesting habitat and the restoration  
14 of 49,875 acres and the protection of 2,050 acres of foraging habitat for white-tailed kite.

15 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
16 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
17 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
18 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
19 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
20 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
21 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

22 **NEPA Effects:** The loss of white-tailed kite habitat and potential for direct mortality of this special-  
23 status species under Alternative 1C would represent an adverse effect in the absence of other  
24 conservation actions. With habitat protection and restoration associated with CM3, CM5, CM7, CM8,  
25 CM9, and CM11, guided by biological goals and objectives and by AMM1–AMM7 and *AMM18*  
26 *Swainson's Hawk and White-Tailed Kite*, which would be in place throughout the construction period,  
27 the effects of habitat loss and potential mortality on white-tailed kite would not be adverse under  
28 Alternative 1C.

29 **CEQA Conclusion:**

30 **Near-Term Timeframe**

31 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
32 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
33 provide sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that  
34 the effect of construction would be less than significant under CEQA. Alternative 1C would remove  
35 504 acres (345 acres of permanent loss, 159 acres of temporary loss) of white-tailed kite nesting  
36 habitat in the study area in the near-term. These effects would result from the construction of the  
37 water conveyance facilities (CM1, 104 acres), and implementing other conservation measures (*CM2*  
38 *Yolo Bypass Fisheries Enhancement*, *CM4 Tidal Natural Communities Restoration*, and *CM5 Seasonally*  
39 *Inundated Floodplain Restoration—400 acres*). In addition, 21,229 acres of white-tailed kite foraging  
40 habitat would be removed or converted in the near-term (CM1, 11,390 acres; *CM2 Yolo Bypass*  
41 *Fisheries Enhancement*, *CM4 Tidal Natural Communities Restoration*, *CM5, Seasonally Inundated*  
42 *Floodplain Restoration*, *CM7 Riparian Natural Community Restoration*, *CM8 Grassland Natural*  
43 *Community Restoration*, *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*, *CM11*

1 *Natural Communities Enhancement and Management and CM18 Conservation Hatcheries—9,239*  
2 *acres).*

3 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by  
4 CM1 and that are identified in the biological goals and objectives for white-tailed kite in Chapter 3 of  
5 the BDCP would be 1:1 for restoration/creation and 1:1 protection of valley/foothill riparian habitat  
6 for nesting habitat, and 1:1 protection for foraging habitat. Using these ratios would indicate that  
7 104 acres of nesting habitat should be restored/ created and 104 acres should be protected to  
8 mitigate the CM1 losses of white-tailed kite nesting habitat. In addition, 11,390 acres of foraging  
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10 The near-term effects of other conservation actions would remove 400 acres of modeled nesting  
11 habitat, and therefore require 400 acres of restoration and 400 acres of protection of nesting  
12 habitat. Similarly, the near-term effects of other conservation actions would result in the loss or  
13 conversion of 9,239 acres of modeled foraging habitat, and therefore require 9,239 acres of  
14 protection of foraging habitat using the same typical NEPA and CEQA ratios (1:1 for restoration and  
15 1:1 for protection of nesting habitat; 1:1 for protection of foraging habitat).

16 The BDCP has committed to near-term goals of protecting 750 acres and restoring 800 acres of  
17 valley/foothill riparian natural community, protecting 2,000 acres and restoring 1,140 acres of  
18 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of  
19 alkali seasonal wetland complex, protecting 4,800 acres of managed wetland natural community,  
20 protecting 15,400 acres of non-rice cultivated lands, protecting 900 acres of rice or rice equivalent  
21 habitat, and restoring 19,150 acres of tidal wetlands (Table 3-4 in Chapter 3, *Description of*  
22 *Alternatives*). These conservation actions are associated with CM3, CM4, CM7, and CM8 and would  
23 occur in the same timeframe as the construction and early restoration losses.

24 The majority of riparian protection and restoration acres would occur in CZ 7 as part of a reserve  
25 system with extensive wide bands or large patches of valley/foothill riparian natural community  
26 (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*). Riparian  
27 restoration would expand the patches of existing riparian forest in order to support nesting habitat  
28 for the species. White-tailed kite is excluded from narrow bands of riparian vegetation by  
29 Swainson's hawks and therefore requires wide patches of nesting habitat where its range overlaps  
30 with Swainson's hawk. The distribution and abundance of potential white-tailed kite nest trees  
31 would be increased by planting and maintaining native trees along roadsides and field borders  
32 within protected cultivated lands at a rate of one tree per 10 acres (Objective SWHA2.1). In addition,  
33 small but essential nesting habitat associated with cultivated lands would also be maintained and  
34 protected such as isolated trees, tree rows along field borders or roads, or small clusters of trees in  
35 farmyards or at rural residences (Objective CLNC1.3).

36 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1  
37 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali  
38 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous  
39 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would  
40 provide foraging habitat for white-tailed kite and reduce the effects of current levels of habitat  
41 fragmentation. Small mammal populations would also be increased on protected lands, enhancing  
42 the foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4).  
43 Foraging opportunities would also be improved by enhancing prey populations through the  
44 establishment of 20- to 30-foot-wide hedgerows along field borders and roadsides within protected  
45 cultivated lands (Objective SWHA2.2). Remnant patches of grassland or other uncultivated areas

1 would also be protected and maintained as part of the cultivated lands reserve system which would  
2 provide additional foraging habitat and a source of rodent prey that could recolonize cultivated  
3 fields (Objective CLNC1.3). The protection of managed wetlands (including upland grassland  
4 components) that dry during the spring would also serve as foraging habitat for white-tailed kite as  
5 prey species recolonize the fields (Objective MWNC1.1). In addition, the restoration of 19,150 acres  
6 of tidal natural communities, including transitional uplands would provide high-value foraging  
7 habitat for the white-tailed kite. At least 15,400 acres of cultivated lands that provide habitat for  
8 covered and other native wildlife species would be protected in the near-term time period  
9 (Objective CLNC1.1). These biological goals and objectives would inform the near-term protection  
10 and restoration efforts and represent performance standards for considering the effectiveness of  
11 restoration actions. The acres of restoration and protection contained in the near-term Plan goals  
12 and the additional detail in the biological objectives satisfy the typical mitigation that would be  
13 applied to the project-level effects of CM1 on white-tailed kite foraging habitat, as well as mitigate  
14 the near-term effects of the other conservation measures.

15 The 750 acres of protection and 800 acres of restoration contained in the near-term Plan goals  
16 satisfy the typical mitigation ratios that would be applied to the project-level effects of CM1 and  
17 other near-term impacts on white-tailed kite nesting habitat. The 800 acres of restored riparian  
18 habitat would be initiated in the near-term to offset the loss of modeled nesting habitat, but would  
19 require one to several decades to functionally replace habitat that has been affected and for trees to  
20 attain sufficient size and structure suitable for nesting by white-tailed kites. This time lag between  
21 the removal and restoration of nesting habitat could have a substantial impact on white-tailed kite  
22 in the near-term time period. Nesting habitat is limited throughout much of the Plan Area, consisting  
23 mainly of intermittent riparian, isolated trees, small groves, tree rows along field borders, roadside  
24 trees, and ornamental trees near rural residences. The removal of nest trees or nesting habitat  
25 would further reduce this limited resource and could reduce or restrict the number of active white-  
26 tailed kite nests within the Plan Area until restored riparian habitat is sufficiently developed.

27 *AMM18 Swainson's Hawk and White-Tailed Kite* would implement a program to plant large mature  
28 trees, including transplanting trees scheduled for removal. These would be supplemented with  
29 additional saplings and would be expected to reduce the temporal effects of loss of nesting habitat.  
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32 system for every tree 20 feet or taller anticipated to be removed by construction during the near-  
33 term period. A variety of native tree species would be planted to provide trees with differing growth  
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35 that support high value foraging habitat in clumps of at least three trees each at appropriate sites  
36 within or adjacent to conserved cultivated lands, or they could be incorporated as a component of  
37 the riparian restoration (CM5, CM7) where they are in close proximity to suitable foraging habitat.  
38 Replacement trees that were incorporated into the riparian restoration would not be clustered in a  
39 single region of the Plan Area, but would be distributed throughout the lands protected as foraging  
40 habitat for white-tailed kite. With this program in place, Alternative 1C would not have a substantial  
41 adverse effect on white-tailed kite in the near-term timeframe, either through direct mortality or  
42 through habitat modifications.

43 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*  
44 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*  
45 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
46 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*

1 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
2 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
3 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

#### 4 **Late Long-Term Timeframe**

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6 of modeled foraging habitat for white-tailed kite. Alternative 1C as a whole would result in the  
7 permanent loss of and temporary effects on 732 acres of potential nesting habitat (5% of the  
8 potential nesting habitat in the study area) and the loss or conversion of 65,549 acres of foraging  
9 habitat (13% of the foraging habitat in the study area).

10 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*  
11 *Restoration*, *CM4 Tidal Natural Communities Restoration*, *CM5 Seasonally Inundated Floodplain*  
12 *Restoration*, *CM7 Riparian Natural Community Restoration*, and *CM8 Grassland Natural Community*  
13 *Restoration* to restore or create at least 5,000 acres and protect at least 750 acres of valley/foothill  
14 riparian natural community, protect 8,000 acres and restore 2,000 acres of grassland natural  
15 community, protect 600 acres of vernal pool complex, protect 150 acres of alkali seasonal wetland  
16 complex, protect 8,100 acres of managed wetland, protect 48,625 acres of cultivated lands that  
17 provide suitable habitat for native wildlife species, and restore at least 65,000 acres of tidal  
18 wetlands (Table 3-4 in Chapter 3, *Description of Alternatives*).

19 The majority of riparian protection and restoration acres would occur in CZ 7 as part of a reserve  
20 system with extensive wide bands or large patches of valley/foothill riparian natural community  
21 (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*). Riparian  
22 restoration would expand the patches of existing riparian forest in order to support nesting habitat  
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27 within protected cultivated lands at a rate of one tree per 10 acres (Objective SWHA2.1). In addition,  
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37 the foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4).  
38 Foraging opportunities would also be improved by enhancing prey populations through the  
39 establishment of 20- to 30-foot-wide hedgerows along field borders and roadsides within protected  
40 cultivated lands (Objective SWHA2.2). Remnant patches of grassland or other uncultivated areas  
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44 components) that dry during the spring would also serve as foraging habitat for white-tailed kite as

1 prey species recolonize the fields (Objective MWNC1.1). In addition, the restoration of at least  
2 65,000 acres of tidal natural communities, including transitional uplands would provide high-value  
3 foraging habitat for the white-tailed kite. At least 45,405 acres of cultivated lands that provide  
4 foraging habitat for white-tailed kite would be protected by the late long-term time period  
5 (Objective CLNC1.1).

6 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*  
7 *Plant Species*) estimates that the restoration and protection actions discussed above could result in  
8 the restoration of 3,800 acres and the protection of 570 acres of nesting habitat and the restoration  
9 of 49,875 acres and the protection of 2,050 acres of foraging habitat for white-tailed kite.

10 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*  
11 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*  
12 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
13 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
14 *Material, and AMM7 Barge Operations Plan. All of these AMMs include elements that would avoid or*  
15 *minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are*  
16 *described in detail in BDCP Appendix 3.C, Avoidance and Minimization Measures.*

17 Considering Alternative 1C's protection and restoration provisions, which would provide acreages  
18 of new or enhanced habitat in amounts greater than necessary to compensate for the time lag of  
19 restoring riparian and foraging habitats lost to construction and restoration activities, and with  
20 implementation of AMM1-AMM7 and *AMM18 Swainson's Hawk and White-Tailed Kite*, the loss of  
21 habitat or direct mortality through implementation of Alternative 1C would not result in a  
22 substantial adverse effect through habitat modifications and would not substantially reduce the  
23 number or restrict the range of the species. In particular, 95% of the loss of foraging habitat effects  
24 involve the conversion from one habitat type to another form of suitable foraging habitat. Therefore,  
25 the loss of habitat or potential mortality under this alternative would have a less-than-significant  
26 impact on white-tailed kite.

### 27 **Impact BIO-101: Effects on White-Tailed Kite Associated with Electrical Transmission** 28 **Facilities**

29 New transmission lines would increase the risk that white-tailed kites could be subject to power line  
30 strikes and/or electrocution, which could result in injury or mortality of individuals. This species  
31 would be at low risk of bird strike mortality based on its general maneuverability, its keen eyesight,  
32 and lack of flocking behavior (BDCP Attachment 5J.C, *Analysis of Potential Bird Collisions at Proposed*  
33 *BDCP Transmission Lines*). *AMM20 Greater Sandhill Crane* would further reduce any potential effects.

34 **NEPA Effects:** New transmission lines would minimally increase the risk for white-tailed kite power  
35 line strikes. However, the species would be at a low risk of bird strike mortality based on its general  
36 maneuverability, its keen eyesight and lack of flocking behavior. With the implementation of *AMM20*  
37 *Greater Sandhill Crane* the potential effect of the construction of new transmission lines on white-  
38 tailed kite would not be adverse.

39 **CEQA Conclusion:** New transmission lines would increase the risk for white-tailed kite power line  
40 strikes and/or electrocution. However, the species would be at a low risk of bird strike mortality  
41 based on its general maneuverability, its keen eyesight and lack of flocking behavior. *AMM20 Greater*  
42 *Sandhill Crane* would further reduce any potential impact of the construction of new transmission  
43 lines on white-tailed kite to a less-than-significant level.

1 **Impact BIO-102: Indirect Effects of Plan Implementation on White-Tailed Kite**

2 White-tailed kite nesting habitat within the vicinity of proposed construction areas could be  
3 indirectly affected by construction activities. Construction noise above background noise levels  
4 (greater than 50 dBA) could extend 1,900 to 5,250 feet from the edge of construction activities  
5 (BDCP Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of the BDCP Conveyance*  
6 *Facility on Sandhill Crane*, Table 4), although there are no available data to determine the extent to  
7 which these noise levels could affect white-tailed kite. Indirect effects associated with construction  
8 include noise, dust, and visual disturbance caused by grading, filling, contouring, and other ground-  
9 disturbing operations outside the project footprint but within 1,300 feet from the construction edge.  
10 If white-tailed kite were to nest in or adjacent to work areas, construction and subsequent  
11 maintenance-related noise and visual disturbances could mask calls, disrupt foraging and nesting  
12 behaviors, and reduce the functions of suitable nesting habitat for these species. *AMM18 Swainson's*  
13 *Hawk and White-Tailed Kite* would require preconstruction surveys, and if detected, 200 yard no  
14 disturbance buffers would be established around active nests. The use of mechanical equipment  
15 during water conveyance facilities construction could cause the accidental release of petroleum or  
16 other contaminants that could affect white-tailed kite in the surrounding habitat. The inadvertent  
17 discharge of sediment or excessive dust adjacent to white-tailed kite habitat could also affect the  
18 species. AMM1-AMM7, including *AMM2 Construction Best Management Practices and Monitoring*,  
19 would minimize the likelihood of such spills and ensure that measures are in place to prevent runoff  
20 from the construction area and negative effects of dust on active nests.

21 **Methylmercury Exposure:** Covered activities have the potential to exacerbate bioaccumulation of  
22 mercury in avian species, including white-tailed kite. Marsh (tidal and nontidal) and floodplain  
23 restoration also have the potential to increase exposure to methylmercury. Mercury is transformed  
24 into the more bioavailable form of methylmercury in aquatic systems, especially areas subjected to  
25 regular wetting and drying such as tidal marshes and flood plains (Alpers et al. 2008). Thus, BDCP  
26 restoration activities that create newly inundated areas could increase bioavailability of mercury  
27 (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Increased methylmercury  
28 associated with natural community and floodplain restoration may indirectly affect white-tailed kite  
29 (see BDCP Appendix 5.D, *Contaminants*). However, the potential mobilization or creation of  
30 methylmercury within the study area varies with site-specific conditions and would need to be  
31 assessed at the project level. *CM12 Methylmercury Management* includes provisions for project-  
32 specific Mercury Management Plans. Site-specific restoration plans that address the creation and  
33 mobilization of mercury, as well as monitoring and adaptive management as described in *CM12*  
34 would be available to address the uncertainty of methylmercury levels in restored tidal marsh and  
35 potential impacts on white-tailed kite.

36 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in  
37 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,  
38 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,  
39 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz  
40 2009). The effect of selenium toxicity differs widely between species and also between age and sex  
41 classes within a species. In addition, the effect of selenium on a species can be confounded by  
42 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith  
43 2009).

44 The primary source of selenium bioaccumulation in birds is through their diet (Ackerman and  
45 Eagles-Smith 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the

1 trophic level at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At  
2 Kesterson Reservoir in the San Joaquin Valley, selenium concentrations in invertebrates have been  
3 found to be two to six times the levels in rooted plants. Furthermore, bivalves sampled in the San  
4 Francisco Bay contained much higher selenium levels than crustaceans such as copepods (Stewart et  
5 al. 2004). Studies conducted at the Grasslands in Merced County recorded higher selenium levels in  
6 black-necked stilts which feed on aquatic invertebrates than in mallards and pintails, which are  
7 primarily herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which  
8 forage on bivalves) have much higher levels of selenium levels than shorebirds that prey on aquatic  
9 invertebrates (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high  
10 levels of selenium have a higher risk of selenium toxicity.

11 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations  
12 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to  
13 exacerbate bioaccumulation of selenium in avian species, including white-tailed kite. Marsh (tidal  
14 and nontidal) and floodplain restoration have the potential to mobilize selenium, and therefore  
15 increase avian exposure from ingestion of prey items with elevated selenium levels. Thus, BDCP  
16 restoration activities that create newly inundated areas could increase bioavailability of selenium  
17 (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Changes in selenium  
18 concentrations were analyzed in Chapter 8, *Water Quality*, and it was determined that, relative to  
19 Existing Conditions and the No Action Alternative, CM1 would not result in substantial, long-term  
20 increases in selenium concentrations in water in the Delta under any alternative. However, it is  
21 difficult to determine whether the effects of potential increases in selenium bioavailability  
22 associated with restoration-related conservation measures (CM4 and CM5) would lead to adverse  
23 effects on white-tailed kite.

24 Because of the uncertainty that exists at this programmatic level of review, there could be a  
25 substantial effect on white-tailed kite from increases in selenium associated with restoration  
26 activities. This effect would be addressed through the implementation of *AMM27 Selenium*  
27 *Management* (BDCP Appendix 3.C, *Avoidance and Minimization Measures*) which would provide  
28 specific tidal habitat restoration design elements to reduce the potential for bioaccumulation of  
29 selenium and its bioavailability in tidal habitats. Furthermore, the effectiveness of selenium  
30 management to reduce selenium concentrations and/or bioaccumulation would be evaluated  
31 separately for each restoration effort as part of design and implementation. This avoidance and  
32 minimization measure would be implemented as part of the tidal habitat restoration design  
33 schedule.

34 **NEPA Effects:** Noise and visual disturbances from the construction of water conveyance facilities  
35 could reduce white-tailed kite use of modeled habitat adjacent to work areas. Moreover, operation  
36 and maintenance of the water conveyance facilities, including the transmission facilities, could result  
37 in ongoing but periodic postconstruction disturbances that could affect white-tailed kite use of the  
38 surrounding habitat. Noise, potential spills of hazardous materials, increased dust and  
39 sedimentation, and operations and maintenance of the water conveyance facilities under Alternative  
40 1C would not have an adverse effect on white-tailed kite with the implementation of AMM1–AMM7,  
41 and *AMM18 Swainson's Hawk and White-Tailed Kite*. Tidal habitat restoration could result in  
42 increased exposure of white-tailed kite to selenium. This effect would be addressed through the  
43 implementation of *AMM27 Selenium Management* which would provide specific tidal habitat  
44 restoration design elements to reduce the potential for bioaccumulation of selenium and its  
45 bioavailability in tidal habitats. The indirect effects associated with noise and visual disturbances,  
46 potential spills of hazardous material, and increased exposure to selenium from Alternative 1C

1 implementation would not have an adverse effect on white-tailed kite. Tidal habitat restoration is  
2 unlikely to have an adverse effect on white-tailed kite through increased exposure to  
3 methylmercury, as kites currently forage in tidal marshes where elevated methylmercury levels  
4 exist. However, it is unknown what concentrations of methylmercury are harmful to the species and  
5 the potential for increased exposure varies substantially within the study area. Site-specific  
6 restoration plans in addition to monitoring and adaptive management, described in CM12  
7 *Methylmercury Management*, would address the uncertainty of methylmercury levels in restored  
8 tidal marsh. The site-specific planning phase of marsh restoration would be the appropriate place to  
9 assess the potential for risk of methylmercury exposure for white-tailed kite, once site specific  
10 sampling and other information could be developed.

11 **CEQA Conclusion:** Noise, the potential for hazardous spills, increased dust and sedimentation, and  
12 operations and maintenance of the water conveyance facilities under Alternative 1C would have a  
13 less-than-significant impact on white-tailed kite with the implementation of *AMM18 Swainson's*  
14 *Hawk and White-Tailed Kite*, and AMMs 1–7. Tidal habitat restoration could result in increased  
15 exposure of white-tailed kite to selenium. This effect would be addressed through the  
16 implementation of *AMM27 Selenium Management* which would provide specific tidal habitat  
17 restoration design elements to reduce the potential for bioaccumulation of selenium and its  
18 bioavailability in tidal habitats. The implementation of tidal natural communities restoration or  
19 floodplain restoration could result in increased exposure of white-tailed kite to methylmercury.  
20 However, it is unknown what concentrations of methylmercury are harmful to this species. *CM12*  
21 *Methylmercury Management* includes provisions for project-specific Mercury Management Plans.  
22 Site-specific restoration plans that address the creation and mobilization of mercury, as well as  
23 monitoring and adaptive management as described in CM12, would better inform potential impacts  
24 and address the uncertainty of methylmercury levels in restored tidal marsh in the study area on  
25 white-tailed kite. With these measures in place, the indirect effects associated with noise and visual  
26 disturbances, potential spills of hazardous material, and increased exposure to selenium from  
27 Alternative 1C implementation would have a less-than-significant impact on white-tailed kite.

28 **Impact BIO-103: Periodic Effects of Inundation of White-Tailed Kite Habitat as a Result of**  
29 **Implementation of Conservation Components**

30 Flooding of the Yolo Bypass from Fremont Weir operations related to *CM2 Yolo Bypass Fisheries*  
31 *Enhancement* would increase the frequency and duration of inundation on approximately 48–82  
32 acres of modeled white-tailed kite nesting habitat and 3,030–6,651 acres of modeled white-tailed  
33 kite foraging habitat (Table 12-1C-41). During inundation years, affected cultivated lands and  
34 grassland would not be available as foraging habitat until prey populations have re-inhabited  
35 inundated areas. This would result in temporary periodic reduction in availability of foraging  
36 habitat. If late-season Fremont Weir operations were to preclude the planting of some crop types,  
37 there could be a further loss of foraging habitat value if the crop type that would have been planted  
38 would provide greater foraging habitat value than the fallowed fields. No known white-tailed kite  
39 nest sites would be affected, and increased periodic flooding is not expected to cause any adverse  
40 effect on nest sites that may be within the inundation area because existing trees already withstand  
41 floods in the area, the increase in inundation frequency and duration is expected to remain within  
42 the range of tolerance of riparian trees, and any nest sites would be located above floodwaters.

43 Based on hypothetical floodplain restoration, CM5 implementation could result in periodic  
44 inundation of up to approximately 230 acres of modeled white-tailed kite nesting habitat and 7,402  
45 acres of modeled white-tailed kite foraging habitat (Table 12-1C-41). Inundation of foraging habitat

1 could result in a periodic reduction of available foraging habitat due to the reduction in available  
2 prey. Following draw-down, inundated habitats are expected to recover and provide suitable  
3 foraging conditions until the following inundation period. Thus, this is considered a periodic impact  
4 that is unlikely to affect white-tailed kite distribution and abundance, or foraging use of the Plan  
5 Area.

6 Periodic inundation of floodplains (through CM2 and CM5) would be expected to restore a more  
7 natural flood regime in support of riparian vegetation types that support white-tailed kite nesting  
8 habitat. No adverse effects of inundation on white-tailed kite riparian habitat are expected because  
9 valley/foothill riparian vegetation is expected to benefit from seasonal inundation.

10 **NEPA Effects:** Although foraging habitat would be periodically unavailable to white-tailed kite  
11 because of CM2 and CM5 implementation, inundated habitats are expected to recover following  
12 draw-down. Any effects are considered short-term and would not result in an adverse effect.

13 **CEQA Conclusion:** Although foraging habitat would be periodically unavailable to white-tailed kite  
14 because of CM2 and CM5 implementation, inundated habitats are expected to recover following  
15 draw-down. Any effects are considered short-term and would be expected to have a less-than-  
16 significant impact on white-tailed kite.

#### 17 **Yellow-Breasted Chat**

18 This section describes the effects of Alternative 1C, including water conveyance facilities  
19 construction and implementation of other conservation components, on yellow-breasted chat.  
20 Yellow-breasted chat modeled habitat includes suitable nesting and migratory habitat as those plant  
21 alliances from the valley/foothill riparian modeled habitat that contain a shrub component and an  
22 overstory component. Primary nesting and migratory habitat is qualitatively distinguished from  
23 secondary habitat in Delta areas as those plant associations that support a greater percentage of a  
24 suitable shrub cover, particularly blackberry, and California wild rose, and have an open to  
25 moderately dense overstory canopy, using data from Hickson and Keeler-Wolf (2007). No  
26 distinction is made between primary and secondary habitat for Suisun Marsh/Yolo Basin habitats  
27 because supporting information is lacking. For this reason, the effects analysis only provides the  
28 breakdown between primary and secondary habitat in the habitat loss totals and associated tables,  
29 and does not provide this breakdown in the text by activity or effect type.

30 Construction and restoration associated with Alternative 1C conservation measures would result in  
31 both temporary and permanent losses of yellow-breasted chat modeled habitat as indicated in Table  
32 12-1C-42. Full implementation of Alternative 1C would also include the following conservation  
33 actions over the term of the BDCP to benefit the yellow-breasted chat (BDCP Chapter 3, Section 3.3,  
34 *Biological Goals and Objectives*).

- 35 ● Restore or create at least 5,000 acres of valley/foothill riparian natural community, with at least  
36 3,000 acres occurring on restored seasonally inundated floodplain (Objective VFRNC1.1,  
37 associated with CM7).
- 38 ● Protect at least 750 acres of existing valley/foothill riparian natural community in CZ 7 by year  
39 10 (Objective VFRNC1.2, associated with CM3).
- 40 ● Restore, maintain and enhance structural heterogeneity with adequate vertical and horizontal  
41 overlap among vegetation components and over adjacent riverine channels, freshwater  
42 emergent wetlands, and grasslands (Objective VFRNC2.1, associated with CM7).

- Maintain at least 1,000 acres of early- to mid-successional vegetation with a well-developed understory of dense shrubs on restored seasonally inundated floodplain (Objective VFRNC2.2, associated with CM7).

As explained below, with the restoration or protection of these amounts of habitat, in addition to management activities that would enhance these natural communities for the species and the implementation of AMM1–AMM7 and AMM22 *Suisun Song Sparrow*, *Yellow-Breasted Chat*, *Least Bell's Vireo*, *Western Yellow-Billed Cuckoo*, impacts on yellow-breasted chat would not be adverse for NEPA purposes and would be less than significant for CEQA purposes.

**Table 12-1C-42. Changes in Yellow-Breasted Chat Modeled Habitat Associated with Alternative 1C (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Nesting and Migratory Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	<i>Primary</i>	8	8	32	32	NA	NA
	<i>Secondary</i>	6	6	12	12	NA	NA
	<i>Suisun Marsh/Upper Yolo Bypass</i>	0	0	0	0	NA	NA
<b>Total Impacts CM1</b>		<b>14</b>	<b>14</b>	<b>44</b>	<b>44</b>	<b>NA</b>	<b>NA</b>
CM2–CM18	<i>Primary</i>	96	214	58	73	19–38	92
	<i>Secondary</i>	209	357	0	6	6–18	56
	<i>Suisun Marsh/Upper Yolo Bypass</i>	76	85	29	29	23–32	0
<b>Total Impacts CM2–CM18</b>		<b>381</b>	<b>656</b>	<b>87</b>	<b>108</b>	<b>48–88</b>	<b>148</b>
<b>Total Primary</b>		<b>104</b>	<b>222</b>	<b>90</b>	<b>105</b>	19–38	92
<b>Total Secondary</b>		<b>215</b>	<b>363</b>	<b>12</b>	<b>18</b>	6–18	56
<b>Total Suisun Marsh/Upper Yolo Bypass</b>		<b>76</b>	<b>85</b>	<b>29</b>	<b>29</b>	23–32	0
<b>TOTAL IMPACTS</b>		<b>395</b>	<b>670</b>	<b>131</b>	<b>152</b>	<b>48–88</b>	<b>148</b>

<sup>a</sup> See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

1 **Impact BIO-104: Loss or Conversion of Habitat for and Direct Mortality of Yellow-Breasted**  
2 **Chat**

3 Alternative 1C conservation measures would result in the combined permanent and temporary loss  
4 of up to 822 acres of modeled nesting and migratory habitat for yellow-breasted chat (670 acres of  
5 permanent loss, 152 acres of temporary loss, Table 12-1C-42). Conservation measures that would  
6 result in these losses are conveyance facilities and transmission line construction, and establishment  
7 and use of borrow and spoil areas (CM1), *CM2 Yolo Bypass Fisheries Enhancement*, *CM4 Tidal Natural*  
8 *Communities Restoration*, and *CM5 Seasonally Inundated Floodplain Restoration*. Habitat  
9 enhancement and management activities (CM11) which include ground disturbance or removal of  
10 nonnative vegetation, could result in local adverse habitat effects. In addition, maintenance activities  
11 associated with the long-term operation of the water conveyance facilities and other BDCP physical  
12 facilities could degrade or eliminate yellow-breasted chat habitat. Each of these individual activities  
13 is described below. A summary statement of the combined impacts and NEPA effects, and a CEQA  
14 conclusion follow the individual conservation measure discussions.

- 15 ● *CM1 Water Facilities and Operation*: Construction of Alternative 1C conveyance facilities would  
16 result in the combined permanent and temporary loss of up to 40 acres of primary habitat (8  
17 acres of permanent loss, 32 acres of temporary loss). In addition, 18 acres of secondary habitat  
18 would be removed (6 acres of permanent loss, 12 acres of temporary loss, Table 12-1C-42).  
19 There are no occurrences of yellow-breasted chat that overlap with the CM1 construction  
20 footprint. However, this loss would have the potential to displace individuals, if present, and  
21 remove the functions and value of modeled habitat for resting, protection, or foraging. Most of  
22 the permanent loss of nesting habitat would occur where Intakes 1–5 impact the Sacramento  
23 River’s west bank between just north of Clarksburg and Courtland. The riparian areas here are  
24 very small patches, dominated by valley oak, scrub vegetation, and nonnative trees. Temporary  
25 impacts would occur from the footprint of proposed temporary transmission lines, siphon work  
26 areas, a barge unloading facility east of Rio Vista, and a safe haven work area south of Piper  
27 Slough. The implementation of *AMM22 Suisun Song Sparrow*, *Yellow-Breasted Chat*, *Least Bell’s*  
28 *Vireo*, *Western Yellow-Billed Cuckoo* would minimize effects on yellow-breasted chat if they were  
29 to nest within or adjacent to the construction footprint. Refer to the Terrestrial Biology Map  
30 Book for a detailed view of Alternative 1C construction locations.
- 31 ● *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo bypass fisheries enhancement  
32 would permanently remove approximately 83 acres and temporarily remove 88 acres of yellow-  
33 breasted chat habitat in the Yolo Bypass in CZ 2. The loss is expected to occur during the first 10  
34 years of Alternative 1C implementation.
- 35 ● *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and  
36 inundation would permanently remove an estimated 545 acres of modeled yellow-breasted chat  
37 habitat in CZ 1, 2, 6, and 11. This total is composed of an estimated 182 acres of primary nesting  
38 and migratory habitat, 349 acres of secondary nesting and migratory habitat, and 14 acres of  
39 nesting and migratory habitat in the Suisun Marsh and upper Yolo Bypass areas.
- 40 ● *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore  
41 seasonally inundated floodplain would permanently and temporarily remove approximately 49  
42 acres of modeled yellow-breasted chat habitat in CZ 7. This total is comprised of 28 acres of  
43 primary nesting and migratory habitat and 21 acres of secondary nesting and migratory habitat.  
44 Based on the riparian habitat restoration assumptions, approximately 3,000 acres of  
45 valley/foothill riparian habitat would be restored as a component of seasonally inundated

1 floodplain restoration actions. The actual number of acres that would be restored may differ  
2 from these estimates, depending on how closely the outcome of seasonally inundated floodplain  
3 restoration approximates the assumed outcome. Once this restored riparian vegetation has  
4 developed habitat functions, a portion of it would be suitable to support yellow-breasted chat  
5 habitat.

- 6 • *CM11 Natural Communities Enhancement and Management*: Habitat protection and management  
7 activities that could be implemented in protected yellow-breasted chat habitats would be  
8 expected to maintain and improve the functions of the habitat over the term of the BDCP.  
9 Yellow-breasted chat would be expected to benefit from the increase in protected habitat, which  
10 would maintain conditions favorable for the chat's use of the study area.

11 Habitat management- and enhancement-related activities could disturb yellow-breasted chat  
12 nests if they are present near work sites. Equipment operation could destroy nests, and noise  
13 and visual disturbances could lead to their abandonment, resulting in mortality of eggs and  
14 nestlings. *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-*  
15 *Billed Cuckoo* would ensure that these activities do not result in direct mortality of yellow-  
16 breasted chat or other adverse effects.

17 Occupied habitat would be monitored to determine if there is a need to implement controls on  
18 brood parasites (brown-headed cowbird) or nest predators. If implemented, these actions  
19 would be expected to benefit the yellow-breasted chat by removing a potential stressor that  
20 could, if not addressed, adversely affect the stability of newly established populations.

21 A variety of habitat management actions included in *CM11 Natural Communities Enhancement*  
22 *and Management* that are designed to enhance wildlife values in restored riparian habitats may  
23 result in localized ground disturbances that could temporarily remove small amounts of yellow-  
24 breasted chat habitat. Ground-disturbing activities, such as removal of nonnative vegetation and  
25 road and other infrastructure maintenance activities, are expected to have minor adverse effects  
26 on available yellow-breasted chat habitat and are expected to result in overall improvements to  
27 and maintenance of yellow-breasted chat habitat values over the term of the BDCP.

- 28 • *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground  
29 water conveyance facilities and restoration infrastructure could result in ongoing but periodic  
30 disturbances that could affect least Bell's vireo and yellow warbler use of the surrounding  
31 habitat. Maintenance activities would include vegetation management, levee and structure  
32 repair, and re-grading of roads and permanent work areas. These effects, however, would be  
33 reduced by AMMs and conservation actions as described below.
- 34 • *Injury and Direct Mortality*: Construction is not expected to result in direct mortality of yellow-  
35 breasted chat because adults and fledged young are expected to occur only in very small  
36 numbers and, if present, would avoid contact with construction and other equipment. If yellow-  
37 breasted chat were to nest in the vicinity of construction activities, equipment operation could  
38 destroy nests and noise and visual disturbances could lead to nest abandonment. *AMM22 Suisun*  
39 *Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo* would avoid  
40 and minimize this effect.
- 41 • *Permanent and temporary habitat losses* from the above CMs, would primarily consist of small,  
42 fragmented riparian stands in CZ 2–CZ 8 that do not provide high-value habitat for the species.  
43 Temporarily affected areas would be restored as riparian habitat within 1 year following  
44 completion of construction activities. Although the effects are considered temporary, the

1 restored riparian habitat would require 5 years to several decades, for ecological succession to  
2 occur and for restored riparian habitat to functionally replace habitat that has been affected. The  
3 majority of the riparian vegetation to be temporarily removed is early- to mid-successional;  
4 therefore, the replaced riparian vegetation would be expected to have structural components  
5 comparable to the temporarily removed vegetation within the first 5 to 10 years after the initial  
6 restoration activities are complete.

7 The following paragraphs summarize the combined effects discussed above and describe other  
8 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also  
9 included.

### 10 ***Near-Term Timeframe***

11 Because the water conveyance facilities construction is being evaluated at the project level, the near-  
12 term BDCP conservation strategy has been evaluated to determine whether it would provide  
13 sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that the  
14 effects of construction would not be adverse under NEPA. Alternative 1C would remove 526 acres of  
15 modeled habitat for yellow-breasted chat in the study area in the near-term. These effects would  
16 result from the construction of the water conveyance facilities (CM1, 58 acres of modeled nesting  
17 and migratory habitat), and implementing other conservation measures (CM2 *Yolo Bypass Fisheries*  
18 *Enhancement*, CM4 *Tidal Natural Communities Restoration*, and CM5 *Seasonally Inundated Floodplain*  
19 *Restoration*—468 acres of modeled nesting and migratory habitat). These habitat losses would  
20 primarily consist of small, fragmented riparian stands in CZ 2-CZ 8 that do not provide high-value  
21 habitat for the species.

22 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by  
23 CM1 and that are identified in the biological goals and objectives for yellow-breasted chat in Chapter  
24 3 of the BDCP would be 1:1 for restoration/creation and 1:1 protection of valley/foothill riparian  
25 habitat. Using these ratios would indicate that 58 acres of valley/foothill riparian habitat should be  
26 restored/created and 58 acres should be protected to compensate for the CM1 losses of yellow-  
27 breasted chat habitat. The near-term effects of other conservation actions would remove 468 acres  
28 of modeled habitat, and therefore require 468 acres of restoration and 468 acres of protection of  
29 valley/foothill riparian using the same typical NEPA and CEQA ratios (1:1 for restoration and 1:1 for  
30 protection).

31 The BDCP has committed to near-term goals of protecting 750 acres and restoring 800 acres of the  
32 valley/foothill riparian natural community in the Plan Area (Table 3-4 in Chapter 3, *Description of*  
33 *Alternatives*). These conservation actions are associated with CM3 and CM7 and would occur in the  
34 same timeframe as the construction and early restoration losses, thereby avoiding adverse effects of  
35 habitat loss on yellow-breasted chat. The majority of the riparian restoration acres would occur in  
36 CZ 7 as part of a reserve system with extensive wide bands or large patches of valley/foothill  
37 riparian natural community (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation*  
38 *Strategy*). Goals and objectives in the Plan for riparian restoration also include the restoration,  
39 maintenance and enhancement of structural heterogeneity with adequate vertical and horizontal  
40 overlap among vegetation components and over adjacent riverine channels, freshwater emergent  
41 wetlands, and grasslands (Objective VFRNC2.1). The yellow-breasted chat has specific structural  
42 habitat requirements, so only the early- to mid-successional portions of the restored and protected  
43 riparian natural would be expected to provide suitable habitat characteristics for the species. These  
44 natural community biological goals and objectives would inform the near-term protection and

1 restoration efforts and represent performance standards for considering the effectiveness of  
2 conservation actions for the species.

3 The acres of protection contained in the near-term Plan goals and the additional detail in the  
4 biological objectives for yellow-breasted chat satisfy the typical mitigation ratios that would be  
5 applied to the project-level effects of CM1, as well as mitigate the near-term effects of the other  
6 conservation measures. The restored riparian habitat could require 5 years to several decades, for  
7 ecological succession to occur and for restored riparian habitat to functionally replace habitat that  
8 has been affected. However, because the modeled habitat impacted largely consists of small patches  
9 of blackberry, willow, and riparian scrub, BDCP actions would not be expected to have an adverse  
10 population-level effect on the species in the near-term time period.

11 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
12 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
13 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
14 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
15 *Material*, *AMM7 Barge Operations Plan*, and *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat,*  
16 *Least Bell's Vireo, Western Yellow-Billed Cuckoo*. All of these AMMs include elements that would  
17 avoid or minimize the risk of affecting individuals and species habitats adjacent to work areas and  
18 storage sites. The AMMs are described in detail in BDCP Appendix 3.C, *Avoidance and Minimization*  
19 *Measures*.

#### 20 ***Late Long-Term Timeframe***

21 The habitat model indicates that the study area supports approximately 14,547 acres of modeled  
22 nesting and migratory habitat for yellow-breasted chat. Alternative 1C as a whole would result in  
23 the permanent loss of and temporary effects on 822 acres of modeled habitat (6% of the modeled  
24 habitat in the study area). These losses would occur from the construction of the water conveyance  
25 facilities (CM1) and from *CM2 Yolo Bypass Fisheries Enhancement*, *CM4 Tidal Natural Communities*  
26 *Restoration*, and *CM5 Seasonally Inundated Floodplain Restoration*. The locations of these losses  
27 would be in fragmented riparian habitat throughout the study area.

28 The Plan includes conservation commitments through *CM7 Riparian Natural Community Restoration*  
29 and *CM3 Natural Communities Protection and Restoration* to restore or create at least 5,000 acres  
30 and protect at least 750 acres of valley/foothill riparian woodland. Of the 5,000 acres of restored  
31 riparian natural communities, a minimum of 3,000 acres of valley/foothill riparian would be  
32 restored within the seasonally inundated floodplain, and 1,000 acres would be managed as dense  
33 early to mid-successional riparian forest (Objectives VFRNC1.1 and VFRNC1.2). The yellow-breasted  
34 chat has specific structural habitat requirements, so only the early- to mid-successional portions of  
35 the restored and protected riparian natural would be expected to provide suitable habitat  
36 characteristics for the species. Fluvial disturbance in restored riparian floodplains would help to  
37 maintain early- to mid-successional vegetation. The resulting riparian systems would be subject to  
38 natural erosion and deposition, which would provide conditions conducive to the establishment of  
39 dense willow stands that are preferred by yellow-breasted chat for nesting. In addition, if  
40 monitoring determined that cowbird parasitism was having an effect on the yellow-breasted  
41 population in the Plan Area, a cowbird control program would be implemented through *CM11*  
42 *Natural Communities Enhancement and Management*. Goals and objectives in the Plan for riparian  
43 restoration also include the maintenance and enhancement of structural heterogeneity (Objective  
44 VFRNC2.1) which would provide suitable habitat for yellow-breasted chat.

1 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*  
2 *Plant Species*) estimates that the restoration and protection actions discussed above could result in  
3 the restoration of 2,683 acres and the protection of 594 acres of habitat for the yellow-breasted  
4 chat.

5 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*  
6 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*  
7 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
8 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
9 *Material, AMM7 Barge Operations Plan, and AMM22 Suisun Song Sparrow, Yellow-Breasted Chat,*  
10 *Least Bell's Vireo, Western Yellow-Billed Cuckoo.* All of these AMMs include elements that would  
11 avoid or minimize the risk of affecting individuals and species habitats adjacent to work areas and  
12 storage sites. The AMMs are described in detail in BDCP Appendix 3.C, *Avoidance and Minimization*  
13 *Measures.*

14 **NEPA Effects:** The loss of yellow-breasted chat habitat and potential direct mortality of this special-  
15 status species would represent an adverse effect in the absence of other conservation actions.  
16 However, the habitat that would be lost consists of small, fragmented riparian stands that do not  
17 provide high-value habitat for the species. The restored riparian habitat would require 5 years to  
18 several decades for ecological succession to occur and for restored riparian habitat to functionally  
19 replace habitat that has been affected. Because the nesting and migratory habitat that would be lost  
20 is small relative to the species range throughout California and North America, Alternative 1C would  
21 not be expected to have an adverse population-level effect on the species. With habitat protection  
22 and restoration associated with CM3, CM7, and CM11, guided by biological goals and objectives and  
23 by *AMM1 Worker Awareness Training, AMM2 Construction Best Management Practices and*  
24 *Monitoring, AMM3 Stormwater Pollution Prevention Plan, AMM4 Erosion and Sediment Control Plan,*  
25 *AMM5 Spill Prevention, Containment, and Countermeasure Plan, AMM6 Disposal and Reuse of Spoils,*  
26 *Reusable Tunnel Material, and Dredged Material, AMM7 Barge Operations Plan, and AMM22 Suisun*  
27 *Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo,* which would be  
28 in place throughout the construction period, the effects of habitat loss and potential mortality on  
29 yellow-breasted chat under Alternative 1C would not be adverse.

### 30 **CEQA Conclusion:**

#### 31 **Near-Term Timeframe**

32 Because the water conveyance facilities construction is being evaluated at the project level, the near-  
33 term BDCP conservation strategy has been evaluated to determine whether it would provide  
34 sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that the  
35 impact of construction would be less than significant under CEQA. Alternative 1C would remove 526  
36 acres of modeled habitat for yellow-breasted chat in the study area in the near-term. These effects  
37 would result from the construction of the water conveyance facilities (CM1, 58 acres of modeled  
38 nesting and migratory habitat), and implementing other conservation measures (*CM2 Yolo Bypass*  
39 *Fisheries Enhancement, CM4 Tidal Natural Communities Restoration, and CM5 Seasonally Inundated*  
40 *Floodplain Restoration*—468 acres of modeled nesting and migratory habitat). These habitat losses  
41 would primarily consist of small, fragmented riparian stands in CZ 2-CZ 8 that do not provide high-  
42 value habitat for the species.

43 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by  
44 CM1 and that are identified in the biological goals and objectives for yellow-breasted chat in Chapter

1 3 of the BDCP would be 1:1 for restoration/creation and 1:1 protection of valley/foothill riparian  
2 habitat. Using these ratios would indicate that 58 acres of valley/foothill riparian habitat should be  
3 restored/created and 58 acres should be protected to compensate for the CM1 losses of yellow-  
4 breasted chat habitat. The near-term effects of other conservation actions would remove 468 acres  
5 of modeled habitat, and therefore require 468 acres of restoration and 468 acres of protection of  
6 valley/foothill riparian using the same typical NEPA and CEQA ratios (1:1 for restoration and 1:1 for  
7 protection).

8 The BDCP has committed to near-term goals of protecting 750 acres and restoring 800 acres of the  
9 valley/foothill riparian natural community in the Plan Area (Table 3-4 in Chapter 3, *Description of*  
10 *Alternatives*). These conservation actions are associated with CM3 and CM7 and would occur in the  
11 same timeframe as the construction and early restoration losses, thereby avoiding adverse effects of  
12 habitat loss on yellow-breasted chat. The majority of the riparian restoration acres would occur in  
13 CZ 7 as part of a reserve system with extensive wide bands or large patches of valley/foothill  
14 riparian natural community (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation*  
15 *Strategy*). Goals and objectives in the Plan for riparian restoration also include the restoration,  
16 maintenance and enhancement of structural heterogeneity with adequate vertical and horizontal  
17 overlap among vegetation components and over adjacent riverine channels, freshwater emergent  
18 wetlands, and grasslands (Objective VFRNC2.1). The yellow-breasted chat has specific structural  
19 habitat requirements, so only the early- to mid-successional portions of the restored and protected  
20 riparian natural would be expected to provide suitable habitat characteristics for the species. These  
21 natural community biological goals and objectives would inform the near-term protection and  
22 restoration efforts and represent performance standards for considering the effectiveness of  
23 conservation actions for the species.

24 The acres of protection contained in the near-term Plan goals and the additional detail in the  
25 biological objectives for yellow-breasted chat satisfy the typical mitigation ratios that would be  
26 applied to the project-level effects of CM1, as well as mitigate the near-term effects of the other  
27 conservation measures. The restored riparian habitat could require 5 years to several decades, for  
28 ecological succession to occur and for restored riparian habitat to functionally replace habitat that  
29 has been affected. However, because the modeled habitat impacted largely consists of small patches  
30 of blackberry, willow, and riparian scrub, BDCP actions would not be expected to have a significant  
31 population-level impact on the species in the near-term time period.

32 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
33 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
34 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
35 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
36 *Material*, *AMM7 Barge Operations Plan*, and *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat,*  
37 *Least Bell's Vireo, Western Yellow-Billed Cuckoo*. All of these AMMs include elements that would  
38 avoid or minimize the risk of affecting individuals and species habitats adjacent to work areas and  
39 storage sites. The AMMs are described in detail in BDCP Appendix 3.C, *Avoidance and Minimization*  
40 *Measures*.

#### 41 **Late Long-Term Timeframe**

42 The habitat model indicates that the study area supports approximately 14,547 acres of modeled  
43 nesting and migratory habitat for yellow-breasted chat. Alternative 1C as a whole would result in  
44 the permanent loss of and temporary effects on 822 acres of modeled habitat (6% of the modeled

1 habitat in the study area). These losses would occur from the construction of the water conveyance  
2 facilities (CM1) and from *CM2 Yolo Bypass Fisheries Enhancement*, *CM4 Tidal Natural Communities*  
3 *Restoration*, and *CM5 Seasonally Inundated Floodplain Restoration*. The locations of these losses  
4 would be in fragmented riparian habitat throughout the study area.

5 The Plan includes conservation commitments through *CM7 Riparian Natural Community Restoration*  
6 and *CM3 Natural Communities Protection and Restoration* to restore or create at least 5,000 acres  
7 and protect at least 750 acres of valley/foothill riparian woodland. Of the 5,000 acres of restored  
8 riparian natural communities, a minimum of 3,000 acres of valley/foothill riparian would be  
9 restored within the seasonally inundated floodplain, and 1,000 acres would be managed as dense  
10 early to mid-successional riparian forest (Objectives VFRNC1.1 and VFRNC1.2). The yellow-breasted  
11 chat has specific structural habitat requirements, so only the early- to mid-successional portions of  
12 the restored and protected riparian natural would be expected to provide suitable habitat  
13 characteristics for the species. Fluvial disturbance in restored riparian floodplains would help to  
14 maintain early- to mid-successional vegetation. The resulting riparian systems would be subject to  
15 natural erosion and deposition, which would provide conditions conducive to the establishment of  
16 dense willow stands that are preferred by yellow-breasted chat for nesting. In addition, if  
17 monitoring determined that cowbird parasitism was having an effect on the yellow-breasted  
18 population in the Plan Area, a cowbird control program would be implemented through *CM11*  
19 *Natural Communities Enhancement and Management*. Goals and objectives in the Plan for riparian  
20 restoration also include the maintenance and enhancement of structural heterogeneity (Objective  
21 VFRNC2.1) which would provide suitable habitat for yellow-breasted chat.

22 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*  
23 *Plant Species*) estimates that the restoration and protection actions discussed above could result in  
24 the restoration of 2,683 acres and the protection of 594 acres of habitat for the yellow-breasted  
25 chat.

26 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
27 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
28 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
29 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
30 *Material*, *AMM7 Barge Operations Plan*, and *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat,*  
31 *Least Bell's Vireo, Western Yellow-Billed Cuckoo*. All of these AMMs include elements that would  
32 avoid or minimize the risk of affecting individuals and species habitats adjacent to work areas and  
33 storage sites. The AMMs are described in detail in BDCP Appendix 3.C, *Avoidance and Minimization*  
34 *Measures*.

35 Considering Alternative 1C's protection and restoration provisions, which would provide acreages  
36 of new or enhanced habitat in amounts suitable to compensate for habitats lost to construction and  
37 restoration activities, and with implementation of AMM1–AMM7 and *AMM22 Suisun Song Sparrow,*  
38 *Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo*, the loss of habitat or direct  
39 mortality through implementation of Alternative 1C would not result in a substantial adverse effect  
40 through habitat modifications and would not substantially reduce the number or restrict the range  
41 of the species. Therefore, the loss of habitat or potential mortality under this alternative would have  
42 a less-than-significant impact on yellow-breasted chat.

1 **Impact BIO-105: Fragmentation of Yellow-Breasted Chat Habitat as a Result of Constructing**  
2 **the Water Conveyance Facilities**

3 Grading, filling, contouring, and other initial ground-disturbing activities for water conveyance  
4 facilities construction may temporarily fragment modeled yellow-breasted chat habitat. This could  
5 temporarily reduce the extent of and functions supported by the affected habitat. Because of the  
6 current infrequent occurrence and small numbers of yellow-breasted chat in the Plan Area, and  
7 because CM5 would restore and protect contiguous high-value riparian habitat in CZ 7, any such  
8 habitat fragmentation is expected to have no or minimal effect on the species.

9 **NEPA Effects:** Temporary fragmentation of habitat would not result in an adverse effect on yellow-  
10 breasted chat. The habitat functions for the species would be significantly improved through the  
11 implementation of CM5, which would restore and protect large contiguous patches of riparian  
12 habitat.

13 **CEQA Conclusion:** Temporary fragmentation of habitat would have a less-than-significant impact on  
14 yellow-breasted chat. The habitat functions for the species would be significantly improved through  
15 the implementation of CM5, which would restore and protect large contiguous patches of riparian  
16 habitat.

17 **Impact BIO-106: Effects on Yellow-Breasted Chat Associated with Electrical Transmission**  
18 **Facilities**

19 New transmission lines would increase the risk for bird-power line strikes, which could result in  
20 injury or mortality of yellow-breasted chat. Yellow-breasted chats are migratory and usually arrive  
21 at California breeding grounds in April from their wintering grounds in Mexico and Guatemala.  
22 Departure for wintering grounds occurs from August to September. These are periods of relative  
23 high visibility when the risk of powerline collisions would be low. The species' small, relatively  
24 maneuverable body; its foraging behavior; and its presence in the Plan Area during the summer  
25 contribute to a low risk of collision with the proposed transmission lines (BDCP Attachment 5J.C,  
26 *Analysis of Potential Bird Collisions at Proposed BDCP Transmission Lines*). New transmission lines  
27 would therefore not be expected to have an adverse effect on yellow-breasted chat.

28 **NEPA Effects:** The construction and presence of new transmission lines would not result in an  
29 adverse effect on yellow-breasted chat because the risk of bird strike is considered to be minimal  
30 based on the species' small, relatively maneuverable body; its foraging behavior; and its presence in  
31 the Plan Area during the summer when visibility is high.

32 **CEQA Conclusion:** The construction and presence of new transmission lines would have a less-than-  
33 significant impact on yellow-breasted chat because the risk of bird-strike is considered to be  
34 minimal based on the species' small, relatively maneuverable body, its foraging behavior, and its  
35 presence in the Plan Area during the summer when visibility is high.

36 **Impact BIO-107: Indirect Effects of Plan Implementation on Yellow-Breasted Chat**

37 Noise and visual disturbances associated with construction-related activities could result in  
38 temporary disturbances that affect yellow-breasted chat use of modeled habitat adjacent to  
39 proposed construction areas. Construction noise above background noise levels (greater than 50  
40 dBA) could extend 1,900 to 5,250 feet from the edge of construction activities (BDCP Appendix 5.J,  
41 *Attachment 5J.D, Indirect Effects of the Construction of the BDCP Conveyance Facility on Sandhill*  
42 *Crane, Table 4*), although there are no available data to determine the extent to which these noise

1 levels could affect yellow-breasted chat. Indirect effects associated with construction include noise,  
2 dust, and visual disturbance caused by grading, filling, contouring, and other ground-disturbing  
3 operations outside the project footprint but within 1,300 feet of the construction edge. If yellow-  
4 breasted chat were to nest in or adjacent to work areas, construction and subsequent maintenance-  
5 related noise and visual disturbances could mask calls, disrupt foraging and nesting behaviors, and  
6 reduce the functions of suitable nesting habitat for these species. These potential effects would be  
7 minimized with incorporation of *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's*  
8 *Vireo, Western Yellow-Billed Cuckoo* into the BDCP, which would ensure 250-foot no-disturbance  
9 buffers were established around active nests. The use of mechanical equipment during water  
10 conveyance facilities construction could cause the accidental release of petroleum or other  
11 contaminants that could affect yellow-breasted chat in the surrounding habitat. The inadvertent  
12 discharge of sediment or excessive dust adjacent to yellow-breasted chat habitat could also affect  
13 the species. *AMM1–AMM7*, including *AMM2 Construction BMPs and Monitoring*, in addition to  
14 *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo*,  
15 would minimize the likelihood of such spills and ensure that measures were in place to prevent  
16 runoff from the construction area and any adverse effects of dust on active nests. If present, yellow-  
17 breasted chat individuals could be temporarily affected by noise and visual disturbances adjacent to  
18 water conveyance construction sites, *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's*  
19 *Vireo, Western Yellow-Billed Cuckoo* would minimize this effect on the species.

20 **NEPA Effects:** The potential for noise and visual disturbance, hazardous spills, increased dust and  
21 sedimentation, and the potential impacts of operations and maintenance of the water conveyance  
22 facilities would not result in an adverse effect on yellow-breasted chat with the incorporation of  
23 *AMM1–AMM7* and *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western*  
24 *Yellow-Billed Cuckoo* into the BDCP.

25 **CEQA Conclusion:** The potential for noise and visual disturbance, hazardous spills, increased dust  
26 and sedimentation, and the potential impacts of operations and maintenance of the water  
27 conveyance facilities would have a less-than-significant impact on yellow-breasted chat with the  
28 incorporation of *AMM1–AMM7* and *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's*  
29 *Vireo, Western Yellow-Billed Cuckoo* into the BDCP.

### 30 **Impact BIO-108: Periodic Effects of Inundation of Yellow-Breasted Chat Habitat as a Result of** 31 **Implementation of Conservation Components**

32 Flooding of the Yolo Bypass from Fremont Weir operations (CM2) would increase the frequency and  
33 duration of inundation of approximately 48–88 acres of modeled yellow-breasted chat nesting and  
34 migratory habitat. No adverse effects of increased inundation frequency on yellow-breasted chat or  
35 its habitat are expected because the chat breeding period is outside the period the weir would be  
36 operated. Moreover, riparian vegetation supporting habitat has persisted under the existing Yolo  
37 Bypass flooding regime, and changes to frequency and inundation would be within the tolerance of  
38 these vegetation types.

39 Based on hypothetical floodplain restoration, CM5 could result in periodic inundation of up to 148  
40 acres of modeled yellow-breasted chat habitat. Inundation of restored floodplains is not expected to  
41 affect yellow-breasted chat or its habitat because the chat breeding period is outside the period the  
42 floodplains would likely be inundated. In addition, providing for periodic inundation of floodplains  
43 is expected to restore a more natural flood regime in support of riparian vegetation types that  
44 provide nesting and migratory habitat for yellow-breasted chat. The overall effect of seasonal

1 inundation in existing riparian natural communities is likely to be beneficial because, historically,  
2 flooding was the main natural disturbance regulating ecological processes in riparian areas, and  
3 flooding promotes the germination and establishment of many native riparian plants.

4 **NEPA Effects:** Increases in the frequency and duration of Yolo Bypass flooding and CM5 floodplain  
5 restoration would be expected to create more natural flood regimes that would support riparian  
6 habitat, which would not result in an adverse effect on yellow breasted chat.

7 **CEQA Conclusion:** By creating more natural flood regimes that would support riparian habitat,  
8 increases in the frequency and duration of Yolo Bypass flooding and CM5 floodplain restoration  
9 would have a beneficial impact on yellow breasted chat.

## 10 **Cooper's Hawk and Osprey**

11 This section describes the effects of Alternative 1C, including water conveyance facilities  
12 construction and implementation of other conservation components, on Cooper's hawk and osprey.  
13 Although osprey often nest on manmade structures such as telephone poles, and Cooper's hawk will  
14 nest in more developed landscapes, modeled breeding habitat for these species is restricted to  
15 valley/foothill riparian forest.

16 Construction and restoration associated with Alternative 1C conservation measures would result in  
17 both temporary and permanent losses of Cooper's hawk and osprey modeled habitat as indicated in  
18 Table 12-1C-43. The majority of the losses would take place over an extended period of time as tidal  
19 marsh is restored in the study area. Although restoration for the loss of nesting habitat would be  
20 initiated in the same timeframe as the losses, it could take one or more decades for restored habitats  
21 to replace the functions of habitat lost. This time lag between impacts and restoration of habitat  
22 function would be minimized by specific requirements of *AMM18 Swainson's Hawk and White-Tailed*  
23 *Kite*, including the planting of mature trees in the near-term time period. Full implementation of  
24 Alternative 1C would include the following conservation actions over the term of the BDCP which  
25 would also benefit Cooper's hawk and osprey (BDCP Chapter 3, Section 3.3, *Biological Goals and*  
26 *Objectives*).

- 27 ● Restore or create at least 5,000 acres of valley/foothill riparian natural community, with at least  
28 3,000 acres occurring on restored seasonally inundated floodplain (Objective VFRNC1.1,  
29 associated with CM7)
- 30 ● Protect at least 750 acres of existing valley/foothill riparian natural community in CZ 7 by year  
31 10 (Objective VFRNC1.2, associated with CM3).
- 32 ● Plant and maintain native trees along roadsides and field borders within protected cultivated  
33 lands at a rate of one tree per 10 acres (Objective SH2.1, associated with CM11).
- 34 ● Maintain and protect the small patches of important wildlife habitats associated with cultivated  
35 lands within the reserve system including isolated valley oak trees, trees and shrubs along field  
36 borders and roadsides, remnant groves, riparian corridors, water conveyance channels,  
37 grasslands, ponds, and wetlands (Objective CLNC1.3, associated with CM3).

38 As explained below, with the acres of restoration or protection included in the Plan, in addition to  
39 management activities to enhance natural communities for species and the implementation of  
40 *AMM1-AMM7*, *AMM18 Swainson's Hawk and White-Tailed Kite*, and Mitigation Measure BIO-75,  
41 impacts on Cooper's hawk and osprey would not be adverse for NEPA purposes and would be less  
42 than significant for CEQA purposes.

1 **Table 12-1C-43. Changes in Cooper’s Hawk and Osprey Modeled Habitat Associated with**  
2 **Alternative 1C (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	Nesting	33	33	71	71	NA	NA
<b>Total Impacts CM1</b>		<b>33</b>	<b>33</b>	<b>71</b>	<b>71</b>	<b>NA</b>	<b>NA</b>
CM2–CM18	Nesting	312	507	88	121	48–82	230
<b>Total Impacts CM2–CM18</b>		<b>312</b>	<b>507</b>	<b>88</b>	<b>121</b>	<b>48–82</b>	<b>230</b>
<b>TOTAL IMPACTS</b>		<b>345</b>	<b>540</b>	<b>159</b>	<b>192</b>	<b>48–82</b>	<b>230</b>

<sup>a</sup> See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-109: Loss or Conversion of Habitat for and Direct Mortality of Cooper’s Hawk and**  
5 **Osprey**

6 Alternative 1C conservation measures would result in the combined permanent and temporary loss  
7 of up to 911 acres of modeled habitat for Cooper’s hawk and osprey (Table 12-1C-43). Conservation  
8 measures that would result in these losses are *CM1 Water Facilities and Operation* (which would  
9 involve conveyance facilities and transmission line construction, and establishment and use of  
10 borrow and spoil areas), *CM2 Yolo Bypass Fisheries Enhancement*, *CM4 Tidal Natural Communities*  
11 *Restoration*, and *CM5 Seasonally Inundated Floodplain Restoration*. Habitat enhancement and  
12 management activities (CM11) which include ground disturbance or removal of nonnative  
13 vegetation, could result in local adverse habitat effects. In addition, maintenance activities  
14 associated with the long-term operation of the water conveyance facilities and other BDCP physical  
15 facilities could affect Cooper’s hawk and osprey modeled habitat. Each of these individual activities  
16 is described below. A summary statement of the combined impacts and NEPA and CEQA conclusions  
17 follows the individual conservation measure discussions.

- 18 • *CM1 Water Facilities and Operation*: Construction of Alternative 1C water conveyance facilities  
19 would result in the combined permanent and temporary loss of up to 104 acres of white-tailed  
20 kite nesting habitat (33 acres of permanent loss and 71 acres of temporary loss, Table 12-1C-  
21 43). Most of the permanent loss of nesting habitat would occur where Intakes 1–5 impact the  
22 Sacramento River’s west bank between just north of Clarksburg and Courtland. The riparian  
23 areas here are very small patches, dominated by valley oak, scrub vegetation, and nonnative  
24 trees. Temporary impacts would occur from the footprint of proposed temporary transmission  
25 lines, siphon work areas, a barge unloading facility east of Rio Vista, and a safe haven work area  
26 south of Piper Slough. These losses would have the potential to displace individuals, if present,

1 and remove the functions and value of potentially suitable habitat. There are no occurrences of  
2 Cooper's hawk or osprey that overlap with the construction footprint for CM1. Mitigation  
3 Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting*  
4 *Birds*, (described below) would require preconstruction surveys and the establishment of no-  
5 disturbance buffers and would be available to address potential effects on Cooper's hawk and  
6 osprey if either species were to nest in or adjacent to the construction footprint. Refer to the  
7 Terrestrial Biology Map Book for a detailed view of Alternative 1C construction locations.  
8 Impacts from CM1 would occur within the first 10 years of Alternative 1C implementation.

- 9 • *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo bypass fisheries enhancement  
10 would result in the combined permanent and temporary loss of up to 170 acres of Cooper's  
11 hawk and osprey nesting habitat (82 acres of permanent loss, 88 acres of temporary loss) in the  
12 Yolo Bypass in CZ 2. Activities through CM2 could involve excavation and grading in  
13 valley/foothill riparian areas to improve passage of fish through the bypasses. Most of the  
14 riparian losses would occur at the north end of Yolo Bypass where major fish passage  
15 improvements are planned. Excavation to improve water movement in the Toe Drain and in the  
16 Sacramento Weir would also remove potential Cooper's hawk and osprey habitat. Mitigation  
17 Measure BIO-75 would require preconstruction surveys and the establishment of no-  
18 disturbance buffers and would be available to address potential effects on cooper's hawk and  
19 osprey if either species were to nest in or adjacent to the construction footprint. The loss is  
20 expected to occur during the first 10 years of Alternative 1C implementation.
- 21 • *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration could permanently  
22 remove up to 383 acres of potential Cooper's hawk and osprey nesting habitat. Trees would not  
23 be actively removed but tree mortality would be expected over time as areas became tidally  
24 inundated.
- 25 • *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore  
26 seasonally inundated floodplain and riparian restoration actions (CM5) would remove  
27 approximately 75 acres of Cooper's hawk and osprey nesting habitat (42 acres of permanent  
28 loss, 33 acres of temporary loss). These losses would be expected after the first 10 years of  
29 Alternative 1C implementation along the San Joaquin River and other major waterways in CZ 7.
- 30 • *CM11 Natural Communities Enhancement and Management*: Habitat management- and  
31 enhancement-related activities could disturb Cooper's hawk and osprey nests if they were  
32 present near work sites. A variety of habitat management actions included in CM11 that are  
33 designed to enhance wildlife values in BDCP-protected habitats may result in localized ground  
34 disturbances that could temporarily remove small amounts of Cooper's hawk and osprey habitat  
35 and reduce the functions of habitat until restoration is complete. Ground-disturbing activities,  
36 such as removal of nonnative vegetation and road and other infrastructure maintenance, are  
37 expected to have minor effects on available Cooper's hawk and osprey habitat and are expected  
38 to result in overall improvements to and maintenance of habitat values over the term of the  
39 BDCP. These effects cannot be quantified, but are expected to be minimal and would be avoided  
40 and minimized by the AMMs listed below.

41 Permanent and temporary habitat losses from the above conservation measures would  
42 primarily consist of fragmented riparian stands. Temporarily affected areas would be restored  
43 as riparian habitat within 1 year following completion of construction activities. Although the  
44 effects are considered temporary, the restored riparian habitat would require 1 to several  
45 decades to functionally replace habitat that has been affected and for trees to attain sufficient

1 size and structure suitable for nesting by Cooper's hawk or osprey. *AMM18 Swainson's Hawk and*  
2 *White-Tailed Kite* contains actions described below to reduce the effect of temporal loss of  
3 nesting habitat, including the transplanting of mature trees.

- 4 ● Operations and Maintenance: Postconstruction operation and maintenance of the above-ground  
5 water conveyance facilities and restoration infrastructure could result in ongoing but periodic  
6 disturbances that could affect Cooper's hawk or osprey use of the surrounding habitat.  
7 Maintenance activities would include vegetation management, levee and structure repair, and  
8 re-grading of roads and permanent work areas. These effects, however, would be reduced by  
9 AMM1–AMM7 and conservation actions as described below.
- 10 ● Injury and Direct Mortality: Construction-related activities would not be expected to result in  
11 direct mortality of adult or fledged Cooper's hawk or osprey if they were present in the Plan  
12 Area, because they would be expected to avoid contact with construction and other equipment.  
13 If Cooper's hawk or osprey were to nest in the construction area, construction-related activities,  
14 including equipment operation, noise and visual disturbances could affect nests or lead to their  
15 abandonment, potentially resulting in mortality of eggs and nestlings. Mitigation Measure BIO-  
16 75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would  
17 be available to address these adverse effects on Cooper's hawk and osprey.

18 The following paragraphs summarize the combined effects discussed above and describe other  
19 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also  
20 included.

### 21 ***Near-Term Timeframe***

22 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
23 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
24 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
25 effect of construction would not be adverse under NEPA. Alternative 1C would remove 504 acres  
26 (345 acres of permanent loss, 159 acres of temporary loss) of Cooper's hawk and osprey nesting  
27 habitat in the study area in the near-term. These effects would result from the construction of the  
28 water conveyance facilities (CM1, 104 acres), and implementing other conservation measures (CM2  
29 *Yolo Bypass Fisheries Enhancement*, CM4 *Tidal Natural Communities Restoration*, and CM5 *Seasonally*  
30 *Inundated Floodplain Restoration*—400 acres of habitat).

31 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by  
32 CM1 would be 1:1 for restoration/creation and 1:1 protection of valley/foothill riparian habitat.  
33 Using these ratios would indicate that 104 acres of nesting habitat should be restored/created and  
34 104 acres should be protected to compensate for the CM1 losses of modeled Cooper's hawk and  
35 osprey habitat. In addition, The near-term effects of other conservation actions would remove 400  
36 acres of modeled breeding habitat, and therefore require 400 acres of restoration and 400 acres of  
37 protection of modeled Cooper's hawk and osprey using the same typical NEPA and CEQA ratios.

38 The BDCP has committed to near-term goals of protecting 750 acres and restoring 800 acres of  
39 valley/foothill riparian natural community (Table 3-4 in Chapter 3, *Description of Alternatives*).  
40 These conservation actions are associated with CM3, and CM7 and would occur in the same  
41 timeframe as the construction and early restoration losses. The majority of riparian protection and  
42 restoration acres would occur in CZ 7 as part of a reserve system with extensive wide bands or large  
43 patches of valley/foothill riparian natural community (Objectives VFRNC1.1 and VFRNC1.2 in BDCP  
44 Chapter 3, *Conservation Strategy*). Riparian restoration would expand the patches of existing

1 riparian forest in order to support nesting habitat for riparian species. The Plan's objectives would  
2 also benefit Cooper's hawk and osprey by protecting small but essential habitats that occur within  
3 cultivated lands, such as tree rows along field borders or roads, and small clusters of trees in  
4 farmyards or rural residences(Objective CLNC1.3). In addition, the distribution and abundance of  
5 potential nest trees would be increased by planting and maintaining native trees along roadsides  
6 and field borders within protected cultivated lands at a rate of one tree per 10 acres (Objective  
7 SWHA2.1).

8 The 750 acres of protection and 800 acres of restoration contained in the near-term Plan goals  
9 satisfy the typical mitigation ratios that would be applied to the project-level effects of CM1 and  
10 other near-term impacts on Cooper's hawk and osprey nesting habitat. The 800 acres of restored  
11 riparian habitat would be initiated in the near-term to offset the loss of modeled nesting habitat, but  
12 would require one to several decades to functionally replace habitat that has been affected and for  
13 trees to attain sufficient size and structure suitable for nesting by these species. This time lag  
14 between the removal and restoration of nesting habitat could have a substantial impact on nesting  
15 raptors in the near-term time period. Nesting habitat is limited throughout much of the study area,  
16 consisting mainly of intermittent riparian, isolated trees, small groves, tree rows along field borders,  
17 roadside trees, and ornamental trees near rural residences. The removal of nest trees or nesting  
18 habitat would further reduce this limited resource and could reduce or restrict the number of active  
19 nests within the study area until restored riparian habitat is sufficiently developed.

20 *AMM18 Swainson's Hawk and White-Tailed Kite* would implement a program to plant large mature  
21 trees, including transplanting trees scheduled for removal. These would be supplemented with  
22 additional saplings and would be expected to reduce the temporal effects of loss of nesting habitat.  
23 The plantings would occur prior to or concurrent with (in the case of transplanting) the loss of trees.  
24 In addition, at least five trees (5-gallon container size) would be planted within the BDCP reserve  
25 system for every tree 20 feet or taller anticipated to be removed by construction during the near-  
26 term period. A variety of native tree species would be planted to provide trees with differing growth  
27 rates, maturation, and life span. Trees would be planted within the BDCP reserve system in clumps  
28 of at least three trees each at appropriate sites within or adjacent to conserved cultivated lands, or  
29 they could be incorporated as a component of the riparian restoration (CM5, CM7). Replacement  
30 trees that were incorporated into the riparian restoration would not be clustered in a single region  
31 of the study area, but would be distributed throughout the conserved lands.

32 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
33 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
34 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
35 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
36 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
37 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
38 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*. Cooper's hawk and  
39 osprey are not species that are covered under the BDCP. In order for the BDCP not to have an  
40 adverse effect on individuals, preconstruction surveys for noncovered avian species would be  
41 required to ensure that active nests are detected and avoided. Mitigation Measure BIO-75, *Conduct*  
42 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to  
43 address this adverse effect.

1 **Late Long-Term Timeframe**

2 The study area supports approximately 14,069 acres of modeled nesting habitat for Cooper's hawk  
3 and osprey. Alternative 1C as a whole would result in the permanent loss of and temporary effects  
4 on 732 acres of potential nesting habitat (5% of the potential nesting habitat in the study area).

5 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*  
6 *Restoration*, *CM5 Seasonally Inundated Floodplain Restoration*, and *CM7 Riparian Natural Community*  
7 *Restoration* to restore or create at least 5,000 acres and protect at least 750 acres of valley/foothill  
8 riparian natural community (Table 3-4 in Chapter 3, *Description of Alternatives*). The majority of  
9 riparian protection and restoration acres would occur in CZ 7 as part of a reserve system with  
10 extensive wide bands or large patches of valley/foothill riparian natural community (Objectives  
11 VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*). Riparian restoration would  
12 expand the patches of existing riparian forest in order to support nesting habitat for riparian  
13 species. The Plan's objectives would also benefit Cooper's hawk and osprey by protecting small but  
14 essential habitats that occur within cultivated lands, such as tree rows along field borders or roads,  
15 and small clusters of trees in farmyards or rural residences (Objective CLNC1.3). In addition, the  
16 distribution and abundance of potential nest trees would be increased by planting and maintaining  
17 native trees along roadsides and field borders within protected cultivated lands at a rate of one tree  
18 per 10 acres (Objective SWHA2.1).

19 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
20 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
21 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
22 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
23 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
24 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
25 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*. Cooper's hawk and  
26 osprey are not species that are covered under the BDCP. For the BDCP to avoid an adverse effect on  
27 individuals, preconstruction surveys for noncovered avian species would be required to ensure that  
28 active nests are detected and avoided. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting*  
29 *Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to address this adverse  
30 effect.

31 **NEPA Effects:** The loss of Cooper's hawk and osprey habitat and potential for direct mortality of  
32 these special-status species under Alternative 1C would represent an adverse effect in the absence  
33 of other conservation actions. However, with habitat protection and restoration associated with  
34 CM3, CM5, CM7, guided by biological goals and objectives and by AMM1-AMM7 and *AMM18*  
35 *Swainson's Hawk and White-Tailed Kite*, which would be in place throughout the construction period,  
36 the effects of habitat loss on Cooper's hawk and osprey under Alternative 1C would not be adverse.  
37 Cooper's hawk and osprey are not covered species under the BDCP. For the BDCP to avoid an  
38 adverse effect on individuals, preconstruction surveys for noncovered avian species would be  
39 required to ensure that nests are detected and avoided. Mitigation Measure BIO-75 would be  
40 available to address this effect.

41 **CEQA Conclusion:**

42 **Near-Term Timeframe**

43 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
44 the near-term BDCP conservation strategy has been evaluated to determine whether it would

1 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
2 effect of construction would not be adverse under NEPA. Alternative 1C would remove 504 acres  
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4 habitat in the study area in the near-term. These effects would result from the construction of the  
5 water conveyance facilities (CM1, 104 acres), and implementing other conservation measures (CM2  
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7 *Inundated Floodplain Restoration*—400 acres of habitat).

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11 104 acres should be protected to compensate for the CM1 losses of modeled Cooper's hawk and  
12 osprey habitat. In addition, The near-term effects of other conservation actions would remove 400  
13 acres of modeled breeding habitat, and therefore require 400 acres of restoration and 400 acres of  
14 protection of modeled Cooper's hawk and osprey using the same typical NEPA and CEQA ratios.

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16 valley/foothill riparian natural community (Table 3-4 in Chapter 3, *Description of Alternatives*).  
17 These conservation actions are associated with CM3, and CM7 and would occur in the same  
18 timeframe as the construction and early restoration losses. The majority of riparian protection and  
19 restoration acres would occur in CZ 7 as part of a reserve system with extensive wide bands or large  
20 patches of valley/foothill riparian natural community (Objectives VFRNC1.1 and VFRNC1.2 in BDCP  
21 Chapter 3, *Conservation Strategy*). Riparian restoration would expand the patches of existing  
22 riparian forest in order to support nesting habitat for riparian species. The Plan's objectives would  
23 also benefit Cooper's hawk and osprey by protecting small but essential habitats that occur within  
24 cultivated lands, such as tree rows along field borders or roads, and small clusters of trees in  
25 farmyards or rural residences (Objective CLNC1.3). In addition, the distribution and abundance of  
26 potential nest trees would be increased by planting and maintaining native trees along roadsides  
27 and field borders within protected cultivated lands at a rate of one tree per 10 acres (Objective  
28 SWHA2.1).

29 The 750 acres of protection and 800 acres of restoration contained in the near-term Plan goals  
30 satisfy the typical mitigation ratios that would be applied to the project-level effects of CM1 and  
31 other near-term impacts on Cooper's hawk and osprey nesting habitat. The 800 acres of restored  
32 riparian habitat would be initiated in the near-term to offset the loss of modeled nesting habitat, but  
33 would require one to several decades to functionally replace habitat that has been affected and for  
34 trees to attain sufficient size and structure suitable for nesting by these species. This time lag  
35 between the removal and restoration of nesting habitat could have a substantial impact on nesting  
36 raptors in the near-term time period. Nesting habitat is limited throughout much of the study area,  
37 consisting mainly of intermittent riparian, isolated trees, small groves, tree rows along field borders,  
38 roadside trees, and ornamental trees near rural residences. The removal of nest trees or nesting  
39 habitat would further reduce this limited resource and could reduce or restrict the number of active  
40 nests within the study area until restored riparian habitat is sufficiently developed.

41 *AMM18 Swainson's hawk and White-Tailed Kite* would implement a program to plant large mature  
42 trees, including transplanting trees scheduled for removal. These would be supplemented with  
43 additional saplings and would be expected to reduce the temporal effects of loss of nesting habitat.  
44 The plantings would occur prior to or concurrent with (in the case of transplanting) the loss of trees.  
45 In addition, at least five trees (5-gallon container size) would be planted within the BDCP reserve

1 system for every tree 20 feet or taller anticipated to be removed by construction during the near-  
2 term period. A variety of native tree species would be planted to provide trees with differing growth  
3 rates, maturation, and life span. Trees would be planted within the BDCP reserve system in clumps  
4 of at least three trees each at appropriate sites within or adjacent to conserved cultivated lands, or  
5 they could be incorporated as a component of the riparian restoration (CM5, CM7). Replacement  
6 trees that were incorporated into the riparian restoration would not be clustered in a single region  
7 of the study area, but would be distributed throughout the conserved lands.

8 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*  
9 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*  
10 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
11 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
12 *Material, and AMM7 Barge Operations Plan. All of these AMMs include elements that would avoid or*  
13 *minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are*  
14 *described in detail in BDCP Appendix 3.C, Avoidance and Minimization Measures. Cooper's hawk and*  
15 *osprey are not species that are covered under the BDCP. For the BDCP to avoid a significant impact*  
16 *on individuals, preconstruction surveys for noncovered avian species would be required to ensure*  
17 *that active nests are detected and avoided. Implementation of Mitigation Measure BIO-75 would*  
18 *reduce the potential impact on nesting Cooper's hawk and osprey to a less-than-significant level.*

#### 19 **Late Long-Term Timeframe**

20 The study area supports approximately 14,069 acres of modeled nesting habitat for Cooper's hawk  
21 and osprey. Alternative 1C as a whole would result in the permanent loss of and temporary effects  
22 on 732 acres of potential nesting habitat (5% of the potential nesting habitat in the study area).

23 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*  
24 *Restoration, CM5 Seasonally Inundated Floodplain Restoration, and CM7 Riparian Natural Community*  
25 *Restoration to restore or create at least 5,000 acres and protect at least 750 acres of valley/foothill*  
26 *riparian natural community (Table 3-4 in Chapter 3, Description of Alternatives). The majority of*  
27 *riparian protection and restoration acres would occur in CZ 7 as part of a reserve system with*  
28 *extensive wide bands or large patches of valley/foothill riparian natural community (Objectives*  
29 *VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, Conservation Strategy). Riparian restoration would*  
30 *expand the patches of existing riparian forest in order to support nesting habitat for riparian*  
31 *species. The Plan's objectives would also benefit Cooper's hawk and osprey by protecting small but*  
32 *essential habitats that occur within cultivated lands, such as tree rows along field borders or roads,*  
33 *and small clusters of trees in farmyards or rural residences (Objective CLNC1.3). In addition, the*  
34 *distribution and abundance of potential nest trees would be increased by planting and maintaining*  
35 *native trees along roadsides and field borders within protected cultivated lands at a rate of one tree*  
36 *per 10 acres (Objective SWHA2.1).*

37 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*  
38 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*  
39 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
40 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
41 *Material, and AMM7 Barge Operations Plan. All of these AMMs include elements that would avoid or*  
42 *minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are*  
43 *described in detail in BDCP Appendix 3.C, Avoidance and Minimization Measures. Cooper's hawk and*  
44 *osprey are not species that are covered under the BDCP. For the BDCP to have a less-than-significant*

1 impact on individuals, preconstruction surveys for noncovered avian species would be required to  
2 ensure that active nests are detected and avoided. Mitigation Measure BIO-75, *Conduct*  
3 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be reduce this  
4 impact to a less-than-significant level.

5 Considering Alternative 1C's protection and restoration provisions, which would provide acreages  
6 of new or enhanced habitat in amounts greater than necessary to compensate for the time lag of  
7 restoring riparian habitats lost to construction and restoration activities, and with implementation  
8 of AMM1-AMM7, *AMM18 Swainson's Hawk and White-Tailed Kite*, and Mitigation Measure BIO-75,  
9 the loss of habitat or direct mortality through implementation of Alternative 1C would not result in a  
10 substantial adverse effect through habitat modifications and would not substantially reduce the  
11 number or restrict the range of either species. Therefore, the loss of habitat or potential mortality  
12 under this alternative would have a less-than-significant impact on Cooper's hawk and osprey.

13 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**  
14 **Disturbance of Nesting Birds**

15 See Mitigation Measure BIO-75 under Impact BIO-75.

16 **Impact BIO-110: Effects on Cooper's Hawk and Osprey Associated with Electrical**  
17 **Transmission Facilities**

18 New transmission lines would increase the risk for bird-power line strikes, which could result in  
19 injury or mortality of Cooper's hawk and osprey. The existing network of transmission lines in the  
20 Plan Area currently poses the same small risk for Cooper's hawk and osprey, and any incremental  
21 risk associated with the new power line corridors would also be expected to be low. *AMM20 Greater*  
22 *Sandhill Crane*, which would install flight-diverters on new and selected existing transmission lines  
23 would further reduce any potential effects.

24 **NEPA Effects:** New transmission lines would increase the risk for bird-power line strikes, which  
25 could result in injury or mortality of Cooper's hawk and osprey. With the implementation of *AMM20*  
26 *Greater Sandhill Crane*, which would install flight-diverters on new and selected existing  
27 transmission lines, there would not be an adverse effect on Cooper's hawk and osprey.

28 **CEQA Conclusion:** New transmission lines would increase the risk for bird-power line strikes, which  
29 could result in injury or mortality of Cooper's hawk and osprey. *AMM20 Greater Sandhill Crane*,  
30 which would install flight-diverters on new and selected existing transmission lines, would  
31 minimize this risk would reduce the impact of new transmission lines on Cooper's hawk and osprey  
32 to a less-than-significant level.

33 **Impact BIO-111: Indirect Effects of Plan Implementation on Cooper's Hawk and Osprey**

34 **Indirect construction- and operation-related effects:** Construction noise above background noise  
35 levels (greater than 50 dBA) could extend 1,900 to 5,250 feet from the edge of construction  
36 activities (BDCP Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of the BDCP*  
37 *Conveyance Facility on Sandhill Crane*, Table 4), although there are no available data to determine  
38 the extent to which these noise levels could affect Cooper's hawk or osprey. If Cooper's hawk or  
39 osprey were to nest in or adjacent to work areas, construction and subsequent maintenance-related  
40 noise and visual disturbances could mask calls, disrupt foraging and nesting behaviors, and reduce  
41 the functions of suitable nesting habitat for these species. Mitigation Measure BIO-75, *Conduct*

1 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would avoid the  
2 potential for adverse effects of construction-related activities on survival and productivity of nesting  
3 Cooper's hawk and osprey. The use of mechanical equipment during water conveyance facilities  
4 construction could cause the accidental release of petroleum or other contaminants that could affect  
5 Cooper's hawk and osprey in the surrounding habitat. The inadvertent discharge of sediment or  
6 excessive dust adjacent to suitable habitat could also have an adverse effect on these species.  
7 AMM1–AMM7, including *AMM2 Construction Best Management Practices and Monitoring*, would  
8 minimize the likelihood of such spills and ensure that measures are in place to prevent runoff from  
9 the construction area and negative effects of dust on active nests.

10 **Methylmercury Exposure:** Covered activities have the potential to exacerbate bioaccumulation of  
11 mercury in avian species, including Cooper's hawk and osprey. Future operational impacts under  
12 CM1 were analyzed using a DSM-2 based model to assess potential effects on mercury concentration  
13 and bioavailability resulting from proposed flows. Subsequently, a regression model was used to  
14 estimate fish-tissue concentrations under these future operational conditions (evaluated starting  
15 operations or ESO). Results indicated that changes in total mercury levels in water and fish tissues  
16 due to ESO were insignificant (see BDCP Appendix 5.D, Tables 5D.4-3, 5D.4-4, and 5D.4-5).

17 Marsh (tidal and nontidal) and floodplain restoration have the potential to increase exposure to  
18 methylmercury. Mercury is transformed into the more bioavailable form of methylmercury in  
19 aquatic systems, especially areas subjected to regular wetting and drying such as tidal marshes and  
20 flood plains (Alpers et al. 2008). Thus, BDCP restoration activities that create newly inundated areas  
21 could increase bioavailability of mercury (see BDCP Chapter 3, *Conservation Strategy*, for details of  
22 restoration). Species sensitivity to methylmercury differs widely and there is a large amount of  
23 uncertainty with respect to species-specific effects. Increased methylmercury associated with  
24 natural community and floodplain restoration could indirectly affect cooper's hawk and osprey, via  
25 uptake in lower trophic levels (as described in the BDCP, Appendix 5.D, *Contaminants*).

26 In addition, the potential mobilization or creation of methylmercury within the Plan Area varies  
27 with site-specific conditions and would need to be assessed at the project level. *CM12 Methylmercury*  
28 *Management* contains provisions for project-specific Mercury Management Plans. Site-specific  
29 restoration plans that address the creation and mobilization of mercury, as well as monitoring and  
30 adaptive management as described in CM12 would be available to address the uncertainty of  
31 methylmercury levels in restored tidal marsh and potential impacts on cooper's hawk and osprey.

32 **NEPA Effects:** Noise and visual disturbances from the construction of water conveyance facilities  
33 could reduce Cooper's hawk and osprey use of modeled habitat adjacent to work areas. Moreover,  
34 operation and maintenance of the water conveyance facilities, including the transmission facilities,  
35 could result in ongoing but periodic postconstruction disturbances that could affect Cooper's hawk  
36 and osprey use of the surrounding habitat. Mitigation Measure BIO-75, *Conduct Preconstruction*  
37 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to address adverse  
38 effects on nesting individuals in addition to AMM1–AMM7. The implementation of tidal natural  
39 communities restoration or floodplain restoration could result in increased exposure of Cooper's  
40 hawk or osprey to methylmercury, through the ingestion of fish or small mammals in tidally  
41 restored areas. However, it is currently unknown what concentrations of methylmercury are  
42 harmful to these species and the potential for increased exposure varies substantially within the  
43 study area. Site-specific restoration plans that address the creation and mobilization of mercury, as  
44 well as monitoring and adaptive management as described in CM12 would better inform potential  
45 impacts and address the uncertainty of methylmercury levels in restored tidal marsh in the study

1 area on cooper's hawk and osprey. The site-specific planning phase of marsh restoration would be  
2 the appropriate place to assess the potential for risk of methylmercury exposure for Cooper's hawk  
3 and osprey, once site specific sampling and other information could be developed.

4 **CEQA Conclusion:** Noise and visual disturbances from the construction of water conveyance  
5 facilities could reduce Cooper's hawk and osprey use of modeled habitat adjacent to work areas.  
6 Moreover, operation and maintenance of the water conveyance facilities, including the transmission  
7 facilities, could result in ongoing but periodic postconstruction disturbances that could affect  
8 Cooper's hawk and osprey use of the surrounding habitat. Noise, the potential for hazardous spills,  
9 increased dust and sedimentation, and operations and maintenance of the water conveyance  
10 facilities under Alternative 1C would have a less-than-significant impact on Cooper's hawk and  
11 osprey with the implementation of Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird*  
12 *Surveys and Avoid Disturbance of Nesting Birds*, and AMM1-AMM7. The implementation of tidal  
13 natural communities restoration or floodplain restoration could result in increased exposure of  
14 Cooper's hawk or osprey to methylmercury through the ingestion of fish or small mammals in  
15 restored tidal areas. However, it is currently unknown what concentrations of methylmercury are  
16 harmful to these species. Site-specific restoration plans that address the creation and mobilization of  
17 mercury, as well as monitoring and adaptive management as described in CM12, would address the  
18 uncertainty of methylmercury levels in restored tidal marsh in the study area and better inform  
19 potential impacts on Cooper's hawk and osprey.

20 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**  
21 **Disturbance of Nesting Birds**

22 See Mitigation Measure BIO-75 under Impact BIO-75.

23 **Impact BIO-112: Periodic Effects of Inundation of Cooper's Hawk and Osprey Nesting Habitat**  
24 **as a Result of Implementation of Conservation Components**

25 Flooding of the Yolo Bypass from Fremont Weir operations (CM2) would increase the frequency and  
26 duration of inundation of approximately 48-82 acres of modeled Cooper's hawk and osprey  
27 breeding habitat. However, increased periodic flooding is not expected to cause any adverse effect on  
28 breeding habitat because trees in which nest sites are situated already withstand floods, the  
29 increase in inundation frequency and duration is expected to remain within the range of tolerance of  
30 riparian trees, and nest sites are located above floodwaters.

31 Based on hypothetical floodplain restoration, CM5 implementation could result in periodic  
32 inundation of up to 230 acres of breeding habitat for Cooper's hawk and osprey. The overall effect of  
33 seasonal inundation in existing riparian natural communities is likely to be beneficial for these  
34 species, because, historically, flooding was the main natural disturbance regulating ecological  
35 processes in riparian areas, and flooding promotes the germination and establishment of many  
36 native riparian plants.

37 **NEPA Effects:** Increased periodic flooding would not be expected to cause any adverse effect on nest  
38 sites because trees in which nest sites are situated already withstand floods, the increase in  
39 inundation frequency and duration is expected to remain within the range of tolerance of riparian  
40 trees, and nest sites are located above floodwaters. Therefore, increased duration of inundation  
41 resulting from CM2 and CM5 would not have an adverse effect on Cooper's hawk and osprey.

1 **CEQA Conclusion:** Increased periodic flooding would not be expected to cause any adverse effect on  
2 nest sites because trees in which nest sites are situated already withstand floods, the increase in  
3 inundation frequency and duration is expected to remain within the range of tolerance of riparian  
4 trees, and nest sites are located above floodwaters. Therefore, increased duration of inundation  
5 resulting from CM2 and CM5 would have a less-than-significant impact on Cooper's hawk and  
6 osprey.

### 7 **Golden Eagle and Ferruginous Hawk**

8 This section describes the effects of Alternative 1C, including water conveyance facilities  
9 construction and implementation of other conservation components, on golden eagle and  
10 ferruginous hawk. Modeled foraging habitat for these species consists of grassland, alkali seasonal  
11 wetland, vernal pool complex, alfalfa, grain and hay, pasture, and idle cropland throughout the study  
12 area.

13 Construction and restoration associated with Alternative 1C conservation measures would result in  
14 both temporary and permanent losses of golden eagle and ferruginous hawk modeled foraging  
15 habitat as indicated in Table 12-1C-44. Full implementation of Alternative 1C would include the  
16 following conservation actions over the term of the BDCP that would also benefit golden eagles or  
17 ferruginous hawk (BDCP Chapter 3, Section 3.3, *Biological Goals and Objectives*).

- 18 ● Protect at least 8,000 acres of grassland with at least 2,000 acres protected in CZ 1, at least 1,000  
19 acres protected in CZ 8, at least 2,000 acres protected in CZ 11, and the remainder distributed  
20 among CZs 1, 2, 4, 5, 7, 8, and 11 (Objective GNC1.1, associated with CM3).
- 21 ● Restore at least 2,000 acres of grasslands (Objective GNC1.2, associated with CM8).
- 22 ● Protect at least 150 acres of alkali seasonal wetland and at least 600 acres of existing vernal pool  
23 complex in CZs 1, 8, and/or 11 (Objectives ASWNC1.1 and VPNC1.1, associated with CM3).
- 24 ● Increase prey availability and accessibility for grassland-foraging species (Objectives ASWNC2.4,  
25 VPNC2.5, and GNC2.4, associated with CM11).
- 26 ● Protect at least 48,625 acres of cultivated lands that provide suitable habitat for covered and  
27 other native wildlife species (Objective CLNC1.1, associated with CM3).
- 28 ● Within the at least 48,625 acres of protected cultivated lands, protect at least 42,275 acres of  
29 cultivated lands as Swainson's hawk foraging habitat with at least 50% in very high-value  
30 habitat in CZs 2, 3, 4, 5, 7, 8, 9, and 11 (Objective SH1.2, associated with CM3).

31 As explained below, with the restoration or protection of these amounts of habitat, in addition to  
32 management activities to enhance natural communities for species and implementation of AMM1–  
33 AMM7, impacts on golden eagle and ferruginous hawk would not be adverse for NEPA purposes and  
34 would be less than significant for CEQA purposes.

1 **Table 12-1C-44. Changes in Golden Eagle and Ferruginous Hawk Habitat Associated with**  
2 **Alternative 1C (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	Foraging	2,796	2,796	3,750	3,750	NA	NA
<b>Total Impacts CM1</b>		<b>2,796</b>	<b>2,796</b>	<b>3,750</b>	<b>3,750</b>	<b>NA</b>	<b>NA</b>
CM2–CM18	Foraging	5,450	26,198	376	893	1,158–3,650	3,823
<b>Total Impacts CM2–CM18</b>		<b>5,450</b>	<b>26,198</b>	<b>376</b>	<b>893</b>	<b>1,158–3,650</b>	<b>3,823</b>
<b>TOTAL IMPACTS</b>		<b>8,246</b>	<b>28,994</b>	<b>4,126</b>	<b>4,643</b>	<b>1,158–3,650</b>	<b>3,823</b>

<sup>a</sup> See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-113: Loss or Conversion of Habitat for and Direct Mortality of Golden Eagle and**  
5 **Ferruginous Hawk**

6 Alternative 1C conservation measures would result in the combined permanent and temporary loss  
7 of up to 33,688 acres of modeled foraging habitat for golden eagle and ferruginous hawk (of which  
8 28,994 acres would be a permanent loss and 4,643 acres would be a temporary loss of habitat, Table  
9 12-1C-44). Conservation measures that would result in these losses are conveyance facilities and  
10 transmission line construction, and establishment and use of borrow and spoil areas (CM1), Yolo  
11 Bypass fisheries improvements (CM2), tidal habitat restoration (CM4), floodplain restoration (CM5),  
12 riparian habitat restoration (CM7), grassland restoration (CM8), vernal pool and wetland  
13 restoration (CM9), nontidal marsh restoration (CM10), and construction of conservation hatcheries  
14 (CM18). The majority of habitat loss (20,880 acres) would result from CM4. Habitat enhancement  
15 and management activities (CM11), which include ground disturbance or removal of nonnative  
16 vegetation, and the construction of recreational trails, signs, and facilities, could result in local  
17 adverse habitat effects. In addition, maintenance activities associated with the long-term operation  
18 of the water conveyance facilities and other BDCP physical facilities could degrade or eliminate  
19 golden eagle foraging habitat. Each of these individual activities is described below. A summary  
20 statement of the combined impacts and NEPA effects, and a CEQA conclusion follows the individual  
21 conservation measure discussions.

- 22 • *CM1 Water Facilities and Operation*: Construction of Alternative 1C conveyance facilities would  
23 result in the combined permanent and temporary loss of up to 6,546 acres of modeled golden  
24 eagle and ferruginous hawk foraging habitat (2,796 acres of permanent loss, 3,750 acres of  
25 temporary loss) from CZs 3, 5, 6, 8, and 9. The permanent losses would occur at various  
26 locations along the western canal route and at the intake sites along the Sacramento River. The

1 majority of grassland that would be removed would be in CZ 8, west of the Clifton Court Forebay  
2 from the construction of the new forebay and the associated borrow and spoil areas. Larger  
3 areas of annual grassland would be permanently removed by canal construction south of Rock  
4 Slough, south of Discovery Bay and immediately west of Clifton Court Forebay. Both temporary  
5 and permanent losses of grassland would be created by constructing transmission corridors  
6 west of the Plan Area and along the tunnel alignment in the west Delta. Other temporary losses  
7 occur from siphon construction areas, at safe haven work areas, and at railroad work areas just  
8 southwest of Clifton Court Forebay. There are no occurrences of golden eagle or ferruginous  
9 hawk that intersect with the CM1 footprint. Refer to the Terrestrial Biology Map Book for a  
10 detailed view of Alternative 1C construction locations. Impacts resulting from CM1 would occur  
11 within the first 10 years of Alternative 1C implementation.

- 12 ● *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo bypass fisheries enhancement  
13 would result in the combined permanent and temporary loss of up to 1,274 acres of modeled  
14 golden eagle and ferruginous hawk foraging habitat (898 acres of permanent loss, 376 acres of  
15 temporary loss) in the Yolo Bypass in CZ 2. Impacted habitat would consist primarily of  
16 grassland and pasture. Most of the grassland losses would occur at the north end of the bypass  
17 below Fremont Weir, along the Toe Drain/Tule Canal, and along the west side channels.  
18 Realignment of Putah Creek could also involve excavation and grading in alkali seasonal wetland  
19 complex habitat as a new channel is constructed. The loss is expected to occur during the first 10  
20 years of Alternative 1C implementation.
- 21 ● *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and  
22 inundation would permanently remove an estimated 20,880 acres of modeled golden eagle and  
23 ferruginous hawk habitat. The majority of the acres lost would consist of cultivated lands in CZs  
24 1, 2, 4, 5, 6, and/or 7. Grassland losses would likely occur in the vicinity of Cache Slough, on  
25 Decker Island in the West Delta ROA, on the upslope fringes of Suisun Marsh, and along narrow  
26 bands adjacent to waterways in the South Delta ROA. Tidal restoration would directly impact  
27 and fragment grassland just north of Rio Vista in and around French and Prospect Islands, and in  
28 an area south of Rio Vista around Threemile Slough. Losses of alkali seasonal wetland complex  
29 habitat would likely occur in the south end of the Yolo Bypass and on the northern fringes of  
30 Suisun Marsh.
- 31 ● *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore  
32 seasonally inundated floodplain would permanently and temporarily remove approximately  
33 1,450 acres of modeled golden eagle and ferruginous hawk foraging habitat (933 permanent,  
34 517 temporary). These losses would be expected after the first 10 years of Alternative 1C  
35 implementation along the San Joaquin River and other major waterways in CZ 7.
- 36 ● *CM8 Grassland Natural Community Restoration and CM9 Vernal Pool and Alkali Seasonal Wetland*  
37 *Complex Restoration*: Temporary construction-related disturbance of grassland habitat would  
38 result from implementation of CM8 and CM9 in in CZs 1, 2, 4, 5, 7, 8, and 11. However, all areas  
39 would be restored after the construction periods. Grassland restoration would be implemented  
40 on agricultural lands that also provide foraging habitat for golden eagle and ferruginous hawk  
41 and would result in the conversion of 837 acres of cultivated lands to grassland.
- 42 ● *CM10 Nontidal Marsh Restoration*: Implementation of *CM10 Nontidal Marsh Restoration* would  
43 result in the permanent removal of 705 acres of golden eagle and ferruginous hawk foraging  
44 habitat.

- 1       ● *CM11 Natural Communities Enhancement and Management*: A variety of habitat management  
2       actions included in CM11 that are designed to enhance wildlife values in restored or protected  
3       habitats could result in localized ground disturbances that could temporarily remove small  
4       amounts of golden eagle and ferruginous hawk foraging habitat. Ground-disturbing activities,  
5       such as removal of nonnative vegetation and road and other infrastructure maintenance  
6       activities, would be expected to have minor adverse effects on available habitat for these  
7       species. CM11 would also include the construction of recreational-related facilities including  
8       trails, interpretive signs, and picnic tables (BDCP Chapter 4, *Covered Activities and Associated*  
9       *Federal Actions*). The construction of trailhead facilities, signs, staging areas, picnic areas,  
10      bathrooms, etc. would be placed on existing, disturbed areas when and where possible.  
11      However, approximately 50 acres of grassland habitat would be lost from the construction of  
12      trails and facilities.
- 13      ● *CM18 Conservation Hatcheries*: Implementation of CM18 would remove up to 35 acres of  
14      modeled golden eagle and ferruginous hawk foraging habitat for the development of a delta and  
15      longfin smelt conservation hatchery in CZ 1.
- 16      ● *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground  
17      water conveyance facilities and restoration infrastructure could result in ongoing but periodic  
18      disturbances that could affect golden eagle and ferruginous hawk use of the surrounding habitat.  
19      Maintenance activities would include vegetation management, levee and structure repair, and  
20      re-grading of roads and permanent work areas. These effects, however, would be reduced by  
21      AMM1–AMM7 and conservation actions as described below.
- 22      ● *Injury and Direct Mortality*: Construction would not be expected to result in direct mortality of  
23      golden eagle and ferruginous hawk because foraging individuals would be expected to  
24      temporarily avoid the increased noise and activity associated with construction areas.

25      The following paragraphs summarize the combined effects discussed above and describe other  
26      BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also  
27      included.

### 28      ***Near-Term Timeframe***

29      Because the water conveyance facility construction is being evaluated at the project level, the near-  
30      term BDCP conservation strategy has been evaluated to determine whether it would provide  
31      sufficient habitat protection or restoration in an appropriate timeframe to ensure that the effects of  
32      such conveyance facility construction would not be adverse under NEPA. Alternative 1C would  
33      remove 12,372 acres (8,246 acres permanent, 4,126 acres temporary) of modeled golden eagle and  
34      ferruginous hawk foraging habitat in the study area in the near-term. These effects would result  
35      from the construction of the water conveyance facilities (CM1, 6,546 acres), and implementing other  
36      conservation measures (*CM2 Yolo Bypass Fisheries Enhancement*, *CM4 Tidal Natural Communities*  
37      *Restoration*, *CM7 Riparian Natural Community Restoration*, *CM8 Grassland Natural Community*  
38      *Restoration*, *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*, *CM11 Natural*  
39      *Communities Enhancement and Management* and *CM18 Conservation Hatcheries*—5,826 acres).

40      The typical NEPA and CEQA project-level mitigation ratio for those natural communities affected  
41      would be 2:1 for protection of habitat. Using this ratio would indicate that 13,092 acres should be  
42      protected to compensate for the CM1 losses of 6,546 acres of golden eagle and ferruginous hawk  
43      foraging habitat. The near-term effects of other conservation actions would remove 5,826 acres of

1 modeled habitat, and therefore require 11,652 acres of protection of golden eagle and ferruginous  
2 hawk habitat using the same typical NEPA and CEQA ratio (2:1 for protection).

3 The BDCP has committed to near-term goals of protecting 2,000 acres and restoring 1,140 acres of  
4 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of  
5 alkali seasonal wetland complex, and protecting 15,400 acres of non-rice cultivated lands (Table 3-4  
6 in Chapter 3). These conservation actions are associated with CM3, CM8, and CM9 and would occur  
7 in the same timeframe as the construction and early restoration losses thereby avoiding adverse  
8 effects of habitat loss on golden eagle and ferruginous hawk foraging in the study area. Grassland  
9 restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1 and GNC1.2)  
10 Grassland protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali seasonal  
11 wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous matrix of  
12 grassland, alkali seasonal wetland, and vernal pool natural communities which would expand golden  
13 eagle and ferruginous hawk foraging habitat and reduce the effects of current levels of habitat  
14 fragmentation. Under *CM11 Natural Communities Enhancement and Management*, insect and  
15 mammal prey populations would be increased on protected lands, enhancing the foraging value of  
16 these natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4). Burrow availability would  
17 be increased on protected natural communities by encouraging ground squirrel occupancy and  
18 expansion through the creation of berms, mounds, edges, and through the prohibition of ground  
19 squirrel control programs (i.e., poisoning).

20 Cultivated lands that provide habitat for covered and other native wildlife species would provide  
21 approximately 15,400 acres of potential foraging habitat for golden eagle and ferruginous hawk  
22 (Objective CLNC1.1). Approximately 87% of cultivated lands protected by the late long-term time  
23 period would be in alfalfa and pasture crop types (very high- and high-value crop types for  
24 Swainson's hawk (Objective SH1.2) which are also suitable for golden eagle and ferruginous hawk.  
25 This biological objective provides an estimate for the high proportion of cultivated lands protected  
26 in the near-term time period which would be suitable for golden eagle and ferruginous hawk.

27 The acres of restoration and protection contained in the near-term Plan goals and the additional  
28 detail in the biological objectives satisfy the typical mitigation that would be applied to the project-  
29 level effects of CM1 on golden eagle and ferruginous hawk. However, the conservation commitment  
30 is 5,684 acres short of meeting the compensation for other near-term effects on golden eagle and  
31 ferruginous hawk habitat. Mitigation Measure BIO-113, *Compensate for the Near-Term Loss of Golden  
32 Eagle and Ferruginous Hawk Foraging Habitat*, would be available to address the adverse effect of  
33 near-term habitat loss.

34 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2  
35 Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention  
36 Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and  
37 Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged  
38 Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
39 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
40 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

#### 41 **Late Long-Term Timeframe**

42 Based on modeled habitat, the study area supports approximately 269,411 acres of modeled  
43 foraging habitat for golden eagle and ferruginous hawk. Alternative 1C as a whole would result in  
44 the permanent loss of and temporary effects on 33,688 acres of modeled foraging habitat during the

1 term of the Plan (13% of the modeled habitat in the study area). The locations of these losses are  
2 described above in the analyses of individual conservation measures.

3 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*  
4 *Restoration*, *CM8 Grassland Natural Communities Restoration*, and *CM9 Vernal Pool and Alkali*  
5 *Seasonal Wetland Complex Restoration* to protect 8,000 acres and restore 2,000 acres of grassland  
6 natural community, protect 600 acres of vernal pool complex, protect 150 acres of alkali seasonal  
7 wetland complex and protect 48,625 acres of cultivated lands that provide suitable habitat for native  
8 wildlife species (Table 3-4 in Chapter 3, *Description of Alternatives*). Grassland restoration and  
9 protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1 and GNC1.2). Grassland  
10 protection in CZs 1, 8, and 11 would be associated with vernal pool and alkali seasonal wetland  
11 complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous matrix of  
12 grassland, alkali seasonal wetland, and vernal pool natural communities which would expand  
13 foraging habitat for golden eagle and ferruginous hawk and reduce the effects of current levels of  
14 habitat fragmentation. Under *CM11 Natural Communities Enhancement and Management*, insect and  
15 small mammal prey populations would be increased on protected lands, enhancing the foraging  
16 value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4). Burrow  
17 availability would be increased on protected natural communities by encouraging ground squirrel  
18 occupancy and expansion through the creation of berms, mounds, edges, and through the  
19 prohibition of ground squirrel control programs (i.e., poisoning). Cultivated lands that provide  
20 habitat for covered and other native wildlife species would provide approximately 15,400 acres of  
21 potential habitat for golden eagle and ferruginous hawk (Objective CLNC1.1). Approximately 42,275  
22 acres of cultivated lands protected would be in alfalfa and pasture crop types (very high- and high-  
23 value crop types for Swainson's hawk (Objective SH1.2) which are also suitable for golden eagle and  
24 ferruginous hawk.

25 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
26 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
27 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
28 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
29 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
30 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
31 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

32 **NEPA Effects:** The loss of golden eagle and ferruginous hawk habitat and potential for mortality of  
33 these special-status species under Alternative 1C would represent an adverse effect in the absence  
34 of other conservation actions. However, with habitat protection and restoration associated with  
35 CM3, CM8, CM9, and CM11, guided by biological goals and objectives and by AMM1–AMM7, which  
36 would be in place throughout the construction period, and with implementation of Mitigation  
37 Measure BIO-113, *Compensate for the Near-Term Loss of Golden Eagle and Ferruginous Hawk*  
38 *Foraging Habitat*, the effects of habitat loss and potential for direct mortality on golden eagle and  
39 ferruginous hawk under Alternative 1C would not be adverse under NEPA.

#### 40 **CEQA Conclusion:**

#### 41 **Near-Term Timeframe**

42 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
43 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
44 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the

1 effects of construction would be less than significant under CEQA. Alternative 1C would remove  
2 12,372 acres (8,246 acres permanent, 4,126 acres temporary) of modeled golden eagle and  
3 ferruginous hawk foraging habitat in the study area in the near-term. These effects would result  
4 from the construction of the water conveyance facilities (CM1, 6,546 acres), and implementing other  
5 conservation measures (*CM2 Yolo Bypass Fisheries Enhancement, CM4 Tidal Natural Communities*  
6 *Restoration, CM7 Riparian Natural Community Restoration, CM8 Grassland Natural Community*  
7 *Restoration, CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration, CM11 Natural*  
8 *Communities Enhancement and Management and CM18 Conservation Hatcheries—5,826 acres).*

9 The typical NEPA and CEQA project-level mitigation ratio for those natural communities affected  
10 would be 2:1 for protection of habitat. Using this ratio would indicate that 13,092 acres should be  
11 protected to compensate for the CM1 losses of 6,546 acres of golden eagle and ferruginous hawk  
12 foraging habitat. The near-term effects of other conservation actions would remove 5,826 acres of  
13 modeled habitat, and therefore require 11,652 acres of protection of golden eagle and ferruginous  
14 hawk habitat using the same typical NEPA and CEQA ratio (2:1 for protection).

15 The BDCP has committed to near-term goals of protecting 2,000 acres and restoring 1,140 acres of  
16 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of  
17 alkali seasonal wetland complex, and protecting 15,400 acres of non-rice cultivated lands (Table 3-4  
18 in Chapter 3). These conservation actions are associated with CM3, CM8, and CM9 and would occur  
19 in the same timeframe as the construction and early restoration losses thereby avoiding significant  
20 impacts of habitat loss on golden eagle and ferruginous hawk foraging in the study area. Grassland  
21 restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1 and  
22 GNC1.2). Grassland protection in CZs 1, 8, and 11 would be associated with vernal pool and alkali  
23 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous  
24 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would  
25 expand golden eagle and ferruginous hawk foraging habitat and reduce the effects of current levels  
26 of habitat fragmentation. Under *CM11 Natural Communities Enhancement and Management*, insect  
27 and mammal prey populations would be increased on protected lands, enhancing the foraging value  
28 of these natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4). Burrow availability  
29 would be increased on protected natural communities by encouraging ground squirrel occupancy  
30 and expansion through the creation of berms, mounds, edges, and through the prohibition of ground  
31 squirrel control programs (i.e., poisoning). Cultivated lands that provide habitat for covered and  
32 other native wildlife species would provide approximately 15,400 acres of potential foraging habitat  
33 for golden eagle and ferruginous hawk (Objective CLNC1.1). Approximately 87% of cultivated lands  
34 protected by the late long-term time period would be in alfalfa and pasture crop types (very high-  
35 and high-value crop types for Swainson's hawk (Objective SH1.2) which are also suitable for golden  
36 eagle and ferruginous hawk. This biological objective provides an estimate for the high proportion of  
37 cultivated lands protected in the near-term time period which would be suitable for golden eagle  
38 and ferruginous hawk.

39 The acres of restoration and protection contained in the near-term Plan goals and the additional  
40 detail in the biological objectives satisfy the typical mitigation that would be applied to the project-  
41 level effects of CM1 on golden eagle and ferruginous hawk. However, the conservation commitment  
42 is 5,684 acres short of meeting the compensation for other near-term effects on golden eagle and  
43 ferruginous hawk habitat. The implementation of Mitigation Measure BIO-113, *Compensate for the*  
44 *Near-Term Loss of Golden Eagle and Ferruginous Hawk Foraging Habitat*, would reduce the near-  
45 term impact of habitat loss to less than significant.

1 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*  
2 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*  
3 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
4 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
5 *Material, and AMM7 Barge Operations Plan. All of these AMMs include elements that would avoid or*  
6 *minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are*  
7 *described in detail in BDCP Appendix 3.C, Avoidance and Minimization Measures.*

### 8 **Late Long-Term Timeframe**

9 Based on modeled habitat, the study area supports approximately 269,411 acres of modeled  
10 foraging habitat for golden eagle and ferruginous hawk. Alternative 1C as a whole would result in  
11 the permanent loss of and temporary effects on 33,688 acres of modeled foraging habitat during the  
12 term of the Plan (13% of the modeled habitat in the study area). The locations of these losses are  
13 described above in the analyses of individual conservation measures.

14 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*  
15 *Restoration, CM8 Grassland Natural Community Restoration, and CM9 Vernal Pool and Alkali Seasonal*  
16 *Wetland Complex Restoration* to protect 8,000 acres and restore 2,000 acres of grassland natural  
17 community, protect 600 acres of vernal pool complex, protect 150 acres of alkali seasonal wetland  
18 complex and protect 48,625 acres of cultivated lands that provide suitable habitat for native wildlife  
19 species (Table 3-4 in Chapter 3). Grassland restoration and protection would occur in CZs 1, 2, 4, 5,  
20 7, 8, and 11 (Objectives GNC1.1 and GNC1.2). Grassland protection in CZs 1, 8, and 11 would be  
21 associated with vernal pool and alkali seasonal wetland complexes (Objectives ASWNC1.1 and  
22 VPNC1.1) and would result in a contiguous matrix of grassland, alkali seasonal wetland, and vernal  
23 pool natural communities that would expand foraging habitat for golden eagle and ferruginous  
24 hawk and reduce the effects of current levels of habitat fragmentation. Under *CM11 Natural*  
25 *Communities Enhancement and Management*, insect and small mammal prey populations would be  
26 increased on protected lands, enhancing the foraging value of these natural communities (Objectives  
27 ASWNC2.4, VPNC2.5, and GNC2.4). Burrow availability would be increased on protected natural  
28 communities by encouraging ground squirrel occupancy and expansion through the creation of  
29 berms, mounds, edges, and through the prohibition of ground squirrel control programs (i.e.,  
30 poisoning). Cultivated lands that provide habitat for covered and other native wildlife species would  
31 provide approximately 15,400 acres of potential habitat for golden eagle and ferruginous hawk  
32 (Objective CLNC1.1). Approximately 42,275 acres of cultivated lands protected would be in alfalfa  
33 and pasture crop types. These are very high- and high-value crop types for Swainson's hawk  
34 (Objective SH1.2) which are also suitable for golden eagle and ferruginous hawk.

35 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*  
36 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*  
37 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
38 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
39 *Material, and AMM7 Barge Operations Plan. All of these AMMs include elements that would avoid or*  
40 *minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are*  
41 *described in detail in BDCP Appendix 3.C, Avoidance and Minimization Measures.*

42 Considering Alternative 1C's protection and restoration provisions, which would provide acreages  
43 of new high-value or enhanced habitat in amounts suitable to compensate for habitats lost to  
44 construction and restoration activities, and with the implementation of AMM1–AMM7 and

1 Mitigation Measure BIO-113, *Compensate for the Near-Term Loss of Golden Eagle and Ferruginous*  
2 *Hawk Foraging Habitat*, the loss of habitat or direct mortality through implementation of Alternative  
3 1C would not result in a substantial adverse effect through habitat modifications and would not  
4 substantially reduce the number or restrict the range of either species. Therefore, the loss of habitat  
5 or potential mortality under this alternative would have a less-than-significant impact on golden  
6 eagle and ferruginous hawk.

7 **Mitigation Measure BIO-113: Compensate for the Near-Term Loss of Golden Eagle and**  
8 **Ferruginous Hawk Foraging Habitat**

9 DWR will manage and protect sufficient acres of cultivated lands such as pasture, grain and hay  
10 crops, or alfalfa to provide golden eagle and ferruginous hawk foraging habitat such that the  
11 total acres of high-value habitat impacted in the near-term timeframe are mitigated at a ratio of  
12 2:1. Additional grassland protection, enhancement, and management may be substituted for the  
13 protection of high-value cultivated lands.

14 **Impact BIO-114: Effects on Golden Eagle and Ferruginous Hawk Associated with Electrical**  
15 **Transmission Facilities**

16 New transmission lines would increase the risk for bird-power line strikes and/or electrocution,  
17 which could result in injury or mortality of golden eagle and ferruginous hawk. The risk for bird-  
18 power line strikes, and/or electrocution would be minimized with *AMM20 Greater Sandhill Crane*.  
19 This measure would ensure that conductor and ground lines are fitted with flight diverters in  
20 compliance with the best available practices, such as those specified in the USFWS Avian Protection  
21 Guidelines.

22 **NEPA Effects:** New transmission lines would minimally increase the risk for golden eagle and  
23 ferruginous hawk power line strikes. With the implementation of *AMM20 Greater Sandhill Crane*, the  
24 potential effect of the construction of new transmission lines on golden eagle and ferruginous hawk  
25 would not be adverse.

26 **CEQA Conclusion:** New transmission lines would minimally increase the risk for golden eagle and  
27 ferruginous hawk power line strikes. *AMM20 Greater Sandhill Crane* would reduce the potential  
28 impact of the construction of new transmission lines on golden eagle and ferruginous hawk to a less-  
29 than-significant level.

30 **Impact BIO-115: Indirect Effects of Plan Implementation on Golden Eagle and Ferruginous**  
31 **Hawk**

32 Construction- and subsequent maintenance-related noise and visual disturbances could disrupt  
33 foraging, and reduce the functions of suitable foraging habitat for golden eagle and ferruginous  
34 hawk. Construction noise above background noise levels (greater than 50 dBA) could extend 1,900  
35 to 5,250 feet from the edge of construction activities (BDCP Appendix 5.J, Attachment 5J.D, *Indirect*  
36 *Effects of the Construction of the BDCP Conveyance Facility on Sandhill Crane*, Table 4), although there  
37 are no available data to determine the extent to which these noise levels could affect golden eagle or  
38 ferruginous hawk. Indirect effects associated with construction include noise, dust, and visual  
39 disturbance caused by grading, filling, contouring, and other ground-disturbing operations. The use  
40 of mechanical equipment during water conveyance facilities construction could cause the accidental  
41 release of petroleum or other contaminants that could affect these species or their prey in the  
42 surrounding habitat. AMM1–AMM7, including *AMM2 Construction Best Management Practices and*

1 *Monitoring*, would minimize the likelihood of such spills from occurring. The inadvertent discharge  
2 of sediment or excessive dust adjacent to golden eagle and ferruginous hawk grassland habitat could  
3 also have a negative effect on the species. However, AMM1–AMM7 would also ensure that measures  
4 would be in place to prevent runoff from the construction area and the negative effects of dust on  
5 wildlife adjacent to work areas.

6 **NEPA Effects:** Indirect effects on golden eagle and ferruginous hawk as a result of Alternative 1C  
7 implementation could have adverse effects on these species through the modification of habitat.  
8 With the incorporation of AMM1–AMM7 into the BDCP, indirect effects as a result of Alternative 1C  
9 implementation would not have an adverse effect on golden eagle and ferruginous hawk.

10 **CEQA Conclusion:** Indirect effects on golden eagle and ferruginous hawk as a result of Alternative  
11 1C implementation could have a significant impact on the species from modification of habitat. With  
12 the incorporation of AMM1–AMM7 into the BDCP, indirect effects as a result of Alternative 1C  
13 implementation would have a less-than-significant impact on golden eagle and ferruginous hawk.

#### 14 **Impact BIO-116: Periodic Effects of Inundation on Golden Eagle and Ferruginous Hawk** 15 **Habitat as a Result of Implementation of Conservation Components**

16 Flooding of the Yolo Bypass from Fremont Weir operations (*CM2 Yolo Bypass Fisheries*  
17 *Enhancement*) would increase the frequency and duration of inundation on approximately 1,158–  
18 3,650 acres of modeled golden eagle and ferruginous hawk foraging habitat (Table 12-1C-44).

19 Based on hypothetical footprints, implementation of *CM5 Seasonally Inundated Floodplain*  
20 *Restoration*, could result in the periodic inundation of up to approximately 3,823 acres of modeled  
21 habitat (Table 12-1C-44).

22 Golden eagles and ferruginous hawks would not likely use inundated areas for foraging, and  
23 increased inundation frequency and duration of inundation of grassland habitats may affect prey  
24 populations that have insufficient time to recover following inundation events. nesting burrows.  
25 Periodic inundation would at a maximum, remove 2% of the available foraging habitat in the Plan  
26 Area. Thus, periodically inundated habitat would not be expected to have an adverse effect on local  
27 or migratory golden eagles or the wintering ferruginous hawk population in the area.

28 **NEPA Effects:** Implementation of CM2 and CM5 would increase the frequency and duration of  
29 inundation of modeled golden eagle and ferruginous hawk foraging habitat. However, periodic  
30 inundation would not be expected to have an adverse effect on the wintering golden eagle or  
31 ferruginous hawk populations in the study area.

32 **CEQA Conclusion:** Implementation of CM2 and CM5 would increase the frequency and duration of  
33 inundation of modeled golden eagle and ferruginous hawk foraging habitat. Periodic inundation  
34 would be expected to have a less-than-significant impact on the population.

#### 35 **Cormorants, Herons and Egrets**

36 This section describes the effects of Alternative 1C, including water conveyance facilities  
37 construction and implementation of other conservation components, on double-crested cormorant,  
38 great blue heron, great egret, snowy egret, and black-crowned night heron. Modeled breeding  
39 habitat for these species consists of valley/foothill riparian forest.

1 Construction and restoration associated with Alternative 1C conservation measures would result in  
2 both temporary and permanent losses of cormorant, heron, and egret modeled habitat as indicated  
3 in Table 12-1C-45. The majority of the losses would take place over an extended period of time as  
4 tidal marsh is restored in the study area. Although restoration for the loss of nesting habitat would  
5 be initiated in the same timeframe as the losses, it could take one or more decades for restored  
6 habitats to replace the functions of habitat lost. This time lag between impacts and restoration of  
7 habitat function would be minimized by specific requirements of *AMM18 Swainson's Hawk and*  
8 *White-Tailed Kite*, including the planting of mature trees in the near-term time period. Full  
9 implementation of Alternative 1C would include the following conservation actions over the term of  
10 the BDCP which would also benefit cormorants, herons, and egrets (BDCP Chapter 3, Section 3.3,  
11 *Biological Goals and Objectives*).

- 12 ● Restore or create at least 5,000 acres of valley/foothill riparian natural community, with at least  
13 3,000 acres occurring on restored seasonally inundated floodplain (Objective VFRNC1.1,  
14 associated with CM7).
- 15 ● Protect at least 750 acres of existing valley/foothill riparian natural community in CZ 7 by year  
16 10 (Objective VFRNC1.2, associated with CM3).
- 17 ● Maintain and protect the small patches of important wildlife habitats associated with cultivated  
18 lands within the reserve system including isolated valley oak trees, trees and shrubs along field  
19 borders and roadsides, remnant groves, riparian corridors, water conveyance channels,  
20 grasslands, ponds, and wetlands (Objective CLNC1.3, associated with CM3).

21 As explained below, with the restoration or protection of these amounts of habitat, in addition to  
22 management activities to enhance natural communities for species and the implementation of  
23 *AMM1-AMM7*, *AMM18 Swainson's Hawk and White-Tailed Kite*, and Mitigation Measure BIO-75,  
24 impacts on cormorants, herons, and egrets would not be adverse for NEPA purposes and would be  
25 less than significant for CEQA purposes.

1 **Table 12-1C-45. Changes in Cormorant, Heron and Egret Modeled Habitat Associated with**  
2 **Alternative 1C (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	Nesting (Rookeries)	40	40	86	86	NA	NA
<b>Total Impacts CM1</b>		<b>40</b>	<b>40</b>	<b>86</b>	<b>86</b>	<b>NA</b>	<b>NA</b>
CM2-CM18	Nesting (Rookeries)	387	684	88	123	51-92	266
<b>Total Impacts CM2-CM18</b>		<b>387</b>	<b>684</b>	<b>88</b>	<b>123</b>	<b>51-92</b>	<b>266</b>
<b>TOTAL IMPACTS</b>		<b>427</b>	<b>724</b>	<b>174</b>	<b>209</b>	<b>51-92</b>	<b>266</b>

<sup>a</sup> See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-117: Loss or Conversion of Nesting Habitat for and Direct Mortality of**  
5 **Cormorants, Herons and Egrets**

6 Alternative 1C conservation measures would result in the combined permanent and temporary loss  
7 of up to 1,133 acres of modeled nesting habitat for double-crested cormorant, great blue heron,  
8 great egret, snowy egret, and black-crowned night heron (724 acres of permanent loss, 209 acres of  
9 temporary loss, Table 12-1C-45). Conservation measures that would result in these losses are *CM1*  
10 *Water Facilities and Operation* (which would involve conveyance facilities and transmission line  
11 construction, and establishment and use of borrow and spoil areas), *CM2 Yolo Bypass Fisheries*  
12 *Enhancement*, *CM4 Tidal Natural Communities Restoration*, and *CM5 Seasonally Inundated Floodplain*  
13 *Restoration*. Habitat enhancement and management activities (CM11), which include ground  
14 disturbance or removal of nonnative vegetation, could result in local adverse habitat effects. In  
15 addition, maintenance activities associated with the long-term operation of the water conveyance  
16 facilities and other BDCP physical facilities could degrade or eliminate cormorant, heron, and egret  
17 modeled habitat. Each of these individual activities is described below. A summary statement of the  
18 combined impacts, NEPA effects, and a CEQA conclusion follow the individual conservation measure  
19 discussions.

- 20 • *CM1 Water Facilities and Operation*: Construction of Alternative 1C water conveyance facilities  
21 would result in the combined permanent and temporary loss of up to 126 acres of modeled  
22 habitat for cormorants, herons, and egrets (Table 12-1C-45). Of the 126 acres of modeled  
23 habitat that would be removed for the construction of the conveyance facilities, 40 acres would  
24 be a permanent loss and 86 acres would be a temporary loss of habitat. This loss would have the

1 potential to displace individuals, if present, and remove the functions and value of potentially  
2 suitable habitat. Most of the permanent loss of nesting habitat would occur where Intakes 1–5  
3 impact the Sacramento River’s west bank between just north of Clarksburg and Courtland. The  
4 riparian areas here are very small patches, dominated by valley oak, scrub vegetation, and  
5 nonnative trees. Temporary impacts would occur from the footprint of proposed temporary  
6 transmission lines, siphon work areas, a barge unloading facility east of Rio Vista, and a safe  
7 haven work area south of Piper Slough. The construction footprint for a potential borrow and  
8 spoil area south of Clifton Court road overlaps with a rookery that includes great blue heron,  
9 double-crested cormorant, and great egret nests. The primary impact of concern regarding  
10 double-crested cormorant, great blue heron, great egret, snowy egret, and black-crowned night  
11 heron is the loss of existing known nest trees, and other large trees associated with known nest  
12 sites. Because these species are highly traditional in their use of rookeries, the establishment of  
13 new nest sites is unpredictable. Therefore, to avoid adverse effects on great blue herons,  
14 cormorants, and great egrets, existing rookeries must be avoided. Mitigation Measure BIO-75,  
15 *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, and  
16 Mitigation Measure BIO-117, *Avoid Impacts on Rookeries*, would be available to address this  
17 adverse effect on cormorants, herons, and egrets. Refer to the Terrestrial Biology Map Book for a  
18 detailed view of Alternative 1C construction locations.

- 19 ● *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo bypass fisheries enhancement  
20 would result in the combined permanent and temporary loss of up to 177 acres of nesting  
21 habitat (89 acres of permanent loss, 88 acres of temporary loss) in the Yolo Bypass in CZ 2.  
22 Activities through CM2 could involve excavation and grading in valley/foothill riparian areas to  
23 improve passage of fish through the bypasses. Most of the riparian losses would occur at the  
24 north end of Yolo Bypass where major fish passage improvements are planned. Excavation to  
25 improve water movement in the Toe Drain and in the Sacramento Weir would also remove  
26 potential nesting habitat. The loss is expected to occur during the first 10 years of Alternative 1C  
27 implementation.
- 28 ● *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and  
29 inundation would permanently remove an estimated 552 acres of nesting habitat for  
30 cormorants, herons and egrets. Trees would not be actively removed but tree mortality would  
31 be expected over time as areas became tidally inundated. Depending on the extent and value of  
32 remaining habitat, this could reduce use of these habitats by these species. There is one CNDDDB  
33 occurrence of a great blue heron rookery that overlaps with the hypothetical restoration  
34 footprint for tidal restoration. The occurrence is on Decker Island and tidal restoration could  
35 potentially impact the nest trees from inundation. This potential effect would need to be  
36 addressed within the project specific analysis for tidal restoration projects.
- 37 ● *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore  
38 seasonally inundated floodplain would permanently remove approximately 43 acres and  
39 temporarily remove approximately 35 acres of potential cormorants, heron, and egret nesting  
40 habitat. These losses would be expected after the first 10 years of Alternative 1C  
41 implementation along the San Joaquin River and other major waterways in CZ 7.
- 42 ● *CM11 Natural Communities Enhancement and Management*: Habitat management- and  
43 enhancement-related activities could disturb cormorant, heron, and egret nests if they were  
44 present near work sites. A variety of habitat management actions included in CM11 that are  
45 designed to enhance wildlife values in BDCP-protected habitats may result in localized ground  
46 disturbances that could temporarily remove small amounts of cormorant, heron, and egret

1 habitat and reduce the functions of habitat until restoration is complete. Ground-disturbing  
2 activities, such as removal of nonnative vegetation and road and other infrastructure  
3 maintenance, are expected to have minor effects on available habitat for these species and are  
4 expected to result in overall improvements to and maintenance of habitat values over the term  
5 of the BDCP. These effects cannot be quantified, but are expected to be minimal and would be  
6 avoided and minimized by the AMMs listed below.

- 7 ● Permanent and temporary habitat losses from the above conservation measures would  
8 primarily consist of fragmented riparian stands. Temporarily affected areas would be restored  
9 as riparian habitat within 1 year following completion of construction activities. Although the  
10 effects are considered temporary, the restored riparian habitat would require years to several  
11 decades to functionally replace habitat that has been affected and for trees to attain sufficient  
12 size and structure for established rookeries. *AMM18 Swainson's Hawk and White-Tailed Kite*  
13 contains actions described below to reduce the effect of temporal loss of mature riparian  
14 habitat, including the transplanting of mature trees.
- 15 ● Operations and Maintenance: Postconstruction operation and maintenance of the above-ground  
16 water conveyance facilities and restoration infrastructure could result in ongoing but periodic  
17 disturbances that could affect use of the surrounding habitat by cormorants, herons or egrets.  
18 Maintenance activities would include vegetation management, levee and structure repair, and  
19 re-grading of roads and permanent work areas. These effects, however, would be reduced by  
20 AMMs and conservation actions as described below.
- 21 ● The primary impact of concern regarding double-crested cormorant, great blue heron, great  
22 egret, snowy egret, and black-crowned night heron is the loss of existing known nest trees, and  
23 other large trees associated with known nest sites. Because these species are highly traditional  
24 in their use of rookeries, the establishment of new nest sites is unpredictable. To avoid adverse  
25 effects on these species, existing known nest sites would have to be avoided. Mitigation Measure  
26 *BIO-75, Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*,  
27 would be available to address these adverse effects on cormorants, herons, and egrets.
- 28 ● Injury and Direct Mortality: Construction-related activities would not be expected to result in  
29 direct mortality of adult or fledged double-crested cormorant, great blue heron, great egret,  
30 snowy egret, and black-crowned night heron if they were present in the Plan Area, because they  
31 would be expected to avoid contact with construction and other equipment. If birds were to nest  
32 in the construction area, construction-related activities, including equipment operation, noise  
33 and visual disturbances could affect nests or lead to their abandonment, potentially resulting in  
34 mortality of eggs and nestlings. Mitigation Measure *BIO-75* would be available to address these  
35 adverse effects on cormorants, herons, and egrets.

36 The following paragraphs summarize the combined effects discussed above and describe other  
37 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also  
38 included.

### 39 ***Near-Term Timeframe***

40 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
41 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
42 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
43 effects of construction would not be adverse under NEPA. Alternative 1C would remove 601 acres of  
44 nesting habitat for cormorants, herons, and egrets in the study area in the near-term. These effects

1 would result from the construction of the water conveyance facilities (CM1, 126 acres of nesting  
2 habitat), and implementing other conservation measures (CM2 Yolo Bypass Fisheries Enhancement,  
3 CM4 Tidal Natural Communities Restoration, and CM5 Seasonally Inundated Floodplain Restoration—  
4 475 acres of nesting habitat).

5 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by  
6 CM1 would be 1:1 for restoration/creation and 1:1 protection of valley/foothill riparian habitat for  
7 breeding habitat. Using these ratios would indicate that 126 acres of breeding habitat should be  
8 restored/created and 126 acres should be protected to compensate for the CM1 losses of modeled  
9 cormorant, heron, and egret habitat. In addition, the near-term effects of other conservation actions  
10 would remove 475 acres of modeled breeding habitat, and therefore require 475 acres of  
11 restoration and 475 acres of protection of modeled cormorant, heron, and egret habitat using the  
12 same typical NEPA and CEQA ratios.

13 The majority of riparian protection and restoration acres would occur in CZ 7 as part of a reserve  
14 system with extensive wide bands or large patches of valley/foothill riparian natural community  
15 (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*). Riparian  
16 restoration would expand the patches of existing riparian forest in order to support nesting habitat  
17 for these species. In addition, small but essential nesting habitat associated with cultivated lands  
18 would also be maintained and protected such as isolated trees, tree rows along field borders or  
19 roads, or small clusters of trees in farmyards or at rural residences (Objective CLNC1.3).

20 The 750 acres of protection and 800 acres of restoration contained in the near-term Plan goals  
21 satisfy the typical mitigation ratios that would be applied to the project-level effects of CM1 and  
22 other near-term impacts on cormorant, heron, and egret nesting habitat. The 800 acres of restored  
23 riparian habitat would be initiated in the near-term to offset the loss of potential nesting habitat, but  
24 would require years to several decades to functionally replace habitat that has been affected and for  
25 trees to attain sufficient size and structure suitable for established rookeries. This time lag between  
26 the removal and restoration of nesting habitat could have a substantial impact on cormorants,  
27 herons and egrets in the near-term time period.

28 *AMM18 Swainson's Hawk and White-Tailed Kite* would implement a program to plant large mature  
29 trees, including transplanting trees scheduled for removal. These would be supplemented with  
30 additional saplings and would be expected to reduce the temporal effects of loss of nesting habitat.  
31 The plantings would occur prior to or concurrent with (in the case of transplanting) the loss of trees.  
32 In addition, at least five trees (5-gallon container size) would be planted within the BDCP reserve  
33 system for every tree 20 feet or taller anticipated to be removed by construction during the near-  
34 term period. A variety of native tree species would be planted to provide trees with differing growth  
35 rates, maturation, and life span. Replacement trees that were incorporated into the riparian  
36 restoration would not be clustered in a single region of the study area, but would be distributed  
37 throughout protected lands.

38 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
39 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
40 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
41 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
42 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
43 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
44 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*. Double-crested

1 cormorant, great blue heron, great egret, snowy egret, and black-crowned night heron are not  
2 species that are covered under the BDCP. To avoid adverse effects on individuals, existing nests and  
3 rookeries would have to be avoided. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting*  
4 *Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to address effects on nesting  
5 cormorants, herons, and egrets.

#### 6 **Late Long-Term Timeframe**

7 Based on modeled habitat, the study area supports approximately 17,966 acres of modeled nesting  
8 habitat for cormorants, herons, and egrets. Alternative 1C as a whole would result in the permanent  
9 loss of and temporary effects on 933 acres of potential breeding habitat (5% of the potential  
10 breeding habitat in the study area).

11 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*  
12 *Restoration*, *CM5 Seasonally Inundated Floodplain Restoration*, and *CM7 Riparian Natural*  
13 *Communities Restoration* to restore or create at least 5,000 acres and protect at least 750 acres of  
14 valley/foothill riparian natural community (Table 3-4 in Chapter 3, *Description of Alternatives*). The  
15 majority of riparian protection and restoration acres would occur in CZ 7 as part of a reserve system  
16 with extensive wide bands or large patches of valley/foothill riparian natural community  
17 (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*). Riparian  
18 restoration would expand the patches of existing riparian forest in order to support nesting habitat  
19 for riparian species. The Plan's objectives would also benefit cormorants, herons, and egrets by  
20 protecting small but essential habitats that occur within cultivated lands, such as tree rows along  
21 field borders or roads, and small clusters of trees in farmyards or rural residences (Objective  
22 CLNC1.3). In addition, the distribution and abundance of potential nest trees would be increased by  
23 planting and maintaining native trees along roadsides and field borders within protected cultivated  
24 lands at a rate of one tree per 10 acres (Objective SWHA2.1).

25 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
26 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
27 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
28 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
29 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
30 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
31 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*. Double-crested  
32 cormorant, great blue heron, great egret, snowy egret, and black-crowned night heron are not  
33 species that are covered under the BDCP. These species are highly traditional in their use of nest  
34 sites and, for the BDCP to avoid an adverse effect on individuals, preconstruction surveys would be  
35 required to ensure that nests are detected and any direct and indirect impacts on rookeries are  
36 avoided. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid*  
37 *Disturbance of Nesting Birds*, and Mitigation Measure BIO-117, *Avoid Impacts on Rookeries*, would be  
38 available to address adverse effects on nesting cormorants, herons, and egrets.

39 **NEPA Effects:** The loss of cormorant, heron, and egret habitat and potential for direct mortality of  
40 these special-status species under Alternative 1C would represent an adverse effect in the absence  
41 of other conservation actions. However, with habitat protection and restoration associated with  
42 CM3, CM5, CM7, CM8, CM9, and CM11, guided by biological goals and objectives and by AMM1-  
43 AMM7 and *AMM18 Swainson's Hawk and White-Tailed Kite*, which would be in place throughout the  
44 construction period, the effects of habitat loss on cormorants, herons, and egrets under Alternative

1 1C would not be adverse. Double-crested cormorant, great blue heron, great egret, snowy egret, and  
2 black-crowned night heron are not species that are covered under the BDCP. Mitigation Measure  
3 BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, and  
4 Mitigation Measure BIO-117, *Avoid Impacts on Rookeries*, would be available to address adverse  
5 effects on nesting cormorants, herons, and egrets.

6 **CEQA Conclusion:**

7 **Near-Term Timeframe**

8 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
9 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
10 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
11 effects of construction would be less than significant under NEPA. Alternative 1C would remove 601  
12 acres of nesting habitat for cormorants, herons, and egrets in the study area in the near-term. These  
13 effects would result from the construction of the water conveyance facilities (CM1, 126 acres of  
14 nesting habitat), and implementing other conservation measures (*CM2 Yolo Bypass Fisheries  
15 Enhancement*, *CM4 Tidal Natural Communities Restoration*, and *CM5 Seasonally Inundated Floodplain  
16 Restoration*—475 acres of nesting habitat).

17 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by  
18 CM1 would be 1:1 for restoration/creation and 1:1 protection of valley/foothill riparian habitat for  
19 breeding habitat. Using these ratios would indicate that 126 acres of breeding habitat should be  
20 restored/created and 126 acres should be protected to compensate for the CM1 losses of modeled  
21 cormorant, heron, and egret habitat. In addition, the near-term effects of other conservation actions  
22 would remove 475 acres of modeled breeding habitat, and therefore require 475 acres of  
23 restoration and 475 acres of protection of modeled cormorant, heron, and egret habitat using the  
24 same typical NEPA and CEQA ratios.

25 The majority of riparian protection and restoration acres would occur in CZ 7 as part of a reserve  
26 system with extensive wide bands or large patches of valley/foothill riparian natural community  
27 (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*). Riparian  
28 restoration would expand the patches of existing riparian forest in order to support nesting habitat  
29 for these species. In addition, small but essential nesting habitat associated with cultivated lands  
30 would also be maintained and protected such as isolated trees, tree rows along field borders or  
31 roads, or small clusters of trees in farmyards or at rural residences (Objective CLNC1.3).

32 The 750 acres of protection and 800 acres of restoration contained in the near-term Plan goals  
33 satisfy the typical mitigation ratios that would be applied to the project-level effects of CM1 and  
34 other near-term impacts on cormorant, heron, and egret nesting habitat. The 800 acres of restored  
35 riparian habitat would be initiated in the near-term to offset the loss of potential nesting habitat, but  
36 would require years to several decades to functionally replace habitat that has been affected and for  
37 trees to attain sufficient size and structure suitable for established rookeries. This time lag between  
38 the removal and restoration of nesting habitat could have a substantial impact on cormorants,  
39 herons and egrets in the near-term time period.

40 *AMM18 Swainson's Hawk and White-Tailed Kite* would implement a program to plant large mature  
41 trees, including transplanting trees scheduled for removal. These would be supplemented with  
42 additional saplings and would be expected to reduce the temporal effects of loss of nesting habitat.  
43 The plantings would occur prior to or concurrent with (in the case of transplanting) the loss of trees.

1 In addition, at least five trees (5-gallon container size) would be planted within the BDCP reserve  
2 system for every tree 20 feet or taller anticipated to be removed by construction during the near-  
3 term period. A variety of native tree species would be planted to provide trees with differing growth  
4 rates, maturation, and life span. Replacement trees that were incorporated into the riparian  
5 restoration would not be clustered in a single region of the study area, but would be distributed  
6 throughout protected lands.

7 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
8 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
9 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
10 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
11 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
12 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
13 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*. Double-crested  
14 cormorant, great blue heron, great egret, snowy egret, and black-crowned night heron are not  
15 species that are covered under the BDCP. For the BDCP to avoid a significant impact on individuals,  
16 preconstruction surveys for noncovered avian species would be required to ensure that nests are  
17 detected and avoided. Implementation of Mitigation Measure BIO-75, *Conduct Preconstruction*  
18 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would reduce this potential impact to a  
19 less-than-significant level.

#### 20 **Late Long-Term Timeframe**

21 Based on modeled habitat, the study area supports approximately 17,966 acres of modeled nesting  
22 habitat for cormorants, herons, and egrets. Alternative 1C as a whole would result in the permanent  
23 loss of and temporary effects on 933 acres of potential breeding habitat (5% of the potential  
24 breeding habitat in the study area).

25 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*  
26 *Restoration*, *CM5 Seasonally Inundated Floodplain Restoration*, and *CM7 Riparian Natural Community*  
27 *Restoration* to restore or create at least 5,000 acres and protect at least 750 acres of valley/foothill  
28 riparian natural community (Table 3-4 in Chapter 3, *Description of Alternatives*). The majority of  
29 riparian protection and restoration acres would occur in CZ 7 as part of a reserve system with  
30 extensive wide bands or large patches of valley/foothill riparian natural community (Objectives  
31 VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*). Riparian restoration would  
32 expand the patches of existing riparian forest in order to support nesting habitat for riparian  
33 species. The Plan's objectives would also benefit cormorants, herons, and egrets by protecting small  
34 but essential habitats that occur within cultivated lands, such as tree rows along field borders or  
35 roads, and small clusters of trees in farmyards or rural residences (Objective CLNC1.3). In addition,  
36 the distribution and abundance of potential nest trees would be increased by planting and  
37 maintaining native trees along roadsides and field borders within protected cultivated lands at a  
38 rate of one tree per 10 acres (Objective SWHA2.1).

39 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
40 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
41 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
42 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
43 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
44 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are

1 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*. Double-crested  
2 cormorant, great blue heron, great egret, snowy egret, and black-crowned night heron are not  
3 species that are covered under the BDCP. These species are highly traditional in their use of nest  
4 sites, and, for the BDCP to avoid a significant impact on individuals, preconstruction surveys would  
5 be required to ensure that nests are detected and any direct and indirect impacts on rookeries are  
6 avoided. Implementation of Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird*  
7 *Surveys and Avoid Disturbance of Nesting Birds*, and Mitigation Measure BIO-117, *Avoid Impacts on*  
8 *Rookeries*, would reduce this potential impact to a less-than-significant level.

9 Considering Alternative 1C's protection and restoration provisions, which would provide acreages  
10 of new or enhanced habitat in amounts sufficient to compensate for the loss of riparian habitats lost  
11 to construction and restoration activities, and with implementation of AMM1–AMM7, *AMM18*  
12 *Swainson's Hawk and White-Tailed Kite* and Mitigation Measures BIO-75 and BIO-117, the loss of  
13 habitat or direct mortality through implementation of Alternative 1C would not result in a  
14 substantial adverse effect through habitat modifications and would not substantially reduce the  
15 number or restrict the range of these species. Therefore, the loss of habitat or potential mortality  
16 under this alternative would have a less-than-significant impact on cormorants, herons, and egrets.

17 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**  
18 **Disturbance of Nesting Birds**

19 See Mitigation Measure BIO-75 under Impact BIO-75.

20 **Mitigation Measure BIO-117: Avoid Impacts on Rookeries**

21 Herons, egrets, and cormorants are highly traditional in their use of nest sites (rookeries);  
22 therefore, DWR will avoid all direct and indirect impacts on rookeries.

23 **Impact BIO-118: Effects Associated with Electrical Transmission Facilities on Cormorants,**  
24 **Herons and Egrets**

25 New transmission lines would increase the risk for bird-power line strikes, which could result in  
26 injury or mortality of cormorants, herons and egrets. *AMM20 Greater Sandhill Crane* would minimize  
27 the risk for bird-power line strikes, for these species. This measure would ensure that conductor and  
28 ground lines are fitted with flight diverters in compliance with the best available practices, such as  
29 those specified in the USFWS Avian Protection Guidelines and would minimize the potential for an  
30 adverse effect.

31 **NEPA Effects:** New transmission lines would increase the risk for bird-power line strikes, which  
32 could result in injury or mortality of cormorants, herons, and egrets. *AMM20 Greater Sandhill Crane*  
33 would reduce the potential for collisions on new and select existing powerlines in the study area.  
34 The construction of new transmission lines would not result in an adverse effect on cormorants,  
35 herons, and egrets.

36 **CEQA Conclusion:** New transmission lines would increase the risk for bird-power line strikes, which  
37 could result in injury or mortality of cormorants, herons, and egrets. *AMM20 Greater Sandhill Crane*  
38 would reduce birdstrike on new transmission lines and select existing transmission lines with the  
39 installation of flight diverters. With these in place, new transmission lines would have a less-than-  
40 significant impact on cormorants, herons and egrets.

1 **Impact BIO-119: Indirect Effects of Plan Implementation on Cormorants, Herons and Egrets**

2 **Indirect construction- and operation-related effects:** Construction noise above background noise  
3 levels (greater than 50 dBA) could extend 1,900 to 5,250 feet from the edge of construction  
4 activities (BDCP Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of the BDCP*  
5 *Conveyance Facility on Sandhill Crane*, Table 4), although there are no available data to determine  
6 the extent to which these noise levels could affect cormorants, herons, or egrets. If cormorants,  
7 herons or egrets were to nest in or adjacent to work areas, construction and subsequent  
8 maintenance-related noise and visual disturbances could mask calls, disrupt foraging and nesting  
9 behaviors, and reduce the functions of suitable nesting habitat for these species. Mitigation Measure  
10 BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would  
11 avoid the potential for adverse effects of construction-related activities on survival and productivity  
12 of nesting cormorants, herons or egrets. The use of mechanical equipment during water conveyance  
13 facilities construction could cause the accidental release of petroleum or other contaminants that  
14 could affect cormorants, herons or egrets in the surrounding habitat. The inadvertent discharge of  
15 sediment or excessive dust adjacent to suitable habitat could also have an adverse effect on these  
16 species. AMM1-AMM7, including *AMM2 Construction Best Management Practices and Monitoring*,  
17 would minimize the likelihood of such spills and ensure that measures are in place to prevent runoff  
18 from the construction area and negative effects of dust on active nests.

19 **Methylmercury Exposure:** Covered activities have the potential to exacerbate bioaccumulation of  
20 mercury in avian species, including cormorants, herons or egrets. Future operational impacts under  
21 CM1 were analyzed using a DSM-2 based model to assess potential effects on mercury concentration  
22 and bioavailability resulting from proposed flows. Subsequently, a regression model was used to  
23 estimate fish-tissue concentrations under these future operational conditions (evaluated starting  
24 operations or ESO). Results indicated that changes in total mercury levels in water and fish tissues  
25 due to ESO were insignificant (see BDCP Appendix 5.D, Tables 5D.4-3, 5D.4-4, and 5D.4-5).

26 Marsh (tidal and nontidal) and floodplain restoration have the potential to increase exposure to  
27 methylmercury. Mercury is transformed into the more bioavailable form of methylmercury in  
28 aquatic systems, especially areas subjected to regular wetting and drying such as tidal marshes and  
29 flood plains (Alpers et al. 2008). Thus, BDCP restoration activities that create newly inundated areas  
30 could increase bioavailability of mercury (see BDCP Chapter 3, *Conservation Strategy*, for details of  
31 restoration). Species sensitivity to methylmercury differs widely and there is a large amount of  
32 uncertainty with respect to species-specific effects. Increased methylmercury associated with  
33 natural community and floodplain restoration could indirectly effect on cormorants, herons or  
34 egrets, via uptake in lower trophic levels (as described in the BDCP, Appendix 5.D, *Contaminants*).

35 In addition, the potential mobilization or creation of methylmercury within the Plan Area varies  
36 with site-specific conditions and would need to be assessed at the project level. *CM12 Methylmercury*  
37 *Management* contains provisions for project-specific Mercury Management Plans. Site-specific  
38 restoration plans that address the creation and mobilization of mercury, as well as monitoring and  
39 adaptive management as described in CM12 would be available to address the uncertainty of  
40 methylmercury levels in restored tidal marsh and potential impacts on cormorants, herons or  
41 egrets.

42 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in  
43 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,  
44 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,

1 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz  
2 2009). The effect of selenium toxicity differs widely between species and also between age and sex  
3 classes within a species. In addition, the effect of selenium on a species can be confounded by  
4 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith  
5 2009).

6 The primary source of selenium bioaccumulation in birds is through their diet (Ackerman and  
7 Eagles-Smith 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the  
8 trophic level at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At  
9 Kesterson Reservoir in the San Joaquin Valley, selenium concentrations in invertebrates have been  
10 found to be two to six times the levels in rooted plants. Furthermore, bivalves sampled in the San  
11 Francisco Bay contained much higher selenium levels than crustaceans such as copepods (Stewart et  
12 al. 2004). Studies conducted at the Grasslands in Merced County recorded higher selenium levels in  
13 black-necked stilts which feed on aquatic invertebrates than in mallards and pintails, which are  
14 primarily herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which  
15 forage on bivalves) have much higher levels of selenium levels than shorebirds that prey on aquatic  
16 invertebrates (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high  
17 levels of selenium have a higher risk of selenium toxicity.

18 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations  
19 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to  
20 exacerbate bioaccumulation of selenium in avian species, including cormorants, herons, and egrets.  
21 Marsh (tidal and nontidal) and floodplain restoration have the potential to mobilize selenium, and  
22 therefore increase avian exposure from ingestion of prey items with elevated selenium levels. Thus,  
23 BDCP restoration activities that create newly inundated areas could increase bioavailability of  
24 selenium (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Changes in  
25 selenium concentrations were analyzed in Chapter 8, *Water Quality*, and it was determined that,  
26 relative to Existing Conditions and the No Action Alternative, CM1 would not result in substantial,  
27 long-term increases in selenium concentrations in water in the Delta under any alternative.  
28 However, it is difficult to determine whether the effects of potential increases in selenium  
29 bioavailability associated with restoration-related conservation measures (CM4 and CM5) would  
30 lead to adverse effects on cormorants, herons, and egrets.

31 Because of the uncertainty that exists at this programmatic level of review, there could be a  
32 substantial effect on cormorants, herons, and egrets from increases in selenium associated with  
33 restoration activities. This effect would be addressed through the implementation of *AMM27*  
34 *Selenium Management* (BDCP Appendix 3.C, *Avoidance and Minimization Measures*) which would  
35 provide specific tidal habitat restoration design elements to reduce the potential for  
36 bioaccumulation of selenium and its bioavailability in tidal habitats. Furthermore, the effectiveness  
37 of selenium management to reduce selenium concentrations and/or bioaccumulation would be  
38 evaluated separately for each restoration effort as part of design and implementation. This  
39 avoidance and minimization measure would be implemented as part of the tidal habitat restoration  
40 design schedule.

41 **NEPA Effects:** Noise and visual disturbances from the construction of water conveyance facilities  
42 could reduce cormorant, heron, and egret use of modeled habitat adjacent to work areas. Moreover,  
43 operation and maintenance of the water conveyance facilities, including the transmission facilities,  
44 could result in ongoing but periodic postconstruction disturbances that could affect cormorant,  
45 heron, and egret use of the surrounding habitat. Mitigation Measure BIO-75, *Conduct Preconstruction*

1 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, and Mitigation Measure BIO-117, *Avoid*  
2 *Impacts on Rookeries*, would be available to address adverse effects on nesting individuals in  
3 addition to AMM1–AMM7. Tidal habitat restoration could result in increased exposure of  
4 cormorants, herons, and egrets to selenium. This effect would be addressed through the  
5 implementation of *AMM27 Selenium Management*, which would provide specific tidal habitat  
6 restoration design elements to reduce the potential for bioaccumulation of selenium and its  
7 bioavailability in tidal habitats. The implementation of tidal natural communities restoration or  
8 floodplain restoration could result in increased exposure of cormorants, herons or egrets to  
9 methylmercury through the ingestion of fish in restored tidal areas. However, it is unknown what  
10 concentrations of methylmercury are harmful to these species and the potential for increased  
11 exposure varies substantially within the study area. Site-specific restoration plans that address the  
12 creation and mobilization of mercury, as well as monitoring and adaptive management as described  
13 in CM12, would address the uncertainty of methylmercury levels in restored tidal marsh in the study  
14 area and better inform potential impacts on cormorants, herons, and egrets. The site-specific  
15 planning phase of marsh restoration would be the appropriate place to assess the potential for risk  
16 of methylmercury exposure for cormorants, herons, and egrets once site specific sampling and other  
17 information could be developed.

18 **CEQA Conclusion:** Impacts of noise, the potential for hazardous spills, increased dust and  
19 sedimentation, and operations and maintenance of the water conveyance facilities would be less  
20 than significant with the implementation of Mitigation Measure BIO-75, *Conduct Preconstruction*  
21 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, Mitigation Measure BIO-117, *Avoid*  
22 *Impacts on Rookeries*, and AMM1–AMM7. The implementation of tidal natural communities  
23 restoration or floodplain restoration could result in increased exposure of cormorants, herons or  
24 egrets to methylmercury, through the ingestion of fish in tidally restored areas. However, it is  
25 unknown what concentrations of methylmercury are harmful to these species. Site-specific  
26 restoration plans that address the creation and mobilization of mercury, as well as monitoring and  
27 adaptive management as described in CM12 would address the potential impacts of methylmercury  
28 levels in restored tidal marsh in the study area on cormorants, herons, and egrets. Tidal habitat  
29 restoration could result in increased exposure of cormorants, herons, and egrets to selenium. This  
30 effect would be addressed through the implementation of *AMM27 Selenium Management* which  
31 would provide specific tidal habitat restoration design elements to reduce the potential for  
32 bioaccumulation of selenium and its bioavailability in tidal habitats. Therefore, the indirect effects of  
33 Alternative 1C implementation would not have a significant impact on cormorants, herons, and  
34 egrets.

35 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**  
36 **Disturbance of Nesting Birds**

37 See Mitigation Measure BIO-75 under Impact BIO-75.

38 **Mitigation Measure BIO-117: Avoid Impacts on Rookeries**

39 See Mitigation Measure BIO-117 under Impact BIO-117.

1 **Impact BIO-120: Periodic Effects of Inundation on Cormorants, Herons and Egrets as a Result**  
2 **of Implementation of Conservation Components**

3 Flooding of the Yolo Bypass from Fremont Weir operations (CM2) would increase the frequency and  
4 duration of inundation of approximately 51–92 acres of modeled breeding habitat for cormorants,  
5 herons and egrets. However, increased periodic flooding is not expected to cause any adverse effect  
6 on breeding habitat because trees in which nest sites are situated already withstand floods, the  
7 increase in inundation frequency and duration is expected to remain within the range of tolerance of  
8 riparian trees, and nest sites are located above floodwaters.

9 Based on hypothetical floodplain restoration, CM5 implementation could result in periodic  
10 inundation of up to 266 acres of breeding habitat for cormorants, herons and egrets. The overall  
11 effect of seasonal inundation in existing riparian natural communities is likely to be beneficial for  
12 these species, because, historically, flooding was the main natural disturbance regulating ecological  
13 processes in riparian areas, and flooding promotes the germination and establishment of many  
14 native riparian plants.

15 **NEPA Effects:** Increased periodic flooding would not be expected to cause any adverse effect on nest  
16 sites because trees in which nest sites are situated already withstand floods, the increase in  
17 inundation frequency and duration is expected to remain within the range of tolerance of riparian  
18 trees, and nest sites are located above floodwaters. Therefore, increased duration of inundation  
19 from CM2 and CM5 would not result in an adverse effect on cormorants, herons and egrets.

20 **CEQA Conclusion:** Increased periodic flooding would not be expected to cause any adverse effect on  
21 nest sites because trees in which nest sites are situated already withstand floods, the increase in  
22 inundation frequency and duration is expected to remain within the range of tolerance of riparian  
23 trees, and nest sites are located above floodwaters. Therefore, increased duration of inundation  
24 from CM2 and CM5 would have a less-than-significant impact on cormorants, herons and egrets.

25 **Short-Eared Owl and Northern Harrier**

26 This section describes the effects of Alternative 1C, including water conveyance facilities  
27 construction and implementation of other conservation components, on short-eared owl and  
28 northern harrier. Modeled habitat for short-eared owl and northern harrier include tidal brackish  
29 and freshwater emergent wetland, nontidal freshwater perennial emergent wetland, managed  
30 wetland, other natural seasonal wetland, grassland, alkali seasonal wetland, vernal pool complex,  
31 and selected cultivated lands.

32 Construction and restoration associated with Alternative 1C conservation measures would result in  
33 both temporary and permanent losses of modeled habitat for short-eared owl and northern harrier  
34 as indicated in Table 12-1C-46. Full implementation of Alternative 1C would include the following  
35 conservation actions over the term of the BDCP which would benefit short-eared owl and northern  
36 harrier (BDCP Chapter 3, Section 3.3, *Biological Goals and Objectives*).

- 37 ● Restore or create at least 6,000 acres of tidal brackish emergent wetland in CZ 11 including at  
38 least 1,500 acres of middle and high marsh (Objectives TBEWNC1.1 and TBEWNC1.2, associated  
39 with CM4).
- 40 ● Restore or create at least 24,000 acres of tidal freshwater emergent wetland in CZ 1, 2, 4, 5, 6,  
41 and/or 7 (Objective TFEWNC1.2, associated with CM4).

- 1 • Create at least 1,200 acres of nontidal marsh consisting of a mosaic of nontidal perennial aquatic  
2 and nontidal freshwater emergent wetland natural communities (Objective NFEW/NPANC1.1,  
3 associated with CM10).
- 4 • Protect at least 8,000 acres of grassland with at least 2,000 acres protected in CZ 1, at least 1,000  
5 acres protected in CZ 8, at least 2,000 acres protected in CZ 11, and the remainder distributed  
6 among CZs 1, 2, 4, 5, 7, 8, and 11 (Objective GNC1.1, associated with CM3).
- 7 • Restore at least 2,000 acres of grasslands (Objective GNC1.2, associated with CM8).
- 8 • Protect at least 150 acres of alkali seasonal wetland and at least 600 acres of existing vernal pool  
9 complex in CZs 1, 8, and/or 11 (Objectives ASWNC1.1 and VPNC1.1, associated with CM3).
- 10 • Protect and enhance at least 8,100 acres of managed wetland, at least 1,500 acres of which are  
11 in the Grizzly Island Marsh Complex (Objective MWNC1.1, associated with CM3).
- 12 • Increase prey availability and accessibility for grassland-foraging species (Objectives ASWNC2.4,  
13 VPNC2.5, and GNC2.4, associated with CM11).

14 As explained below, with the restoration or protection of these amounts of habitat, in addition to  
15 management activities that would enhance habitat for these species and the implementation of  
16 AMM1–AMM7, *AMM27 Selenium Management*, and Mitigation Measures BIO-75 and BIO-121,  
17 impacts on short-eared owl and northern harrier would not be adverse for NEPA purposes and  
18 would be less than significant for CEQA purposes.

19 **Table 12-1C-46. Changes in Short-Eared Owl and Northern Harrier Modeled Habitat Associated**  
20 **with Alternative 1C (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	Nesting and foraging	3,166	3,166	4,779	4,779	NA	NA
<b>Total Impacts CM1</b>		<b>3,166</b>	<b>3,166</b>	<b>4,779</b>	<b>4,779</b>	<b>NA</b>	<b>NA</b>
CM2–CM18	Nesting and foraging	12,281	46,700	471	1,224	2,926–8,060	5,978
<b>Total Impacts CM2–CM18</b>		<b>12,281</b>	<b>46,700</b>	<b>471</b>	<b>1,224</b>	<b>2,926–8,060</b>	<b>5,978</b>
<b>TOTAL IMPACTS</b>		<b>15,447</b>	<b>49,866</b>	<b>5,250</b>	<b>6,003</b>	<b>2,926–8,060</b>	<b>5,978</b>

<sup>a</sup> See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

1 **Impact BIO-121: Loss or Conversion of Habitat for and Direct Mortality of Short-Eared Owl**  
2 **and Northern Harrier**

3 Alternative 1C conservation measures would result in the combined permanent and temporary loss  
4 of up to 55,869 acres of modeled habitat for short-eared owl and northern harrier (of which 49,866  
5 acres would be a permanent loss and 6,003 acres would be a temporary loss of habitat, Table 12-1C-  
6 46). Conservation measures that would result in these losses are conveyance facilities and  
7 transmission line construction, and establishment and use of borrow and spoil areas (CM1), Yolo  
8 Bypass Fisheries Enhancement (CM2), Tidal Natural Communities Restoration (CM4), Seasonally  
9 Inundated Floodplain Restoration (CM5), Grassland Natural Community Restoration (CM8), Vernal  
10 Pool Natural Community and Alkali Seasonal Wetland Complex Restoration (CM9), Nontidal Marsh  
11 Restoration (CM10) and Conservation Hatcheries (CM18). The majority of habitat loss would result  
12 from CM4. Habitat enhancement and management activities (CM11), which include ground  
13 disturbance or removal of nonnative vegetation, could result in local adverse habitat effects. In  
14 addition, maintenance activities associated with the long-term operation of the water conveyance  
15 facilities and other BDCP physical facilities could degrade or eliminate short-eared owl and northern  
16 harrier modeled habitat. Each of these individual activities is described below. A summary  
17 statement of the combined impacts and NEPA effects, and a CEQA conclusion follow the individual  
18 conservation measure discussions.

- 19 ● *CM1 Water Facilities and Operation:* Construction of Alternative 1C conveyance facilities would  
20 result in the combined permanent and temporary loss of up to 7,945 acres of modeled short-  
21 eared owl and northern harrier habitat (3,166 acres of permanent loss, 4,779 acres of  
22 temporary loss) from CZs 3, 5, 6, 8, and 9. The majority of habitat removed would be grassland  
23 and cultivated lands. The permanent losses would occur at various locations along the western  
24 canal route, at the intake sites along the Sacramento River, construction of the new forebay, and  
25 associated RTM storage areas. Both temporary and permanent losses of habitat would occur  
26 from the transmission line corridors west of the study area and along the tunnel alignment in  
27 the west Delta. The CM1 footprint overlaps with two northern harrier occurrences in the study  
28 area (one temporary control structure work area and one potential borrow area in CZ 8 east of  
29 the new forebay). Mitigation Measure BIO-75 would be available to reduce adverse effects on  
30 harriers or short-eared owls nesting in the vicinity of work areas. Refer to the Terrestrial  
31 Biology Map Book for a detailed view of Alternative 1C construction locations.
- 32 ● *CM2 Yolo Bypass Fisheries Enhancement:* Construction of the Yolo bypass fisheries enhancement  
33 would permanently remove 1,021 acres of modeled short-eared owl and northern harrier  
34 habitat in the Yolo Bypass in CZ 2. In addition, 471 acres of habitat would be temporarily  
35 removed. The impact would primarily consist of loss of acreages of pastures. The conversion is  
36 expected to occur during the first 10 years of Alternative 1C implementation.
- 37 ● *CM4 Tidal Natural Communities Restoration:* Tidal habitat restoration site preparation and  
38 inundation would permanently remove an estimated 39,017 acres of modeled short-eared owl  
39 and northern harrier habitat. The majority of the losses would be managed wetlands and  
40 cultivated lands in CZs 1, 2, 4, 5, 6, 7, 8, 10, and 11. Tidal restoration actions through CM4 would  
41 restore an estimated 55,000 acres of tidal natural communities. These restored wetland areas  
42 could provide suitable nesting habitat for short-eared owl and northern harrier. Consequently,  
43 although existing nesting habitat for short-eared owl and northern harrier would be removed,  
44 restoration of wetland habitats is expected to benefit marsh associated ground nesting birds by  
45 increasing the extent and value of their nesting habitat. Grizzley Island supports the only known  
46 resident population of short-eared owls in the Suisun Marsh and Sacramento-San Joaquin River

1 Delta (Roberson 2008). Grizzley Island does not overlap with the hypothetical footprint for CM4.  
2 However, this is an important breeding area for short-eared owl and if restoration footprints  
3 were changed during the implementation process of BDCP to overlap with this area, the effects  
4 on breeding short-eared owls could likely be adverse. Future NEPA and CEQA analysis would be  
5 conducted for restoration projects under BDCP and if restoration was proposed to occur outside  
6 of the hypothetical footprints used for this programmatic analysis, potential impacts on these  
7 species would be captured in the project-level analysis (Appendix 3B, Section 3.2.5).

- 8 ● *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore  
9 seasonally inundated floodplain would permanently and temporarily remove approximately  
10 2,086 acres of modeled short-eared owl and northern harrier habitat (1,332 permanent, 754  
11 temporary). These losses would be expected to occur along the San Joaquin River and other  
12 major waterways in CZ 7.
- 13 ● *CM7 Riparian Natural Community Restoration*: Riparian restoration would permanently remove  
14 approximately 623 acres of short-eared owl and northern harrier habitat as part of tidal  
15 restoration and 2,479 acres of habitat as part of seasonal floodplain restoration.
- 16 ● *CM8 Grassland Natural Community Restoration*: Restoration of grassland is expected to be  
17 implemented on agricultural lands and would result in the conversion of 1,066 acres of  
18 cultivated lands to grassland in CZs 1, 2, 4, 5, 7, 8, and 11. The resulting 2,000 acres of grassland  
19 would provide habitat for short-eared owl and northern harrier.
- 20 ● *CM11 Natural Communities Enhancement and Management*: A variety of habitat management  
21 actions included in *CM11 Natural Communities Enhancement and Management* that are designed  
22 to enhance wildlife values in restored or protected habitats could result in localized ground  
23 disturbances that could temporarily remove small amounts of modeled habitat. Ground-  
24 disturbing activities, such as removal of nonnative vegetation and road and other infrastructure  
25 maintenance activities, would be expected to have minor adverse effects on available habitat  
26 and would be expected to result in overall improvements to and maintenance of habitat values  
27 over the term of the BDCP.

28 Habitat management- and enhancement-related activities could short-eared owl and northern  
29 harrier nests. If either species were to nest in the vicinity of a worksite, equipment operation  
30 could destroy nests, and noise and visual disturbances could lead to their abandonment,  
31 resulting in mortality of eggs and nestlings. Mitigation Measure BIO-75, *Conduct Preconstruction*  
32 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to minimize  
33 these adverse effects.

- 34 ● *CM18 Conservation Hatcheries*: Implementation of CM18 would remove up to 35 acres of short-  
35 eared owl and northern harrier habitat for the development of a delta and longfin smelt  
36 conservation hatchery in CZ 1. The loss is expected to occur during the first 10 years of Plan  
37 implementation.
- 38 ● *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground  
39 water conveyance facilities and restoration infrastructure could result in ongoing but periodic  
40 disturbances that could affect short-eared owl and northern harrier use of the surrounding  
41 habitat. Maintenance activities would include vegetation management, levee and structure  
42 repair, and re-grading of roads and permanent work areas. These effects, however, would be  
43 reduced by AMM1–AMM7, Mitigation Measure BIO-75, and conservation actions as described  
44 below.

- 1 • Injury and Direct Mortality: Construction-related activities would not be expected to result in  
2 direct mortality of adult or fledged short-eared owl and northern harrier if they were present in  
3 the Plan Area, because they would be expected to avoid contact with construction and other  
4 equipment. If either species were to nest in the construction area, construction-related  
5 activities, including equipment operation, noise and visual disturbances could destroy nests or  
6 lead to their abandonment, resulting in mortality of eggs and nestlings. Mitigation Measure BIO-  
7 75 would be available to minimize these adverse effects.

8 The following paragraphs summarize the combined effects discussed above and describe other  
9 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also  
10 included.

### 11 ***Near-Term Timeframe***

12 Because the water conveyance facilities construction is being evaluated at the project level, the near-  
13 term BDCP conservation strategy has been evaluated to determine whether it would provide  
14 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the effects of  
15 construction would not be adverse under NEPA. Alternative 1C would remove 20,697 acres of  
16 modeled habitat (15,447 permanent, 5,250 temporary) for short-eared owl and northern harrier in  
17 the study area in the near-term. These effects would result from the construction of the water  
18 conveyance facilities (CM1, 7,945 acres), and implementing other conservation measures (*CM2 Yolo*  
19 *Bypass Fisheries Enhancement, CM4 Tidal Natural Communities Restoration, CM5 Seasonally*  
20 *Inundated Floodplain Restoration, CM7, Riparian Natural Community Restoration, CM8 Grassland*  
21 *Natural Community Restoration, CM10 Nontidal Marsh Restoration, and CM18 Conservation*  
22 *Hatcheries—12,752 acres).*

23 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by  
24 CM1 would be 1:1 for restoration/creation and 1:1 protection of habitat. Using these typical ratios  
25 would indicate that 7,945 acres of habitat should be restored and 7,945 acres should be protected to  
26 compensate for the CM1 losses of short-eared owl and northern harrier habitat. The near-term  
27 effects of other conservation actions would remove 12,752 acres of modeled habitat, and therefore  
28 require 12,752 acres of restoration and 12,752 acres of protection of short-eared owl and northern  
29 harrier habitat using the same typical NEPA and CEQA ratios (1:1 for restoration and 1:1 for  
30 protection).

31 The BDCP has committed to near-term goals of protecting 2,000 acres and restoring 1,140 acres of  
32 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of  
33 alkali seasonal wetland complex, protecting 4,800 acres of managed wetland natural community,  
34 protecting 15,400 acres of non-rice cultivated lands, protecting 900 acres of rice or rice equivalent  
35 habitat, and restoring 19,150 acres of tidal wetlands (Table 3-4 in Chapter 3, *Description of*  
36 *Alternatives*). These conservation actions are associated with CM3, CM4, and CM8 and would occur  
37 in the same timeframe as the construction and early restoration losses.

38 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1  
39 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali  
40 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous  
41 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would  
42 provide nesting and foraging habitat for short-eared owl and northern harrier and reduce the effects  
43 of current levels of habitat fragmentation. Small mammal populations would also be increased on  
44 protected lands, enhancing the foraging value of these natural communities (Objectives ASWNC2.4,

1 VPNC2.5, and GNC2.4). Foraging opportunities would also be improved by enhancing prey  
2 populations through the establishment of 20- to 30-foot-wide hedgerows along field borders and  
3 roadsides within protected cultivated lands (Objective SWHA2.2). Remnant patches of grassland or  
4 other uncultivated areas would also be protected and maintained as part of the cultivated lands  
5 reserve system which would provide additional foraging habitat and a source of rodent prey that  
6 could recolonize cultivated fields (Objective CLNC1.3). The protection of managed wetlands  
7 (including upland grassland components) would preserve habitat for short-eared owl and northern  
8 harrier (Objective MWNC1.1). Protection and enhancement of managed wetlands to meet this  
9 objective would focus on highly degraded areas in order to provide the greatest possible level of  
10 enhancement benefit to the managed wetland natural community and associated species. Managed  
11 wetland protection and enhancement would be concentrated in Suisun Marsh, which currently  
12 supports a high concentration of nesting short-eared owls on Grizzley Island.

13 The restoration of 19,150 acres of tidal natural communities, including transitional uplands would  
14 provide nesting and foraging habitat for short-eared owl and northern harrier. Short-eared owl and  
15 northern harrier nest in open habitats within cultivated lands including alfalfa, irrigated pasture,  
16 and other grain fields. At least 15,400 acres of cultivated lands that provide habitat for covered and  
17 other native wildlife species would be protected in the near-term time period (Objective CLNC1.1). A  
18 minimum of 87% of cultivated lands protected by the late long-term time period would be in alfalfa,  
19 irrigated pasture, and other hay crops (Objective SH1.2). This biological objective provides an  
20 estimate for the proportion of cultivated lands protected in the near-term time period which would  
21 provide suitable nesting and foraging habitat for short-eared owl and northern harrier.

22 The acres of protection contained in the near-term Plan goals satisfy the typical mitigation ratios  
23 that would be applied to the project-level effects of CM1 and the effects from other near-term  
24 restoration actions. The acres of restoration in the near-term satisfy the project-level effects of CM1,  
25 but are 392 acres short of satisfying the compensation required for other near-term impacts.  
26 Mitigation Measure BIO-121 *Compensate for Loss of Short-Eared Owl and Northern Harrier Nesting*  
27 *Habitat*, would be available to address the adverse effect of near-term habitat loss.

28 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
29 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
30 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
31 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
32 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
33 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
34 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

35 The short-eared owl and the northern harrier are not covered species under the BDCP. For the BDCP  
36 to avoid adverse effects on individuals, preconstruction surveys for noncovered avian species would  
37 be required to ensure that nests are detected and avoided. Mitigation Measure BIO-75, *Conduct*  
38 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to  
39 address this adverse effect.

#### 40 **Late Long-Term Timeframe**

41 Based on modeled habitat, the study area supports approximately 406,784 acres of modeled nesting  
42 and foraging habitat for short-eared owl and northern harrier. Alternative 1C as a whole would  
43 result in the permanent loss of and temporary effects on 55,869 acres of modeled short-eared owl  
44 and northern harrier habitat during the term of the Plan (14% of the modeled habitat in the study

1 area). The locations of these losses are described above in the analyses of individual conservation  
2 measures.

3 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*  
4 *Restoration, CM4 Tidal Natural Communities Restoration, and CM8 Grassland Natural Community*  
5 *Restoration* to protect 8,000 acres and restore 2,000 acres of grassland natural community, protect  
6 600 acres of vernal pool complex, protect 150 acres of alkali seasonal wetland complex, protect  
7 8,100 acres of managed wetland, protect 48,625 acres of cultivated lands that provide suitable  
8 habitat for native wildlife species, and restore at least 65,000 acres of tidal wetlands (Table 3-4 in  
9 Chapter 3).

10 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1  
11 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali  
12 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous  
13 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would  
14 provide nesting and foraging habitat for short-eared owl and northern harrier and reduce the effects  
15 of current levels of habitat fragmentation. Small mammal populations would also be increased on  
16 protected lands, enhancing the foraging value of these natural communities (Objectives ASWNC2.4,  
17 VPNC2.5, and GNC2.4). Foraging opportunities would also be improved by enhancing prey  
18 populations through the establishment of 20- to 30-foot-wide hedgerows along field borders and  
19 roadsides within protected cultivated lands (Objective SWHA2.2). Remnant patches of grassland or  
20 other uncultivated areas would also be protected and maintained as part of the cultivated lands  
21 reserve system which would provide additional foraging habitat and a source of rodent prey that  
22 could recolonize cultivated fields (Objective CLNC1.3). The protection of managed wetlands  
23 (including upland grassland components) would preserve habitat for short-eared owl and northern  
24 harrier (Objective MWNC1.1). Protection and enhancement of managed wetlands to meet this  
25 objective would focus on highly degraded areas in order to provide the greatest possible level of  
26 enhancement benefit to the managed wetland natural community and associated species. Managed  
27 wetland protection and enhancement would be concentrated in Suisun Marsh, which supports a  
28 high concentration of nesting short-eared owls on Grizzley Island. At least 1,500 acres of the  
29 managed wetlands would be protected and enhanced on Grizzley Island by the late long-term time  
30 period. The restoration of 19,150 acres of tidal natural communities, including transitional uplands  
31 would provide nesting and foraging habitat for short-eared owl and northern harrier. Short-eared  
32 owl and northern harrier nest in open habitats within cultivated lands including alfalfa, irrigated  
33 pasture, and other grain fields. A minimum of 87% of the 48,625 acres of cultivated lands protected  
34 by the late long-term time period (Objective CLNC1.1) would be managed in alfalfa, irrigated  
35 pasture, and other hay crops (Objective SH1.2) which are compatible crop types for these species.

36 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*  
37 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*  
38 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
39 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
40 *Material, and AMM7 Barge Operations Plan. All of these AMMs include elements that would avoid or*  
41 *minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are*  
42 *described in detail in BDCP Appendix 3.C, Avoidance and Minimization Measures. Short-eared owl*  
43 *and northern harrier are not species that are covered under the BDCP. For the BDCP to avoid an*  
44 *adverse effect on individuals, preconstruction surveys for noncovered avian species would be*  
45 *required to ensure that active nests are detected and avoided. Mitigation Measure BIO-75, Conduct*

1 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to  
2 address this adverse effect.

3 **NEPA Effects:** The loss of short-eared owl and northern harrier habitat and potential for direct  
4 mortality of these special-status species under Alternative 1C would represent an adverse effect in  
5 the absence of other conservation actions. With habitat protection and restoration associated with  
6 CM3, CM8, and CM11, guided by biological goals and objectives and by AMM1–AMM7, which would  
7 be in place throughout the construction period, the effects of habitat loss from Alternative 1C would  
8 not be adverse under NEPA. Short-eared owl and northern harrier are not covered species under the  
9 BDCP, and preconstruction surveys for noncovered avian species would be required to ensure that  
10 nests are detected and avoided. Mitigation Measure BIO-75 would be available to address the  
11 adverse effect of direct mortality on short-eared owl and northern harrier.

12 **CEQA Conclusion:**

13 **Near-Term Timeframe**

14 Because the water conveyance facilities construction is being evaluated at the project level, the near-  
15 term BDCP conservation strategy has been evaluated to determine whether it would provide  
16 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the effects of  
17 construction would be less than significant under CEQA. Alternative 1C would remove 20,697 acres  
18 of modeled habitat (15,447 permanent, 5,250 temporary) for short-eared owl and northern harrier  
19 in the study area in the near-term. These effects would result from the construction of the water  
20 conveyance facilities (CM1, 7,945 acres), and implementing other conservation measures (*CM2 Yolo*  
21 *Bypass Fisheries Enhancement*, *CM4 Tidal Natural Communities Restoration*, *CM5 Seasonally*  
22 *Inundated Floodplain Restoration*, *CM7, Riparian Natural Community Restoration*, *CM8 Grassland*  
23 *Natural Community Restoration*, *CM10 Nontidal Marsh Restoration*, and *CM18 Conservation*  
24 *Hatcheries*—12,752 acres).

25 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by  
26 CM1 would be 1:1 for restoration/creation and 1:1 protection of habitat. Using these typical ratios  
27 would indicate that 7,945 acres of habitat should be restored and 7,945 acres should be protected to  
28 compensate for the CM1 losses of short-eared owl and northern harrier habitat. The near-term  
29 effects of other conservation actions would remove 12,752 acres of modeled habitat, and therefore  
30 require 12,752 acres of restoration and 12,752 acres of protection of short-eared owl and northern  
31 harrier habitat using the same typical NEPA and CEQA ratios (1:1 for restoration and 1:1 for  
32 protection).

33 The BDCP has committed to near-term goals of protecting 2,000 acres and restoring 1,140 acres of  
34 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of  
35 alkali seasonal wetland complex, protecting 4,800 acres of managed wetland natural community,  
36 protecting 15,400 acres of non-rice cultivated lands, protecting 900 acres of rice or rice equivalent  
37 habitat, and restoring 19,150 acres of tidal wetlands (Table 3-4 in Chapter 3). These conservation  
38 actions are associated with CM3, CM4, and CM8 and would occur in the same timeframe as the  
39 construction and early restoration losses.

40 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1  
41 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali  
42 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous  
43 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would

1 provide nesting and foraging habitat for short-eared owl and northern harrier and reduce the effects  
2 of current levels of habitat fragmentation. Small mammal populations would also be increased on  
3 protected lands, enhancing the foraging value of these natural communities (Objectives ASWNC2.4,  
4 VPNC2.5, and GNC2.4). Foraging opportunities would also be improved by enhancing prey  
5 populations through the establishment of 20- to 30-foot-wide hedgerows along field borders and  
6 roadsides within protected cultivated lands (Objective SWHA2.2). Remnant patches of grassland or  
7 other uncultivated areas would also be protected and maintained as part of the cultivated lands  
8 reserve system which would provide additional foraging habitat and a source of rodent prey that  
9 could recolonize cultivated fields (Objective CLNC1.3). The protection of managed wetlands  
10 (including upland grassland components) would preserve habitat for short-eared owl and northern  
11 harrier (Objective MWNC1.1). Protection and enhancement of managed wetlands to meet this  
12 objective would focus on highly degraded areas in order to provide the greatest possible level of  
13 enhancement benefit to the managed wetland natural community and associated species. Managed  
14 wetland protection and enhancement would be concentrated in Suisun Marsh, which supports a  
15 high concentration of nesting short-eared owls on Grizzley Island.

16 The restoration of 19,150 acres of tidal natural communities, including transitional uplands would  
17 provide nesting and foraging habitat for short-eared owl and northern harrier. Short-eared owl and  
18 northern harrier nest in open habitats within cultivated lands including alfalfa, irrigated pasture,  
19 and other grain fields. At least 15,400 acres of cultivated lands that provide habitat for covered and  
20 other native wildlife species would be protected in the near-term time period (Objective CLNC1.1). A  
21 minimum of 87% of cultivated lands protected by the late long-term time period would be in alfalfa,  
22 irrigated pasture, and other hay crops (Objective SH1.2). This biological objective provides an  
23 estimate for the proportion of cultivated lands protected in the near-term time period which would  
24 provide suitable nesting and foraging habitat for short-eared owl and northern harrier. These  
25 biological goals and objectives would inform the near-term protection and restoration efforts and  
26 represent performance standards for considering the effectiveness of restoration actions.

27 The acres of protection contained in the near-term Plan goals satisfy the typical mitigation ratios  
28 that would be applied to the project-level effects of CM1 and the effects from other near-term  
29 restoration actions. The acres of restoration in the near-term satisfy the project-level effects of CM1,  
30 but are 392 acres short of satisfying the compensation required for other near-term impacts. The  
31 implementation of Mitigation Measure BIO-121 *Compensate for Loss of Short-Eared Owl and*  
32 *Northern Harrier Nesting Habitat*, would reduce the impact of near-term habitat loss to a less-than-  
33 significant level.

34 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
35 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
36 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
37 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
38 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
39 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
40 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

41 The short-eared owl and the northern harrier are not covered species under the BDCP. For the BDCP  
42 to avoid adverse effects on individuals, preconstruction surveys for noncovered avian species would  
43 be required to ensure that nests are detected and avoided. The implementation of Mitigation  
44 Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting*  
45 *Birds*, would reduce this potential impact to a less-than-significant level.

1 **Late Long-Term Timeframe**

2 Based on modeled habitat, the study area supports approximately 406,784 acres of modeled nesting  
3 and foraging habitat for short-eared owl and northern harrier. Alternative 1C as a whole would  
4 result in the permanent loss of and temporary effects on 55,869 acres of modeled short-eared owl  
5 and northern harrier habitat during the term of the Plan (14% of the modeled habitat in the study  
6 area). The locations of these losses are described above in the analyses of individual conservation  
7 measures.

8 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*  
9 *Restoration, CM4 Tidal Natural Communities Restoration, and CM8 Grassland Natural Community*  
10 *Restoration*, to protect 8,000 acres and restore 2,000 acres of grassland natural community, protect  
11 600 acres of vernal pool complex, protect 150 acres of alkali seasonal wetland complex, protect  
12 8,100 acres of managed wetland, protect 48,625 acres of cultivated lands that provide suitable  
13 habitat for native wildlife species, and restore at least 65,000 acres of tidal wetlands (Table 3-4 in  
14 Chapter 3).

15 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1  
16 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali  
17 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous  
18 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would  
19 provide nesting and foraging habitat for short-eared owl and northern harrier and reduce the effects  
20 of current levels of habitat fragmentation. Small mammal populations would also be increased on  
21 protected lands, enhancing the foraging value of these natural communities (Objectives ASWNC2.4,  
22 VPNC2.5, and GNC2.4). Foraging opportunities would also be improved by enhancing prey  
23 populations through the establishment of 20- to 30-foot-wide hedgerows along field borders and  
24 roadsides within protected cultivated lands (Objective SWHA2.2). Remnant patches of grassland or  
25 other uncultivated areas would also be protected and maintained as part of the cultivated lands  
26 reserve system which would provide additional foraging habitat and a source of rodent prey that  
27 could recolonize cultivated fields (Objective CLNC1.3). The protection of managed wetlands  
28 (including upland grassland components) would preserve habitat for short-eared owl and northern  
29 harrier (Objective MWNC1.1). Protection and enhancement of managed wetlands to meet this  
30 objective would focus on highly degraded areas in order to provide the greatest possible level of  
31 enhancement benefit to the managed wetland natural community and associated species. Managed  
32 wetland protection and enhancement would be concentrated in Suisun Marsh, which supports a  
33 high concentration of nesting short-eared owls on Grizzley Island. At least 1,500 acres of the  
34 managed wetlands would be protected and enhanced on Grizzley Island by the late long-term time  
35 period. The restoration of 19,150 acres of tidal natural communities, including transitional uplands  
36 would provide nesting and foraging habitat for short-eared owl and northern harrier. Short-eared  
37 owl and northern harrier nest in open habitats within cultivated lands including alfalfa, irrigated  
38 pasture, and other grain fields. A minimum of 87% of the 48,625 acres of cultivated lands protected  
39 by the late long-term time period (Objective CLNC1.1) would be managed in alfalfa, irrigated  
40 pasture, and other hay crops (Objective SH1.2) which are compatible crop types for these species.

41 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*  
42 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*  
43 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
44 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
45 *Material, and AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or

1 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
2 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*. Short-eared owl  
3 and northern harrier are not species that are covered under the BDCP. For the BDCP to have a less-  
4 than-significant impact on individuals, preconstruction surveys for noncovered avian species would  
5 be required to ensure that active nests are detected and avoided. Mitigation Measure BIO-75,  
6 *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be  
7 reduce the impact to a less-than-significant level.

8 Considering Alternative 1C's protection and restoration provisions, which would provide acreages  
9 of new high-value or enhanced habitat in amounts suitable to compensate for habitats lost to  
10 construction and restoration activities, and with the implementation of AMM1-AMM7 and  
11 Mitigation Measures BIO-75 and BIO-121, the loss of habitat or direct mortality through  
12 implementation of Alternative 1C would not result in a substantial adverse effect through habitat  
13 modifications and would not substantially reduce the number or restrict the range of either species.  
14 Therefore, the loss of habitat or potential mortality under this alternative would have a less-than-  
15 significant impact on short-eared owl and northern harrier.

16 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**  
17 **Disturbance of Nesting Birds**

18 See discussion of Mitigation Measure BIO-75 under Impact BIO-75.

19 **Mitigation Measure BIO-121: Compensate for Loss of Short-Eared Owl and Northern**  
20 **Harrier Nesting Habitat**

21 DWR will restore and protect sufficient acres of suitable nesting habitat for short-eared owl and  
22 northern harrier such that the total acres of habitat impacted in the near-term timeframe are  
23 mitigated at a ratio of 1:1. Restored habitat could consist of grassland or managed wetlands.

24 **Impact BIO-122: Effects on Short-Eared Owl and Northern Harrier Associated with Electrical**  
25 **Transmission Facilities**

26 New transmission lines would increase the risk that short-eared owl and northern harrier could be  
27 subject to power line strikes, which could result in injury or mortality of these species. Short-eared  
28 owl and northern harrier would be at low risk of bird strike mortality based on factors assessed in  
29 the bird strike vulnerability analysis (BDCP Attachment 5J.C, *Analysis of Potential Bird Collisions at*  
30 *Proposed BDCP Transmission Lines*). Factors analyzed include the height of the new transmission  
31 lines and the flight behavior of species. The existing network of transmission lines in the Plan Area  
32 currently poses the same small risk for these species, and any incremental risk associated with the  
33 new power line corridors would also be expected to be low. *AMM20 Greater Sandhill Crane*, would  
34 further reduce any potential effects.

35 **NEPA Effects:** New transmission lines would minimally increase the risk for short-eared owl and  
36 northern harrier power line strikes. With the implementation of *AMM20 Greater Sandhill Crane*, the  
37 potential effect of the construction of new transmission lines on short-eared owl and northern  
38 harrier would not be adverse.

39 **CEQA Conclusion:** New transmission lines would minimally increase the risk for short-eared owl  
40 and northern harrier power line strikes. *AMM20 Greater Sandhill Crane* would reduce the potential

1 impact of the construction of new transmission lines on short-eared owl and northern harrier to a  
2 less-than-significant level.

### 3 **Impact BIO-123: Indirect Effects of Plan Implementation on Short-Eared Owl and Northern** 4 **Harrier**

5 **Indirect construction- and operation-related effects:** Noise and visual disturbances associated  
6 with construction-related activities could result in temporary disturbances that affect short-eared  
7 owl and northern harrier use of modeled habitat. Construction noise above background noise levels  
8 (greater than 50 dBA) could extend 1,900 to 5,250 feet from the edge of construction activities  
9 (BDCP Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of the BDCP Conveyance*  
10 *Facility on Sandhill Crane*, Table 4), although there are no available data to determine the extent to  
11 which these noise levels could affect short-eared owl or northern harrier. Indirect effects associated  
12 with construction include noise, dust, and visual disturbance caused by grading, filling, contouring,  
13 and other ground-disturbing operations. Construction-related noise and visual disturbances could  
14 disrupt nesting and foraging behaviors, and reduce the functions of suitable habitat which could  
15 result in an adverse effect on these species. Mitigation Measure BIO-75, *Conduct Preconstruction*  
16 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to minimize adverse  
17 effects on active nests. The use of mechanical equipment during water conveyance construction  
18 could cause the accidental release of petroleum or other contaminants that could affect these  
19 species or their prey in the surrounding habitat. AMM1–AMM7, including *AMM2 Construction Best*  
20 *Management Practices and Monitoring*, would minimize the likelihood of such spills from occurring.  
21 The inadvertent discharge of sediment or excessive dust adjacent to short-eared owl and northern  
22 harrier could also have a negative effect on these species. AMM1–AMM7 would ensure that  
23 measures are in place to prevent runoff from the construction area and the negative effects of dust  
24 on wildlife adjacent to work areas.

25 **Methylmercury Exposure:** Covered activities have the potential to exacerbate bioaccumulation of  
26 mercury in avian species, including short-eared owl and northern harrier. Marsh (tidal and nontidal)  
27 and floodplain restoration have the potential to increase exposure to methylmercury. Mercury is  
28 transformed into the more bioavailable form of methylmercury in aquatic systems, especially areas  
29 subjected to regular wetting and drying such as tidal marshes and flood plains (Alpers et al. 2008).  
30 Thus, BDCP restoration activities that create newly inundated areas could increase bioavailability of  
31 mercury (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Species sensitivity  
32 to methylmercury differs widely and there is a large amount of uncertainty with respect to species-  
33 specific effects. Increased methylmercury associated with natural community and floodplain  
34 restoration could indirectly affect short-eared owl and northern harrier, via uptake in lower trophic  
35 levels (as described in the BDCP, Appendix 5.D, *Contaminants*).

36 In addition, the potential mobilization or creation of methylmercury within the Plan Area varies  
37 with site-specific conditions and would need to be assessed at the project level. *CM12 Methylmercury*  
38 *Management* contains provisions for project-specific Mercury Management Plans. Site-specific  
39 restoration plans that address the creation and mobilization of mercury, as well as monitoring and  
40 adaptive management as described in CM12 would be available to address the uncertainty of  
41 methylmercury levels in restored tidal marsh and potential impacts on short-eared owl and  
42 northern harrier.

43 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in  
44 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,

1 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,  
2 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz  
3 2009). The effect of selenium toxicity differs widely between species and also between age and sex  
4 classes within a species. In addition, the effect of selenium on a species can be confounded by  
5 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith  
6 2009).

7 The primary source of selenium bioaccumulation in birds is through their diet (Ackerman and  
8 Eagles-Smith 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the  
9 trophic level at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At  
10 Kesterson Reservoir in the San Joaquin Valley, selenium concentrations in invertebrates have been  
11 found to be two to six times the levels in rooted plants. Furthermore, bivalves sampled in the San  
12 Francisco Bay contained much higher selenium levels than crustaceans such as copepods (Stewart et  
13 al. 2004). Studies conducted at the Grasslands in Merced County recorded higher selenium levels in  
14 black-necked stilts which feed on aquatic invertebrates than in mallards and pintails, which are  
15 primarily herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which  
16 forage on bivalves) have much higher levels of selenium levels than shorebirds that prey on aquatic  
17 invertebrates (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high  
18 levels of selenium have a higher risk of selenium toxicity.

19 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations  
20 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to  
21 exacerbate bioaccumulation of selenium in avian species, including short-eared owl and northern  
22 harrier. Marsh (tidal and nontidal) and floodplain restoration have the potential to mobilize  
23 selenium, and therefore increase avian exposure from ingestion of prey items with elevated  
24 selenium levels. Thus, BDCP restoration activities that create newly inundated areas could increase  
25 bioavailability of selenium (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration).  
26 Changes in selenium concentrations were analyzed in Chapter 8, *Water Quality*, and it was  
27 determined that, relative to Existing Conditions and the No Action Alternative, CM1 would not result  
28 in substantial, long-term increases in selenium concentrations in water in the Delta under any  
29 alternative. However, it is difficult to determine whether the effects of potential increases in  
30 selenium bioavailability associated with restoration-related conservation measures (CM4 and CM5)  
31 would lead to adverse effects on short-eared owl and northern harrier.

32 Because of the uncertainty that exists at this programmatic level of review, there could be a  
33 substantial effect on short-eared owl and northern harrier from increases in selenium associated  
34 with restoration activities. This effect would be addressed through the implementation of *AMM27*  
35 *Selenium Management* (BDCP Appendix 3.C, *Avoidance and Minimization Measures*) which would  
36 provide specific tidal habitat restoration design elements to reduce the potential for  
37 bioaccumulation of selenium and its bioavailability in tidal habitats. Furthermore, the effectiveness  
38 of selenium management to reduce selenium concentrations and/or bioaccumulation would be  
39 evaluated separately for each restoration effort as part of design and implementation. This  
40 avoidance and minimization measure would be implemented as part of the tidal habitat restoration  
41 design schedule.

42 **NEPA Effects:** Noise and visual disturbances from the construction of water conveyance facilities  
43 could reduce short-eared owl and northern harrier use of modeled habitat adjacent to work areas.  
44 Moreover, operation and maintenance of the water conveyance facilities, including the transmission  
45 facilities, could result in ongoing but periodic postconstruction disturbances that could affect short-

1 eared owl and northern harrier use of the surrounding habitat. Mitigation Measure BIO-75, *Conduct*  
2 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to  
3 address adverse effects on nesting individuals in addition to AMM1–AMM7. Tidal habitat restoration  
4 could result in increased exposure of short-eared owl and northern harrier. This effect would be  
5 addressed through the implementation of *AMM27 Selenium Management*, which would provide  
6 specific tidal habitat restoration design elements to reduce the potential for bioaccumulation of  
7 selenium and its bioavailability in tidal habitats.

8 Tidal habitat restoration is unlikely to have an adverse effect on short-eared owl and northern  
9 harrier through increased exposure to methylmercury, as these species currently nest and forage in  
10 tidal marshes where elevated methylmercury levels exist. However, it is unknown what  
11 concentrations of methylmercury are harmful to the species and the potential for increased  
12 exposure varies substantially within the study area. Site-specific restoration plans in addition to  
13 monitoring and adaptive management, described in *CM12 Methylmercury Management*, would  
14 address the uncertainty of methylmercury levels in restored tidal marsh. The site-specific planning  
15 phase of marsh restoration would be the appropriate place to assess the potential for risk of  
16 methylmercury exposure for California least tern, once site specific sampling and other information  
17 could be developed.

18 **CEQA Conclusion:** Noise, the potential for hazardous spills, increased dust and sedimentation, and  
19 operations and maintenance of the water conveyance facilities would have a less-than-significant  
20 impact on short-eared owl and northern harrier with the implementation of Mitigation Measure  
21 *BIO-75, Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, and  
22 *AMM1–AMM7*. Tidal habitat restoration is unlikely to have a significant impact on short-eared owl  
23 and northern harrier through increased exposure to methylmercury, as these species currently nest  
24 and forage in tidal marshes where elevated methylmercury levels exist. However, it is unknown  
25 what concentrations of methylmercury are harmful to these species. Site-specific restoration plans  
26 that address the creation and mobilization of mercury, as well as monitoring and adaptive  
27 management as described in *CM12* would better inform potential impacts and address the  
28 uncertainty of methylmercury levels in restored tidal marsh in the study area. Tidal habitat  
29 restoration could result in increased exposure of short-eared owl and northern harrier. This effect  
30 would be addressed through the implementation of *AMM27 Selenium Management*, which would  
31 provide specific tidal habitat restoration design elements to reduce the potential for  
32 bioaccumulation of selenium and its bioavailability in tidal habitats. Therefore, the indirect effects of  
33 Alternative 1C implementation would not have a significant impact on short-eared owl and northern  
34 harrier.

35 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**  
36 **Disturbance of Nesting Birds**

37 See Mitigation Measure BIO-75 under Impact BIO-75.

38 **Impact BIO-124: Periodic Effects of Inundation on Short-Eared Owl and Northern Harrier as a**  
39 **Result of Implementation of Conservation Components**

40 Flooding of the Yolo Bypass from Fremont Weir operations (*CM2 Yolo Bypass Fisheries*  
41 *Enhancement*) would increase the frequency and duration of inundation on approximately 2,926–  
42 8,060 acres of modeled short-eared owl and northern harrier habitat (Table 12-1C-46).

1 Based on hypothetical footprints, implementation of *CM5 Seasonally Inundated Floodplain*  
2 *Restoration* could result in the periodic inundation of up to approximately 5,978 acres of modeled  
3 habitat (Table 12-1C-46), the majority of which would be pasture and other cultivated lands.

4 Reduced foraging habitat availability may be expected during the fledgling period of the nesting  
5 season due to periodic inundation. However, inundation would occur during the nonbreeding  
6 season and would not be expected to have an adverse effect on either species.

7 **NEPA Effects:** Periodic inundation of floodplains would not result in an adverse effect on short-  
8 eared owl and northern harrier because inundation is expected to occur prior to the breeding  
9 season.

10 **CEQA Conclusion:** Periodic inundation of floodplains would not have a significant impact on short-  
11 eared owl and northern harrier because inundation is expected to occur prior to the breeding  
12 season.

### 13 **Redhead and Tule Greater White-Fronted Goose**

14 Impacts, relevant protection and restoration actions, and mitigation requirements under CEQA are  
15 discussed for these species in the *General Terrestrial Biology Effects* section under Impacts BIO-178  
16 through BIO-183. Further details of the methods of analysis for waterfowl and shorebirds can be  
17 found in the *BDCP Waterfowl and Shorebird Effects Analysis* (Ducks Unlimited 2013).

### 18 **Mountain Plover**

19 This section describes the effects of Alternative 1C, including water conveyance facilities  
20 construction and implementation of other conservation components, on mountain plover. Modeled  
21 habitat for mountain plover consists of grassland, alkali seasonal wetland, vernal pool complex,  
22 alfalfa, grain and hay, pasture, and idle cropland throughout the study area.

23 Construction and restoration associated with Alternative 1C conservation measures would result in  
24 both temporary and permanent losses of modeled habitat for mountain plover as indicated in Table  
25 12-1C-47. Full implementation of Alternative 1C would include the following biological objectives  
26 over the term of the BDCP which would also benefit the mountain plover (BDCP Chapter 3,  
27 *Conservation Strategy*).

- 28 ● Protect at least 8,000 acres of grassland with at least 2,000 acres protected in CZ 1, at least 1,000  
29 acres protected in CZ 8, at least 2,000 acres protected in CZ 11, and the remainder distributed  
30 among CZs 1, 2, 4, 5, 7, 8, and 11 (Objective GNC1.1, associated with CM3).
- 31 ● Restore at least 2,000 acres of grasslands (Objective GNC1.2, associated with CM8).
- 32 ● Protect at least 150 acres of alkali seasonal wetland and at least 600 acres of existing vernal pool  
33 complex in CZs 1, 8, and/or 11 (Objectives ASWNC1.1 and VPNC1.1, associated with CM3).
- 34 ● Increase prey availability and accessibility for grassland-foraging species (Objectives ASWNC2.4,  
35 VPNC2.5, GNC2.4, associated with CM11).
- 36 ● Protect at least 48,625 acres of cultivated lands that provide suitable habitat for covered and  
37 other native wildlife species (Objective CLNC1.1, associated with CM3).
- 38 ● Within the at least 48,625 acres of protected cultivated lands, protect at least 42,275 acres of  
39 cultivated lands as Swainson's hawk foraging habitat with at least 50% in very high-value  
40 habitat in CZs 2, 3, 4, 5, 7, 8, 9, and 11 (Objective SH1.2, associated with CM3).

1 As explained below, with the restoration or protection of these amounts of habitat, in addition to  
 2 management activities that would enhance these natural communities for the species, impacts on  
 3 mountain plover would not be adverse for NEPA purposes and would be less than significant for  
 4 CEQA purposes.

5 **Table 12-1C-47. Changes in Mountain Plover Modeled Habitat Associated with Alternative 1C**  
 6 **(acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	Wintering	2,796	2,796	3,750	3,750	NA	NA
<b>Total Impacts CM1</b>		<b>2,796</b>	<b>2,796</b>	<b>3,750</b>	<b>3,750</b>	<b>NA</b>	<b>NA</b>
CM2–CM18	Wintering	5,450	26,198	376	893	1,158–3,650	3,823
<b>Total Impacts CM2–CM18</b>		<b>5,450</b>	<b>26,198</b>	<b>376</b>	<b>893</b>	<b>1,158–3,650</b>	<b>3,823</b>
<b>TOTAL IMPACTS</b>		<b>8,246</b>	<b>28,994</b>	<b>4,126</b>	<b>4,643</b>	<b>1,158–3,650</b>	<b>3,823</b>

<sup>a</sup> See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

7

8 **Impact BIO-125: Loss or Conversion of Habitat for and Direct Mortality of Mountain Plover**

9 Alternative 1C conservation measures would result in the combined permanent and temporary loss  
 10 of up to 33,668 acres of modeled habitat for mountain plover (28,994 acres of permanent loss and  
 11 4,643 of temporary loss, Table 12-1C-47). Conservation measures that would result in these losses  
 12 are conveyance facilities and transmission line construction, and establishment and use of borrow  
 13 and spoil areas (CM1), Yolo Bypass fisheries improvements (CM2), tidal habitat restoration (CM4),  
 14 floodplain restoration (CM5), riparian restoration (CM7), grassland restoration (CM8), vernal pool  
 15 and wetland restoration (CM9), nontidal marsh restoration (CM10), and construction of  
 16 conservation hatcheries (CM18). The majority of habitat loss (20,880 acres) would result from CM4.  
 17 Habitat enhancement and management activities (CM11), which include ground disturbance or  
 18 removal of nonnative vegetation, and the construction of recreational trails, signs, and facilities,  
 19 could result in local adverse habitat effects. In addition, maintenance activities associated with the  
 20 long-term operation of the water conveyance facilities and other BDCP physical facilities could  
 21 degrade or eliminate mountain plover modeled wintering habitat. Each of these individual activities  
 22 is described below. A summary statement of the combined impacts and NEPA effects, and a CEQA  
 23 conclusion follow the individual conservation measure discussions.

- 24 • *CM1 Water Facilities and Operation*: Construction of Alternative 1C conveyance facilities would  
 25 result in the combined permanent and temporary loss of up to 6,546 acres of modeled mountain

1 plover habitat (2,796 acres of permanent loss, 3,750 acres of temporary loss) from CZs 1, 3, 5, 6,  
 2 8, and 9. The majority of habitat that would be removed would be in CZ 8, west of the Clifton  
 3 Court Forebay from the construction of the new forebay and the associated borrow and spoil  
 4 areas. Larger areas of annual grassland would be permanently removed by canal construction  
 5 south of Rock Slough, south of Discovery Bay and immediately west of Clifton Court Forebay.  
 6 Both temporary and permanent losses of grassland would be created by constructing the  
 7 transmission corridor west of the Plan Area and along the tunnel alignment in the west Delta.  
 8 The transmission corridor in the western tail of the study area as it is currently designed, would  
 9 consist of a permanent 230 kV transmission line parallel to Flannery Road, which is an  
 10 important wintering area for mountain plover. Mountain plovers use the grasslands, pastures,  
 11 and recently plowed fields in this area for foraging during winter months. Existing transmission  
 12 lines in the western tail include two 500 kV lines that intersect Canright Road, in addition to a  
 13 500 kV line and a 230 kV line that intersect Lambie Road at the western end of the study area.  
 14 The construction of the new transmission line along Flannery Road would be expected to cause  
 15 temporary disturbance to mountain plovers if construction were to occur during the winter  
 16 months. However, mountain plovers tend to forage in open areas and are more likely to use  
 17 areas of pastures and fields that are not in close proximity to roads. Foraging individuals would  
 18 be expected to move to adjacent suitable habitat north of Flannery Road during construction.  
 19 Refer to the Terrestrial Biology Map Book for a detailed view of Alternative 1C construction  
 20 locations.

- 21 ● *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo bypass fisheries enhancement  
 22 would result in the combined permanent and temporary loss of up to 1,274 acres of modeled  
 23 mountain plover wintering habitat (898 acres of permanent loss, 376 acres of temporary loss) in  
 24 the Yolo Bypass in CZ 2. Impacted habitat would consist primarily of grassland and pasture.  
 25 Most of the grassland losses would occur at the north end of the bypass below Fremont Weir,  
 26 along the Toe Drain/Tule Canal, and along the west side channels. Realignment of Putah Creek  
 27 could also involve excavation and grading in alkali seasonal wetland complex habitat as a new  
 28 channel is constructed. The loss is expected to occur during the first 10 years of Alternative 1C  
 29 implementation.
- 30 ● *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and  
 31 inundation would permanently remove an estimated 20,880 acres of modeled mountain plover  
 32 habitat. The majority of the acres lost would consist of cultivated lands in CZs 1, 2, 4, 5, 6, and/or  
 33 7. Grassland losses would likely occur in the vicinity of Cache Slough, on Decker Island in the  
 34 West Delta ROA, on the upslope fringes of Suisun Marsh, and along narrow bands adjacent to  
 35 waterways in the South Delta ROA. Tidal restoration would directly impact and fragment  
 36 grassland just north of Rio Vista in and around French and Prospect Islands, and in an area  
 37 south of Rio Vista around Threemile Slough. Losses of alkali seasonal wetland complex habitat  
 38 would likely occur in the south end of the Yolo Bypass and on the northern fringes of Suisun  
 39 Marsh.
- 40 ● *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore  
 41 seasonally inundated floodplain would permanently and temporarily remove approximately  
 42 1,450 acres of modeled mountain plover habitat (933 permanent, 517 temporary). These losses  
 43 would be expected after the first 10 years of Alternative 1C implementation along the San  
 44 Joaquin River and other major waterways in CZ 7.

- 1       ● *CM7 Riparian Natural Community Restoration*: Riparian restoration would permanently remove  
2       approximately 370 acres of mountain plover wintering habitat as part of tidal restoration and  
3       1,489 acres of habitat as part of seasonal floodplain restoration.
- 4       ● *CM8 Grassland Natural Community Restoration and CM9 Vernal Pool and Alkali Seasonal Wetland*  
5       *Complex Restoration*: Temporary construction-related disturbance of grassland habitat would  
6       result from implementation of CM8 and CM9 in in CZs 1, 2, 4, 5, 7, 8, and 11. However, all areas  
7       would be restored after the construction periods. Grassland restoration would be implemented  
8       on agricultural lands that also provide wintering habitat for mountain plover and would result  
9       in the conversion of 837 acres of cultivated lands to grassland.
- 10      ● *CM10 Nontidal Marsh Restoration*: Implementation of *CM10 Nontidal Marsh Restoration* would  
11      result in the permanent removal of 705 acres of mountain plover habitat.
- 12      ● *CM11 Natural Communities Enhancement and Management*: A variety of habitat management  
13      actions included in CM11 that are designed to enhance wildlife values in restored or protected  
14      habitats could result in localized ground disturbances that could temporarily remove small  
15      amounts of mountain plover habitat. Ground-disturbing activities, such as removal of nonnative  
16      vegetation and road and other infrastructure maintenance activities, would be expected to have  
17      minor adverse effects on available mountain plover habitat. CM11 would also include the  
18      construction of recreational-related facilities including trails, interpretive signs, and picnic  
19      tables (BDCP Chapter 4, *Covered Activities and Associated Federal Actions*). The construction of  
20      trailhead facilities, signs, staging areas, picnic areas, bathrooms, etc. would be placed on existing,  
21      disturbed areas when and where possible. However, approximately 50 acres of grassland  
22      habitat would be lost from the construction of trails and facilities.
- 23      ● *CM18 Conservation Hatcheries*: Implementation of CM18 would remove up to 35 acres of  
24      modeled mountain plover habitat for the development of a delta and longfin smelt conservation  
25      hatchery in CZ 1.
- 26      ● *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground  
27      water conveyance facilities and restoration infrastructure could result in ongoing but periodic  
28      disturbances that could affect mountain plover use of the surrounding habitat. Maintenance  
29      activities would include vegetation management, levee and structure repair, and re-grading of  
30      roads and permanent work areas. These effects, however, would be reduced by AMM1–AMM7  
31      and conservation actions as described below.
- 32      ● *Injury and Direct Mortality*: Construction would not be expected to result in direct mortality of  
33      mountain plover because foraging individuals would be expected to temporarily avoid the  
34      increased noise and activity associated with construction areas.

35      The following paragraphs summarize the combined effects discussed above and describe other  
36      BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also  
37      included.

### 38      ***Near-Term Timeframe***

39      Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
40      the near-term BDCP conservation strategy has been evaluated to determine whether it would  
41      provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
42      effects of construction would not be adverse under NEPA. Alternative 1C would remove 12,372  
43      acres (8,246 acres permanent, 4,126 acres temporary) of modeled mountain plover wintering

1 habitat in the study area in the near-term. These effects would result from the construction of the  
2 water conveyance facilities (CM1, 6,546 acres), and implementing other conservation measures  
3 (*CM2 Yolo Bypass Fisheries Enhancement, CM4 Tidal Natural Communities Restoration, CM7 Riparian*  
4 *Natural Community Restoration, CM8 Grassland Natural Community Restoration, CM9 Vernal Pool and*  
5 *Alkali Seasonal Wetland Complex Restoration, CM11 Natural Communities Enhancement and*  
6 *Management and CM18 Conservation Hatcheries—5,826 acres).*

7 The typical NEPA and CEQA project-level mitigation ratio for those natural communities affected  
8 would be 2:1 for protection of habitat. Using this ratio would indicate that 13,092 acres should be  
9 protected to compensate for the CM1 losses of 6,546 acres of mountain plover wintering habitat.  
10 The near-term effects of other conservation actions would remove 5,826 acres of modeled habitat,  
11 and therefore require 11,652 acres of protection of mountain plover habitat using the same typical  
12 NEPA and CEQA ratio (2:1 for protection).

13 The BDCP has committed to near-term goals of protecting 2,000 acres and restoring 1,140 acres of  
14 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of  
15 alkali seasonal wetland complex, and protecting 15,400 acres of non-rice cultivated lands (Table 3-4  
16 in Chapter 3, *Description of Alternatives*). These conservation actions are associated with CM3, CM8,  
17 and CM9 and would occur in the same timeframe as the construction and early restoration losses  
18 thereby avoiding adverse effects of habitat loss on mountain plover wintering in the study area.  
19 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1  
20 and GNC1.2). Grassland protection in CZs 1, 8, and 11 would be associated with vernal pool and  
21 alkali seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a  
22 contiguous matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which  
23 would expand mountain plover wintering habitat and reduce the effects of current levels of habitat  
24 fragmentation. Under *CM11 Natural Communities Enhancement and Management*, insect prey  
25 populations would be increased on protected lands, enhancing the foraging value of these natural  
26 communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4). Cultivated lands that provide habitat  
27 for covered and other native wildlife species would provide approximately 15,400 acres of potential  
28 wintering habitat for mountain plover (Objective CLNC1.1). Approximately 87% of cultivated lands  
29 protected by the late long-term time period would be in alfalfa and pasture crop types (very high-  
30 and high-value crop types for Swainson's hawk (Objective SH1.2) which are also modeled habitat for  
31 wintering mountain plover. This biological objective provides an estimate for the high proportion of  
32 cultivated lands protected in the near-term time period which would be suitable for mountain  
33 plover.

34 The combined acres of restoration and protection of 3,660 acres of grassland, vernal pool complex,  
35 and alkali seasonal wetland contained in the near-term Plan goals and the additional detail in the  
36 biological objectives satisfy the typical mitigation that would be applied to the project-level effects of  
37 CM1. However, some portion of the 15,400 acres of cultivated lands protected in the near-term  
38 timeframe would need to include suitable crop types for these species in order to avoid the adverse  
39 effect of habitat loss resulting from CM1. The conservation commitment is 7,572 acres short of  
40 meeting the compensation for other near-term effects on mountain plover habitat. Mitigation  
41 Measure BIO-125, *Compensate for the Near-Term Loss of Mountain Plover Wintering Habitat*, would  
42 be available to address the adverse effect of near-term high-value habitat loss by providing crop  
43 management requirements for CM1 compensation and requiring acreage compensation for the  
44 other near-term effects.

1 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*  
2 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*  
3 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
4 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
5 *Material, and AMM7 Barge Operations Plan. All of these AMMs include elements that would avoid or*  
6 *minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are*  
7 *described in detail in BDCP Appendix 3.C, Avoidance and Minimization Measures.*

### 8 **Late Long-Term Timeframe**

9 Based on the habitat model, the study area supports approximately 269,411 acres of potential  
10 habitat for mountain plover. Alternative 1C as a whole would result in the permanent loss of and  
11 temporary effects on 33,688 acres of modeled mountain plover wintering habitat during the term of  
12 the Plan (13% of the total habitat in the study area). The locations of these losses are described  
13 above in the analyses of individual conservation measures. The Plan includes conservation  
14 commitments through *CM3 Natural Communities Protection and Restoration, CM8 Grassland Natural*  
15 *Community Restoration, and CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration* to  
16 protect 8,000 acres and restore 2,000 acres of grassland natural community, protect 600 acres of  
17 vernal pool complex, protect 150 acres of alkali seasonal wetland complex and protect 48,625 acres  
18 of cultivated lands that provide suitable habitat for native wildlife species (Table 3-4 in Chapter 3).  
19 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1  
20 and GNC1.2). Grassland protection in CZs 1, 8, and 11 would be associated with vernal pool and  
21 alkali seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a  
22 contiguous matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which  
23 would expand habitat for mountain plover and reduce the effects of current levels of habitat  
24 fragmentation. Under *CM11 Natural Communities Enhancement and Management*, insect prey  
25 populations would be increased on protected lands, enhancing the foraging value of these natural  
26 communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4). Cultivated lands that provide habitat  
27 for covered and other native wildlife species would provide approximately 15,400 acres of potential  
28 wintering habitat for mountain plover (Objective CLNC1.1). Approximately 42,275 acres of  
29 cultivated lands protected would be in alfalfa and pasture crop types (very high- and high-value crop  
30 types for Swainson's hawk (Objective SH1.2) which would also provide potential wintering habitat  
31 for mountain plover. The Plan also includes commitments to implement *AMM1 Worker Awareness*  
32 *Training, AMM2 Construction Best Management Practices and Monitoring, AMM3 Stormwater*  
33 *Pollution Prevention Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention,*  
34 *Containment, and Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel*  
35 *Material, and Dredged Material, and AMM7 Barge Operations Plan. All of these AMMs include*  
36 *elements that would avoid or minimize the risk of affecting individuals and species habitats adjacent*  
37 *to work areas. The AMMs are described in detail in BDCP Appendix 3.C, Avoidance and Minimization*  
38 *Measures.*

39 **NEPA Effects:** The loss of mountain plover habitat and potential for mortality of this special-status  
40 species under Alternative 1C would represent an adverse effect in the absence of other conservation  
41 actions. With habitat protection and restoration associated with CM3, CM8, CM9, and CM11, guided  
42 by biological goals and objectives and by AMM1–AMM7, which would be in place throughout the  
43 construction period, and with implementation of Mitigation Measure BIO-125, *Compensate for the*  
44 *Near-Term Loss of Mountain Plover Wintering Habitat*, the effects of habitat loss and potential for  
45 direct mortality on mountain plover under Alternative 1C would not be adverse.

1 **CEQA Conclusion:**

2 **Near-Term Timeframe**

3 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
4 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
5 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
6 effects of construction would be less than significant under CEQA. Alternative 1C would remove  
7 12,372 acres (8,246 acres permanent, 4,126 acres temporary) of modeled mountain plover  
8 wintering habitat in the study area in the near-term. These effects would result from the  
9 construction of the water conveyance facilities (CM1, 6,546 acres), and implementing other  
10 conservation measures (*CM2 Yolo Bypass Fisheries Enhancement, CM4 Tidal Natural Communities*  
11 *Restoration, CM7 Riparian Natural Community Restoration, CM8 Grassland Natural Community*  
12 *Restoration, CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration, CM11 Natural*  
13 *Communities Enhancement and Management and CM18 Conservation Hatcheries—5,826 acres).*

14 The typical NEPA and CEQA project-level mitigation ratio for those natural communities affected  
15 would be 2:1 for protection of habitat. Using this ratio would indicate that 13,092 acres should be  
16 protected to compensate for the CM1 losses of 6,546 acres of mountain plover wintering habitat.  
17 The near-term effects of other conservation actions would remove 5,826 acres of modeled habitat,  
18 and therefore require 11,652 acres of protection of mountain plover habitat using the same typical  
19 NEPA and CEQA ratio (2:1 for protection).

20 The BDCP has committed to near-term goals of protecting 2,000 acres and restoring 1,140 acres of  
21 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of  
22 alkali seasonal wetland complex, and protecting 15,400 acres of non-rice cultivated lands (Table 3-4  
23 in Chapter 3). These conservation actions are associated with CM3, CM8, and CM9 and would occur  
24 in the same timeframe as the construction and early restoration losses thereby avoiding significant  
25 impacts of habitat loss on mountain plover. Grassland restoration and protection would occur in CZs  
26 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1 and GNC1.2). Grassland protection in CZs 1, 8, and 11  
27 would be associated with vernal pool and alkali seasonal wetland complexes (Objectives ASWNC1.1  
28 and VPNC1.1) and would result in a contiguous matrix of grassland, alkali seasonal wetland, and  
29 vernal pool natural communities which would expand wintering habitat for mountain plover and  
30 reduce the effects of current levels of habitat fragmentation. Under *CM11 Natural Communities*  
31 *Enhancement and Management*, insect prey populations would be increased on protected lands,  
32 enhancing the foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and  
33 GNC2.4). Cultivated lands that provide habitat for covered and other native wildlife species would  
34 provide approximately 15,400 acres of potential wintering habitat for mountain plover (Objective  
35 CLNC1.1). Approximately 87% of cultivated lands protected by the late long-term time period would  
36 be in alfalfa and pasture crop types (very high- and high-value crop types for Swainson's hawk  
37 (Objective SH1.2) which would also provide potential habitat for mountain plover wintering in the  
38 study area. This biological objective provides an estimate for the high proportion of cultivated lands  
39 protected in the near-term time period which would provide habitat for mountain plover.

40 The combined acres of restoration and protection of 3,660 acres of grassland, vernal pool complex,  
41 and alkali seasonal wetland contained in the near-term Plan goals and the additional detail in the  
42 biological objectives satisfy the typical mitigation that would be applied to the project-level effects of  
43 CM1. However, some portion of the 15,400 acres of cultivated lands protected in the near-term  
44 timeframe would need to include suitable crop types for these species in order to avoid the

1 significant impact of habitat loss resulting from CM1. The conservation commitment is 7,572 acres  
2 short of meeting the compensation for other near-term effects on mountain plover habitat.  
3 Implementation of Mitigation Measure BIO-125, *Compensate for the Near-Term Loss of Mountain*  
4 *Plover Wintering Habitat*, would reduce the impacts of near-term habitat loss to a less-than-  
5 significant level.

6 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
7 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
8 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
9 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
10 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
11 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
12 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

### 13 **Late Long-Term Timeframe**

14 Alternative 1C as a whole would result in the permanent loss of and temporary effects on 33,688  
15 acres of mountain plover habitat during the term of the Plan (13% of the total habitat in the study  
16 area). The locations of these losses are described above in the analyses of individual conservation  
17 measures. The Plan includes conservation commitments through *CM3 Natural Communities*  
18 *Protection and Restoration*, *CM8 Grassland Natural Community Restoration*, and *CM9 Vernal Pool and*  
19 *Alkali Seasonal Wetland Complex Restoration* to protect 8,000 acres and restore 2,000 acres of  
20 grassland natural community, protect 600 acres of vernal pool complex, protect 150 acres of alkali  
21 seasonal wetland complex and protect 48,625 acres of cultivated lands that provide suitable habitat  
22 for native wildlife species (Table 3-4 in Chapter 3). Grassland restoration and protection would  
23 occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1 and GNC1.2). Grassland protection in CZs 1, 8,  
24 and 11 would be associated with vernal pool and alkali seasonal wetland complexes (Objectives  
25 ASWNC1.1 and VPNC1.1) and would result in a contiguous matrix of grassland, alkali seasonal  
26 wetland, and vernal pool natural communities which would expand wintering habitat for mountain  
27 plover and reduce the effects of current levels of habitat fragmentation. Under *CM11 Natural*  
28 *Communities Enhancement and Management*, insect prey populations would be increased on  
29 protected lands, enhancing the foraging value of these natural communities (Objectives ASWNC2.4,  
30 VPNC2.5, and GNC2.4). Cultivated lands that provide habitat for covered and other native wildlife  
31 species would provide approximately 15,400 acres of potential habitat for mountain plover  
32 (Objective CLNC1.1). Approximately 42,275 acres of cultivated lands protected would be in alfalfa  
33 and pasture crop types (very high- and high-value crop types for Swainson's hawk under Objective  
34 SH1.2) which would also provide habitat for mountain plover.

35 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
36 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
37 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
38 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
39 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
40 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
41 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

42 Considering Alternative 1C's protection and restoration provisions, which would provide acreages  
43 of new high-value or enhanced habitat in amounts suitable to compensate for habitats lost to  
44 construction and restoration activities, and with the implementation of AMM1-AMM7, and  
45 Mitigation Measure BIO-125, *Compensate for the Near-Term Loss of Mountain Plover Wintering*

1 *Habitat*, the loss of habitat or direct mortality through implementation of Alternative 1C would not  
2 result in a substantial adverse effect through habitat modifications and would not substantially  
3 reduce the number or restrict the range of mountain plover. Therefore, the loss of habitat or  
4 potential mortality under this alternative would have a less-than-significant impact on mountain  
5 plover.

6 **Mitigation Measure BIO-125: Compensate for the Near-Term Loss of Mountain Plover**  
7 **Wintering Habitat**

8 DWR will manage and protect sufficient acres of cultivated lands such as pasture, grain and hay  
9 crops, or alfalfa to provide habitat for mountain plover such that the total acres of high-value  
10 habitat impacted in the near-term timeframe are mitigated at a ratio of 2:1. Additional grassland  
11 protection, enhancement, and management may be substituted for the protection of high-value  
12 cultivated lands.

13 **Impact BIO-126: Effects on Mountain Plover Associated with Electrical Transmission**  
14 **Facilities**

15 The transmission corridor in the western tail of the study area as it is currently designed, would  
16 consist of a permanent 230 kV transmission line parallel to Flannery Road, which is an important  
17 wintering area for mountain plover. Mountain plovers use the grasslands, pastures, and recently  
18 plowed fields in this area for foraging during winter months. Existing transmission lines in the  
19 western tail include two 500 kV lines that intersect Canright Road, in addition to a 500 kV line and a  
20 230 kV line that intersect Lambie Road at the western end of the study area. New transmission lines  
21 would increase the risk for bird-power line strikes and/or electrocution, which could result in injury  
22 or mortality of mountain plover. However, mountain plover mortality from powerline strikes is  
23 unlikely due to the species' flight patterns. The risk for bird-power line strikes, and/or electrocution  
24 is therefore not expected to have an adverse effect on mountain plover.

25 **NEPA Effects:** New transmission lines are not expected to have an adverse effect on mountain plover  
26 because mortality from powerline strikes would be expected to be low based on the species' flight  
27 patterns.

28 **CEQA Conclusion:** New transmission lines would have a less-than-significant impact on mountain  
29 plover because mortality from powerline strikes would be expected to be low based on the species'  
30 flight patterns.

31 **Impact BIO-127: Indirect Effects of Plan Implementation on Mountain Plover**

32 Construction- and subsequent maintenance-related noise and visual disturbances could disrupt  
33 foraging, and reduce the functions of suitable foraging habitat for mountain plover. Construction  
34 noise above background noise levels (greater than 50 dBA) could extend 1,900 to 5,250 feet from  
35 the edge of construction activities (BDCP Appendix 5.J, Attachment 5J.D, *Indirect Effects of the*  
36 *Construction of the BDCP Conveyance Facility on Sandhill Crane*, Table 4), although there are no  
37 available data to determine the extent to which these noise levels could affect mountain plover.  
38 Indirect effects associated with construction include noise, dust, and visual disturbance caused by  
39 grading, filling, contouring, and other ground-disturbing operations. The use of mechanical  
40 equipment during water conveyance facilities construction could cause the accidental release of  
41 petroleum or other contaminants that could affect these species or their prey in the surrounding  
42 habitat. AMM1-AMM7, including *AMM2 Construction Best Management Practices and Monitoring*,

1 would minimize the likelihood of such spills from occurring. The inadvertent discharge of sediment  
2 or excessive dust adjacent to mountain plover grassland habitat could also have a negative effect on  
3 the species. However, AMM1–AMM7 would also ensure that measures would be in place to prevent  
4 runoff from the construction area and the negative effects of dust on wildlife adjacent to work areas.

5 **NEPA Effects:** Indirect effects on mountain plover as a result of Alternative 1C implementation could  
6 have adverse effects on the species through the modification of habitat. With the implementation of  
7 AMM1–AMM7, indirect effects as a result of Alternative 1C implementation would not have an  
8 adverse effect mountain plover.

9 **CEQA Conclusion:** Indirect effects on mountain plover as a result of Alternative 1C implementation  
10 could have a significant impact on the species from modification of habitat. With the implementation  
11 of AMM1–AMM7, indirect effects as a result of Alternative 1C implementation would have a less-  
12 than-significant impact on mountain plover.

### 13 **Impact BIO-128: Periodic Effects of Inundation on Mountain Plover as a Result of** 14 **Implementation of Conservation Components**

15 Flooding of the Yolo Bypass from Fremont Weir operations (*CM2 Yolo Bypass Fisheries*  
16 *Enhancement*) would increase the frequency and duration of inundation on approximately 1,884-  
17 3,813 acres of modeled mountain plover foraging habitat (Table 12-1C-47).

18 Based on hypothetical footprints, implementation of *CM5 Seasonally Inundated Floodplain*  
19 *Restoration* could result in the periodic inundation of up to approximately 7,082 acres of modeled  
20 habitat (Table 12-1C-47). Periodic inundation from CM2 and CM5 would not have an adverse effect  
21 on mountain plover because birds would be expected to move to adjacent foraging habitat.

22 **NEPA Effects:** Implementation of CM2 and CM5 would periodically inundate suitable mountain  
23 plover foraging habitat. However, periodic inundation would not have an adverse effect on  
24 mountain plover because birds would be expected to move to adjacent foraging habitat.

25 **CEQA Conclusion:** Implementation of CM2 and CM5 would periodically inundate suitable mountain  
26 plover foraging habitat. However, periodic inundation would have a less-than-significant impact on  
27 mountain plover because birds would be expected to move to adjacent foraging habitat.

### 28 **Black Tern**

29 This section describes the effects of Alternative 1C, including water conveyance facilities  
30 construction and implementation of other conservation components, on black tern. Modeled nesting  
31 habitat for black tern in the study area is currently limited to rice in CZ 2.

32 Construction and restoration associated with Alternative 1C conservation measures would result in  
33 both temporary and permanent losses of modeled habitat for black tern as indicated in Table 12-1C-  
34 48. Full implementation of Alternative 1C would include the following biological objectives over the  
35 term of the BDCP which would also benefit the black tern (BDCP Chapter 3, *Conservation Strategy*).

- 36 ● Protect 700 acres of cultivated lands, with at least 500 acres consisting of rice land, to expand  
37 upon and buffer newly restored/created nontidal perennial habitat in CZ 2, (Objective GGS2.3,  
38 associated with CM3).
- 39 ● Protect up to 1,700 acres of rice land or equivalent habitat (e.g. perennial wetland) in the Yolo  
40 Bypass if this portion meets the criteria specified in CM3, *Reserve Design Requirements by Species*

1 for giant garter snake. Any remaining acreage (from a total 2,740 acre commitment) will consist  
2 of rice land or equivalent-value habitat outside the Yolo Bypass in CZs 1, 2, 4, or 5 (Objective  
3 GGS3.1, associated with CM3).

4 As explained below, with the restoration and protection of these amounts of habitat, in addition to  
5 management activities that would enhance this habitat for the species, implementation of AMM1–  
6 AMM7, and Mitigation Measure BIO-75, impacts on black tern would not be adverse for NEPA  
7 purposes and would be less than significant for CEQA purposes.

8 **Table 12-1C-48. Changes in Black Tern Modeled Habitat Associated with Alternative 1C (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	Nesting	0	0	0	0	NA	NA
<b>Total Impacts CM1</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>NA</b>	<b>NA</b>
CM2–CM18	Nesting	76	260	0	0	791–1,582	0
<b>Total Impacts CM2–CM18</b>		<b>76</b>	<b>260</b>	<b>0</b>	<b>0</b>	<b>791–1,582</b>	<b>0</b>
<b>TOTAL IMPACTS</b>		<b>76</b>	<b>260</b>	<b>0</b>	<b>0</b>	<b>791–1,582</b>	<b>0</b>

<sup>a</sup> See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

9

10 **Impact BIO-129a: Loss or Conversion of Habitat for and Direct Mortality of Black Tern**

11 Alternative 1C conservation measures would result in the permanent loss of up to 260 acres of  
12 modeled nesting habitat for black tern, consisting of rice in CZ 2 (Table 12-1C-48). Conservation  
13 measures that would result in these losses are grassland restoration (CM8) and nontidal marsh  
14 restoration (CM10). Each of these individual activities is described below. A summary statement of  
15 the combined impacts and NEPA effects, and a CEQA conclusion follows the individual conservation  
16 measure discussions.

- 17 • *CM8 Grassland Natural Community Restoration*: Restoration of grassland is expected to be  
18 implemented on agricultural lands and would result in the conversion of 52 acres of rice lands  
19 to grassland in CZ 2 by the late-long time period. An estimated 30 acres of impact would occur in  
20 the first 10 years.
- 21 • *CM10 Nontidal Marsh Restoration*: Implementation of CM10 would result in the permanent  
22 removal of 208 acres of black tern nesting habitat in in CZ 2. An estimated 46 acres would be  
23 removed in the first 10 years.

- 1       ● *CM11 Natural Communities Enhancement and Management*: A variety of habitat management  
2       actions that are designed to enhance wildlife values in restored or protected habitats could  
3       result in localized ground disturbances that could temporarily remove small amounts of  
4       modeled habitat. Ground-disturbing activities, such as removal of nonnative vegetation and road  
5       and other infrastructure maintenance activities, would be expected to have minor adverse  
6       effects on available habitat and would be expected to result in overall improvements to and  
7       maintenance of habitat values over the term of the BDCP. Habitat management- and  
8       enhancement-related activities could disturb nesting black terns if they were to nest in the  
9       vicinity of a worksite. Equipment operation could destroy nests, and noise and visual  
10      disturbances could lead to their abandonment, resulting in mortality of eggs and nestlings. The  
11      potential for these activities to result in direct mortality of black tern would be minimized with  
12      the implementation of and Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird*  
13      *Surveys and Avoid Disturbance of Nesting Birds*.
- 14      ● **Operations and Maintenance**: Postconstruction operation and maintenance of the restoration  
15      infrastructure could result in ongoing but periodic disturbances that could affect black tern  
16      nesting adjacent to maintenance areas. Maintenance activities would include vegetation  
17      management, levee and structure repair, and re-grading of roads and permanent work areas.  
18      These effects, however, would be reduced by AMM1–AMM7, Mitigation Measure BIO-75, and  
19      conservation actions as described below.
- 20      ● **Injury and Direct Mortality**: Construction-related activities would not be expected to result in  
21      direct mortality of adult or fledged black tern individuals if they were present in the study area,  
22      because they would be expected to avoid contact with construction and other equipment. If  
23      black tern were to nest in the construction area, construction-related activities, including  
24      equipment operation, noise and visual disturbances could destroy nests or lead to their  
25      abandonment, resulting in mortality of eggs and nestlings. These effects would be avoided and  
26      minimized with the implementation of Mitigation Measure BIO-75.
- 27      ● **Late season flooding in the Yolo Bypass** could result in the loss of rice (nesting habitat for black  
28      tern) by precluding the preparation and planting of rice fields. The methods for estimating loss  
29      of rice in the bypass and results are provided in BDCP Appendix 5.J, Attachment 5J.E, *Estimation*  
30      *of BDCP Impact on Giant Garter Snake Summer Foraging Habitat in the Yolo Bypass*. This analysis  
31      concludes that the estimated loss of rice could be up to 1,662 acres by the late long-term  
32      timeframe. This potential impact is further described under Impact BIO-129c below.

33      The following paragraphs summarize the combined effects discussed above and describe other  
34      BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also  
35      included.

### 36      ***Near-Term Timeframe***

37      Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
38      the near-term BDCP conservation strategy has been evaluated to determine whether it would  
39      provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
40      effects of construction would not be adverse under NEPA. There would be no impacts on black tern  
41      nesting habitat resulting from the construction of the water conveyance facilities (CM1). However,  
42      there would be a loss of 76 acres of modeled nesting habitat for black tern in the study area in the  
43      near-term. These effects would result from implementing *CM8 Grassland Restoration* and *CM10*  
44      *Nontidal Marsh Restoration*.

1 The typical NEPA and CEQA project-level mitigation ratio would be 1:1 protection for the loss of  
2 cultivated lands including rice. Using this ratio would indicate that 76 acres of rice lands should be  
3 protected in CZ 2 to compensate for the losses of black tern nesting habitat.

4 The BDCP has committed to near-term goals of protecting 200 acres of rice and 700 acres of rice or  
5 equivalent habitat (Table 3-4 in Chapter 3, *Description of Alternatives*). These conservation actions  
6 are associated with CM3 and would occur in the same timeframe as the early restoration losses. The  
7 BDCP also contains objectives for the giant garter snake to protect at least 500 acres of rice in CZ 2  
8 and to protect up to 1,700 acres of rice land or equivalent habitat in the Yolo Bypass (if this portion  
9 meets the criteria specified in CM3, *Reserve Design Requirements by Species* for giant garter snake,  
10 Objectives GGS2.3 and GGS3.1) by the late long-term time period. These objectives would inform the  
11 near-term protection actions, and therefore some portion of the 200 acres of rice and 700 acres of  
12 rice or equivalent habitat would be expected to be restored in CZ 2. However, there is no near-term  
13 acreage commitment in the plan that is specific to CZ 2. In order to avoid an adverse effect on black  
14 tern from habitat loss, protection of 76 acres of rice would need to occur in CZ 2 in the near-term  
15 timeframe. Mitigation Measure BIO-129a, *Compensate for Loss of Black Tern Nesting Habitat*, would  
16 be available to address this adverse effect.

17 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
18 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
19 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
20 *Countermeasure Plan*, and *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
21 *Material*. All of these AMMs include elements that would avoid or minimize the risk of affecting  
22 individuals and species habitats adjacent to work areas. The AMMs are described in detail in BDCP  
23 Appendix 3.C, *Avoidance and Minimization Measures*. Black tern is not a covered species under the  
24 BDCP. For the BDCP to avoid an adverse effect on individuals, preconstruction surveys for  
25 noncovered avian species would be required to ensure that nests are detected and avoided.  
26 Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of*  
27 *Nesting Birds*, would be available to address this adverse effect.

### 28 **Late Long-Term Timeframe**

29 Alternative 1C as a whole would result in the permanent loss of 260 acres of modeled black tern  
30 nesting habitat during the term of the Plan. This impact would result from the removal of rice in CZ  
31 2. The Plan includes conservation commitments through *CM3 Natural Communities Protection and*  
32 *Restoration* to protect 500 acres of rice lands (Table 3-4 in Chapter 3) and up to 1,700 acres of rice  
33 lands or equivalent habitat for the giant garter snake (Objective GGS3.1) in CZ 2. The nesting habitat  
34 for black tern in the northern part of the study area has largely been reduced to rice lands, and these  
35 acres would provide protected nesting habitat for the species.

36 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
37 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
38 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
39 *Countermeasure Plan*, and *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
40 *Material*. All of these AMMs include elements that would avoid or minimize the risk of affecting  
41 individuals and species habitats adjacent to work areas. The AMMs are described in detail in BDCP  
42 Appendix 3.C, *Avoidance and Minimization Measures*. Black tern is not a covered species under the  
43 BDCP. For the BDCP to avoid an adverse effect on individuals, preconstruction surveys for  
44 noncovered avian species would be required to ensure that nests are detected and avoided.

1 Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of*  
2 *Nesting Birds*, would be available to address this adverse effect.

3 **NEPA Effects:** The loss of black tern nesting habitat and potential for mortality of this special-status  
4 species under Alternative 1C would represent an adverse effect in the absence of other conservation  
5 actions. With habitat protection associated with CM3, guided by biological goals and objectives and  
6 AMM1–AMM6, which would be in place throughout the construction period, the effects of habitat  
7 loss on black tern under Alternative 1C would not be adverse. Black tern is not a covered species  
8 under the BDCP, and the potential for mortality would be an adverse effect without preconstruction  
9 surveys to ensure that nests are detected and avoided. Mitigation Measure BIO-75, *Conduct*  
10 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to  
11 address this adverse effect.

12 **CEQA Conclusion:**

13 **Near-Term Timeframe**

14 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
15 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
16 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
17 effects of construction would be less than significant under CEQA. There would be no impacts on  
18 black tern nesting habitat resulting from the construction of the water conveyance facilities (CM1).  
19 However, there would be a loss of 76 acres of modeled nesting habitat for black tern in the study  
20 area in the near-term. These effects would result from implementing *CM8 Grassland Restoration* and  
21 *CM10 Nontidal Marsh Restoration*.

22 The typical NEPA and CEQA project-level mitigation ratio would be 1:1 protection for the loss of  
23 cultivated lands including rice. Using this ratio would indicate that 76 acres of rice lands should be  
24 protected in CZ 2 to mitigate the losses of black tern nesting habitat.

25 The BDCP has committed to near-term goals of protecting 200 acres of rice and 700 acres of rice or  
26 equivalent habitat (Table 3-4 in Chapter 3). These conservation actions are associated with CM3 and  
27 would occur in the same timeframe as the early restoration losses. The BDCP also contains  
28 objectives for the giant garter snake to protect at least 500 acres of rice in CZ 2 and to protect up to  
29 1,700 acres of rice land or equivalent habitat in the Yolo Bypass (if this portion meets the criteria  
30 specified in CM3, *Reserve Design Requirements by Species* for giant garter snake, Objectives GGS2.3  
31 and GGS 3.1) by the late long-term time period. These objectives would inform the near-term  
32 protection actions, and therefore some portion of the 200 acres of rice and 700 acres of rice or  
33 equivalent habitat would be expected to be restored in CZ 2. However, there is no near-term acreage  
34 commitment in the plan that is specific to CZ 2. Mitigation Measure BIO-129a, *Compensate for Loss of*  
35 *Black Tern Nesting Habitat*, which would require 1:1 protection of habitat in CZ 2 in the near-term  
36 timeframe, would reduce this potential impact to a less-than-significant level.

37 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
38 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
39 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
40 *Countermeasure Plan*, and *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
41 *Material*. All of these AMMs include elements that would avoid or minimize the risk of affecting  
42 individuals and species habitats adjacent to work areas. The AMMs are described in detail in BDCP  
43 Appendix 3.C, *Avoidance and Minimization Measures*. Black tern is not a covered species under the

1 BDCP. For the BDCP to have a less-than-significant impact on individuals, preconstruction would be  
2 required to ensure that nests are detected and avoided. Implementation of Mitigation Measure BIO-  
3 75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would  
4 reduce the potential impact on nesting black tern to a less-than-significant level.

#### 5 **Late Long-Term Timeframe**

6 Alternative 1C as a whole would result in the permanent loss of 260 acres of modeled black tern  
7 nesting habitat during the term of the Plan. This impact would result from the removal of rice in CZ  
8 2. The Plan includes conservation commitments through *CM3 Natural Communities Protection and*  
9 *Restoration* to protect 500 acres of rice lands (Table 3-4 in Chapter 3) and up to 1,700 acres of rice  
10 lands or equivalent habitat for the giant garter snake (Objective GGS3.1) in CZ 2.

11 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
12 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
13 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
14 *Countermeasure Plan*, and *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
15 *Material*. All of these AMMs include elements that would avoid or minimize the risk of affecting  
16 individuals and species habitats adjacent to work areas. The AMMs are described in detail in BDCP  
17 Appendix 3.C, *Avoidance and Minimization Measures*. Black tern is not a covered species under the  
18 BDCP. For the BDCP to avoid a significant impact on individuals, preconstruction surveys for  
19 noncovered avian species would be required to ensure that nests are detected and avoided.  
20 Implementation of Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and*  
21 *Avoid Disturbance of Nesting Birds*, reduce the potential impact on nesting black tern to a less-than-  
22 significant level.

23 Considering Alternative 1C's protection provisions, which would provide acreages of new or  
24 enhanced habitat in amounts greater than necessary to compensate for habitats lost to construction  
25 and restoration activities, loss of habitat or direct mortality through implementation of Alternative  
26 1C would not result in a substantial adverse effect through habitat modifications and would not  
27 substantially reduce the number or restrict the range of the species. Therefore, the alternative  
28 would have a less-than-significant impact on black tern.

#### 29 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid** 30 **Disturbance of Nesting Birds**

31 See Mitigation Measure BIO-75 under Impact BIO-75.

#### 32 **Mitigation Measure BIO-129a: Compensate for Loss of Black Tern Nesting Habitat**

33 Because there is no near-term acreage commitment associated with the protection of rice in CZ  
34 2, BDCP proponents must protect rice at a 1:1 ratio for each acre of rice impacted in CZ 2.

#### 35 **Impact BIO-129b: Indirect Effects of Plan Implementation on Black Tern**

36 Construction noise above background noise levels (greater than 50 dBA) could extend 1,900 to  
37 5,250 feet from the edge of construction activities (BDCP Appendix 5.J, Attachment 5J.D, *Indirect*  
38 *Effects of the Construction of the BDCP Conveyance Facility on Sandhill Crane*, Table 4), although there  
39 are no available data to determine the extent to which these noise levels could affect black tern. If  
40 black terns were to nest in or adjacent to work areas, construction and subsequent maintenance-  
41 related noise and visual disturbances could mask calls, disrupt foraging and nesting behaviors, and

1 reduce the functions of suitable nesting habitat for these species. Mitigation Measure BIO-75,  
2 *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would avoid  
3 the potential for adverse effects of construction-related activities on survival and productivity of  
4 nesting black terns. The use of mechanical equipment during restoration activities could cause the  
5 accidental release of petroleum or other contaminants that could affect black terns in the  
6 surrounding habitat. The inadvertent discharge of sediment or excessive dust adjacent to suitable  
7 habitat could also have an adverse effect on these species. AMM1–AMM7, including *AMM2*  
8 *Construction Best Management Practices and Monitoring*, would minimize the likelihood of such  
9 spills and ensure that measures are in place to prevent runoff from the construction area and  
10 negative effects of dust on active nests.

11 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in  
12 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,  
13 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,  
14 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz  
15 2009). The effect of selenium toxicity differs widely between species and also between age and sex  
16 classes within a species. In addition, the effect of selenium on a species can be confounded by  
17 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith  
18 2009).

19 The primary source of selenium bioaccumulation in birds is through their diet (Ackerman and  
20 Eagles-Smith 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the  
21 trophic level at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At  
22 Kesterson Reservoir in the San Joaquin Valley, selenium concentrations in invertebrates have been  
23 found to be two to six times the levels in rooted plants. Furthermore, bivalves sampled in the San  
24 Francisco Bay contained much higher selenium levels than crustaceans such as copepods (Stewart et  
25 al. 2004). Studies conducted at the Grasslands in Merced County recorded higher selenium levels in  
26 black-necked stilts which feed on aquatic invertebrates than in mallards and pintails, which are  
27 primarily herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which  
28 forage on bivalves) have much higher levels of selenium levels than shorebirds that prey on aquatic  
29 invertebrates (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high  
30 levels of selenium have a higher risk of selenium toxicity.

31 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations  
32 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to  
33 exacerbate bioaccumulation of selenium in avian species, including black tern. Marsh (tidal and  
34 nontidal) and floodplain restoration have the potential to mobilize selenium, and therefore increase  
35 avian exposure from ingestion of prey items with elevated selenium levels. Thus, BDCP restoration  
36 activities that create newly inundated areas could increase bioavailability of selenium (see BDCP  
37 Chapter 3, *Conservation Strategy*, for details of restoration). Changes in selenium concentrations  
38 were analyzed in Chapter 8, *Water Quality*, and it was determined that, relative to Existing  
39 Conditions and the No Action Alternative, CM1 would not result in substantial, long-term increases  
40 in selenium concentrations in water in the Delta under any alternative. However, it is difficult to  
41 determine whether the effects of potential increases in selenium bioavailability associated with  
42 restoration-related conservation measures (CM4 and CM5) would lead to adverse effects on black  
43 tern.

44 Because of the uncertainty that exists at this programmatic level of review, there could be an effect  
45 on black tern from increases in selenium associated with restoration activities. This effect would be

1 addressed through the implementation of *AMM27 Selenium Management* (BDCP Appendix 3.C,  
2 *Avoidance and Minimization Measures*) which would provide specific tidal habitat restoration design  
3 elements to reduce the potential for bioaccumulation of selenium and its bioavailability in tidal  
4 habitats. Furthermore, the effectiveness of selenium management to reduce selenium  
5 concentrations and/or bioaccumulation would be evaluated separately for each restoration effort as  
6 part of design and implementation. This avoidance and minimization measure would be  
7 implemented as part of the tidal habitat restoration design schedule.

8 **NEPA Effects:** Noise and visual disturbances from the construction of conservation components  
9 could black tern use of modeled habitat adjacent to work areas. Moreover, the use of mechanical  
10 equipment for the construction of conservation components could cause the accidental release of  
11 petroleum or other contaminants, or the inadvertent discharge of sediment or excess dust adjacent  
12 to suitable habitat. AMM1–AMM7, and Mitigation Measure BIO-75, *Conduct Preconstruction Nesting*  
13 *Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to address adverse effects on  
14 nesting individuals. Tidal habitat restoration could result in increased exposure of black tern to  
15 selenium. This effect would be addressed through the implementation of *AMM27 Selenium*  
16 *Management* which would provide specific tidal habitat restoration design elements to reduce the  
17 potential for bioaccumulation of selenium and its bioavailability in tidal habitats.

18 **CEQA Conclusion:** Noise and visual disturbances from the construction of conservation components  
19 could black tern use of modeled habitat adjacent to work areas. Moreover, the use of mechanical  
20 equipment for the construction of conservation components could cause the accidental release of  
21 petroleum or other contaminants, or the inadvertent discharge of sediment or excess dust adjacent  
22 to suitable habitat. AMM1–AMM7, and Mitigation Measure BIO-75, *Conduct Preconstruction Nesting*  
23 *Bird Surveys and Avoid Disturbance of Nesting Birds*, would reduce these impacts to a less-than-  
24 significant level. Tidal habitat restoration could result in increased exposure of black tern to  
25 selenium. This effect would be addressed through the implementation of *AMM27 Selenium*  
26 *Management* which would provide specific tidal habitat restoration design elements to reduce the  
27 potential for bioaccumulation of selenium and its bioavailability in tidal habitats.

### 28 **Impact BIO-129c: Periodic Effects of Inundation on Black Tern Nesting Habitat as a Result of** 29 **Construction Implementation of Conservation Components**

30 Flooding of the Yolo Bypass would inundate 791–1,582 acres of suitable black tern nesting habitat  
31 (land currently managed as rice in CZ 2). Inundation would occur during the nonbreeding season  
32 but could reduce the availability of nesting habitat during years that flooding extends into the  
33 nesting season (past March). Extended inundation of the Yolo Bypass would not be expected to  
34 affect black tern nesting habitat. However, if periodic inundation took land out of rice production,  
35 this could have an adverse effect on black tern nesting habitat. Late season flooding in the Yolo  
36 Bypass could result in the loss of rice (nesting habitat for black tern) by precluding the preparation  
37 and planting of rice fields. The methods for estimating loss of rice in the bypass and results are  
38 provided in BDCP Appendix 5.J, Attachment 5J.E, *Estimation of BDCP Impact on Giant Garter Snake*  
39 *Summer Foraging Habitat in the Yolo Bypass*. This analysis concludes that the estimated loss of rice  
40 could be up to 1,662 acres by the late long-term timeframe. The BDCP has committed to protect,  
41 restore and/or create up to 1,700 acres of rice in the Yolo Bypass (Objective GGS3.1). These acres of  
42 rice would be protected in areas that are less susceptible to inundation, which would benefit the  
43 black tern during years in which the magnitude and duration of inundation were increased.

1 **NEPA Effects:** Flooding of the Yolo Bypass is not expected to adversely affect nesting habitat for  
2 black tern. However, if flooding were to extend into the nesting season or were to significantly  
3 reduce rice production it could also reduce suitable black tern nesting habitat. This potential effect  
4 would not be adverse with the creation and/or protection of 1,700 acres of rice in CZ 2 under  
5 Objective GGS3.1.

6 **CEQA Conclusion:** Flooding of the Yolo Bypass is not expected to have a significant impact on  
7 nesting habitat for black tern. However, if flooding were to extend into the nesting season or were to  
8 significantly reduce rice production it could also reduce suitable black tern nesting habitat. This  
9 potential impact would be reduced to a less-than-significant level by the creation and/or protection  
10 of 1,700 acres of rice in CZ 2 under Objective GGS3.1.

### 11 **California Horned Lark and Grasshopper Sparrow**

12 This section describes the effects of Alternative 1C, including water conveyance facilities  
13 construction and implementation of other conservation components, on California horned lark and  
14 grasshopper sparrow. The primary impact of concern for grasshopper sparrow and California  
15 horned lark would be the loss of nesting habitat in the Plan Area, which includes grassland, vernal  
16 pool complex, and alkali seasonal wetland natural communities and selected cultivated lands  
17 including grain and hay crops and pasture. Construction and restoration associated with Alternative  
18 1C conservation measures would result in both temporary and permanent losses of modeled  
19 breeding habitat for California horned lark and grasshopper sparrow as indicated in Table 12-1C-49.

20 would include the following biological objectives over the term of the BDCP which would also  
21 benefit the California horned lark and the grasshopper sparrow (BDCP Chapter 3, *Conservation*  
22 *Strategy*).

- 23 ● Protect at least 8,000 acres of grassland with at least 2,000 acres protected in CZ 1, at least 1,000  
24 acres protected in CZ 8, at least 2,000 acres protected in CZ 11, and the remainder distributed  
25 among CZs 1, 2, 4, 5, 7, 8, and 11 (Objective GNC1.1, associated with CM3).
- 26 ● Restore at least 2,000 acres of grasslands (Objective GNC1.2, associated with CM8).
- 27 ● Protect at least 150 acres of alkali seasonal wetland and at least 600 acres of existing vernal pool  
28 complex in CZs 1, 8, and/or 11 (Objectives ASWNC1.1 and VPNC1.1, associated with CM3).
- 29 ● Protect at least 48,625 acres of cultivated lands that provide suitable habitat for covered and  
30 other native wildlife species (Objective CLNC1.1, associated with CM3).
- 31 ● Within the at least 48,625 acres of protected cultivated lands, protect at least 42,275 acres of  
32 cultivated lands as Swainson's hawk foraging habitat with at least 50% in very high-value  
33 habitat in CZs 2, 3, 4, 5, 7, 8, 9, and 11 (Objective SH1.2, associated with CM3).
- 34 ● Increase prey availability and accessibility for grassland-foraging species (Objectives ASWNC2.4,  
35 VPNC2.5, and GNC2.4, associated with CM11).

36 As explained below, with the restoration or protection of these amounts of habitat, in addition to  
37 management activities that would enhance habitat for these species and the implementation of  
38 AMM1-AMM7 and Mitigation Measure BIO-75, impacts on California horned lark and grasshopper  
39 sparrow would not be adverse for NEPA purposes and would be less than significant for CEQA  
40 purposes.

1 **Table 12-1C-49. Changes in California Horned Lark and Grasshopper Sparrow Modeled Habitat**  
2 **Associated with Alternative 1C (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	Breeding	2,796	2,796	3,750	3,750	NA	NA
<b>Total Impacts CM1</b>		<b>2,796</b>	<b>2,796</b>	<b>3,750</b>	<b>3,750</b>	<b>NA</b>	<b>NA</b>
CM2–CM18	Breeding	5,450	26,198	376	893	1,158–3,650	3,823
<b>Total Impacts CM2–CM18</b>		<b>5,450</b>	<b>26,198</b>	<b>376</b>	<b>893</b>	<b>1,158–3,650</b>	<b>3,823</b>
<b>TOTAL IMPACTS</b>		<b>8,246</b>	<b>28,994</b>	<b>4,126</b>	<b>4,643</b>	<b>1,158–3,650</b>	<b>3,823</b>

<sup>a</sup> See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-130: Loss or Conversion of Habitat for and Direct Mortality of California Horned**  
5 **Lark and Grasshopper Sparrow**

6 Alternative 1C conservation measures would result in the combined permanent and temporary loss  
7 of up to 33,688 acres of modeled nesting habitat for California horned lark and grasshopper sparrow  
8 (of which 28,994 acres would be a permanent loss and 4,643 acres would be a temporary loss of  
9 habitat, Table 12-1C-49). Conservation measures that would result in these losses are conveyance  
10 facilities and transmission line construction, and establishment and use of borrow and spoil areas  
11 (CM1), Yolo Bypass fisheries improvements (CM2), tidal habitat restoration (CM4), floodplain  
12 restoration (CM5), riparian restoration (CM7), grassland restoration (CM8), vernal pool and wetland  
13 restoration (CM9), nontidal marsh restoration (CM10), and construction of conservation hatcheries  
14 (CM18). The majority of habitat loss (20,880 acres) would result from CM4. Habitat enhancement  
15 and management activities (CM11), which include ground disturbance or removal of nonnative  
16 vegetation, and the construction of recreational trails, signs, and facilities, could result in local  
17 adverse habitat effects. In addition, maintenance activities associated with the long-term operation  
18 of the water conveyance facilities and other BDCP physical facilities could degrade or eliminate  
19 California horned lark and grasshopper sparrow modeled habitat. Each of these individual activities  
20 is described below. A summary statement of the combined impacts and NEPA effects, and a CEQA  
21 conclusion follow the individual conservation measure discussions.

- 22 • *CM1 Water Facilities and Operation*: Construction of Alternative 1C conveyance facilities would  
23 result in the combined permanent and temporary loss of up to 6,546 acres of modeled California  
24 horned lark and grasshopper sparrow habitat (2,796 acres of permanent loss, 3,750 acres of  
25 temporary loss) from CZs 1, 3, 5, 6, 8, and 9. The permanent losses would occur at various  
26 locations along the western canal route, at the intake sites along the Sacramento River,

1 construction of the new forebay, and associated RTM storage areas. Both temporary and  
2 permanent losses of foraging habitat would occur from the transmission line corridors west of  
3 the study area and along the tunnel alignment in the west Delta. Grasshopper sparrows were  
4 detected in DHCCP surveys south of Byron Highway in CZ 8 (1 occurrence) and east of Intakes 2  
5 and 3 (6 occurrences), in the Stone Lakes NWR. However, the CM1 footprint does not overlap  
6 with any grasshopper sparrow or California horned lark occurrences. However, Mitigation  
7 Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting*  
8 *Birds*, would require preconstruction surveys and the establishment of no-disturbance buffers  
9 and would be available to address potential effects on California horned larks and grasshopper  
10 sparrows if they were to nest in or adjacent to construction areas. Refer to the Terrestrial  
11 Biology Map Book for a detailed view of Alternative 1C construction locations. Impacts resulting  
12 from CM1 would occur within the first 10 years of Alternative 1C implementation.

- 13 ● *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo bypass fisheries enhancement  
14 would result in the combined permanent and temporary loss of up to 1,274 acres of modeled  
15 California horned lark and grasshopper sparrow habitat (898 acres of permanent loss, 376 acres  
16 of temporary loss) in the Yolo Bypass in CZ 2. Impacted habitat would consist primarily of  
17 grassland and pasture. Most of the grassland losses would occur at the north end of the bypass  
18 below Fremont Weir, along the Toe Drain/Tule Canal, and along the west side channels.  
19 Realignment of Putah Creek could also involve excavation and grading in alkali seasonal wetland  
20 complex habitat as a new channel is constructed. The loss is expected to occur during the first 10  
21 years of Alternative 1C implementation.
- 22 ● *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and  
23 inundation would permanently remove an estimated 20,880 acres of modeled California horned  
24 lark and grasshopper sparrow habitat. The majority of the acres lost would consist of cultivated  
25 lands in CZs 1, 2, 4, 5, 6, and/or 7. Grassland losses would likely occur in the vicinity of Cache  
26 Slough, on Decker Island in the West Delta ROA, on the upslope fringes of Suisun Marsh, and  
27 along narrow bands adjacent to waterways in the South Delta ROA. Tidal restoration would  
28 directly impact and fragment grassland just north of Rio Vista in and around French and  
29 Prospect Islands, and in an area south of Rio Vista around Threemile Slough. Losses of alkali  
30 seasonal wetland complex habitat would likely occur in the south end of the Yolo Bypass and on  
31 the northern fringes of Suisun Marsh.
- 32 ● *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore  
33 seasonally inundated floodplain would permanently and temporarily remove approximately  
34 1,450 acres of modeled California horned lark and grasshopper sparrow nesting habitat (933  
35 permanent, 517 temporary). These losses would be expected after the first 10 years of  
36 Alternative 1C implementation along the San Joaquin River and other major waterways in CZ 7.
- 37 ● *CM7 Riparian Natural Community Restoration*: Riparian restoration would permanently remove  
38 approximately 370 acres of California horned lark and grasshopper sparrow nesting habitat as  
39 part of tidal restoration and 1,489 acres as part of seasonal floodplain restoration.
- 40 ● *CM8 Grassland Natural Community Restoration and CM9 Vernal Pool and Alkali Seasonal Wetland*  
41 *Complex Restoration*: Temporary construction-related disturbance of grassland habitat would  
42 result from implementation of CM8 and CM9 in CZs 1, 2, 4, 5, 7, 8, and 11. However, all areas  
43 would be restored after the construction periods. Grassland restoration would be implemented  
44 on agricultural lands that also provide nesting habitat for California horned lark and

1 grasshopper sparrow and would result in the conversion of 837 acres of cultivated lands to  
2 grassland.

- 3 ● *CM10 Nontidal Marsh Restoration*: Implementation of *CM10 Nontidal Marsh Restoration* would  
4 result in the permanent removal of 705 acres of California horned lark and grasshopper  
5 sparrow nesting habitat.
- 6 ● *CM11 Natural Communities Enhancement and Management*: A variety of habitat management  
7 actions included in CM11 that are designed to enhance wildlife values in restored or protected  
8 habitats could result in localized ground disturbances that could temporarily remove small  
9 amounts of modeled habitat. Ground-disturbing activities, such as removal of nonnative  
10 vegetation and road and other infrastructure maintenance activities, would be expected to have  
11 minor adverse effects on available habitat and would be expected to result in overall  
12 improvements to and maintenance of habitat values over the term of the BDCP. CM11 would  
13 also include the construction of recreational-related facilities including trails, interpretive signs,  
14 and picnic tables (BDCP Chapter 4, *Covered Activities and Associated Federal Actions*). The  
15 construction of trailhead facilities, signs, staging areas, picnic areas, bathrooms, etc. would be  
16 placed on existing, disturbed areas when and where possible. However, approximately 50 acres  
17 of grassland habitat would be lost from the construction of trails and facilities.

18 Habitat management- and enhancement-related activities could disturb California horned lark  
19 and grasshopper sparrow nests. If either species were to nest in the vicinity of a worksite,  
20 equipment operation could destroy nests, and noise and visual disturbances could lead to their  
21 abandonment, resulting in mortality of eggs and nestlings. Mitigation Measure BIO-75, *Conduct*  
22 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available  
23 to address these adverse effects.

- 24 ● *CM18 Conservation Hatcheries*: Implementation of CM18 would remove up to 35 acres of  
25 modeled California horned lark and grasshopper sparrow habitat for the development of a delta  
26 and longfin smelt conservation hatchery in CZ 1.
- 27 ● *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground  
28 water conveyance facilities and restoration infrastructure could result in ongoing but periodic  
29 disturbances that could affect California horned lark and grasshopper sparrow use of the  
30 surrounding habitat. Maintenance activities would include vegetation management, levee and  
31 structure repair, and re-grading of roads and permanent work areas. These effects, however,  
32 would be reduced by AMM1–AMM7, Mitigation Measure BIO-75, and conservation actions as  
33 described below.
- 34 ● *Injury and Direct Mortality*: Construction-related activities would not be expected to result in  
35 direct mortality of adult or fledged California horned lark and grasshopper sparrow if they were  
36 present in the Plan Area, because they would be expected to avoid contact with construction and  
37 other equipment. If either species were to nest in the construction area, construction-related  
38 activities, including equipment operation, noise and visual disturbances could destroy nests or  
39 lead to their abandonment, resulting in mortality of eggs and nestlings. Mitigation Measure BIO-  
40 75 would be available to address these adverse effects.

41 The following paragraphs summarize the combined effects discussed above and describe other  
42 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also  
43 included.

1 **Near-Term Timeframe**

2 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
3 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
4 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
5 effects of construction would not be adverse under NEPA. Alternative 1C would remove 12,372  
6 acres (8,246 acres permanent, 4,126 acres temporary) of modeled breeding habitat for California  
7 horned lark and grasshopper sparrow in the study area in the near-term. These effects would result  
8 from the construction of the water conveyance facilities (CM1, 6,546 acres), and implementing other  
9 conservation measures (*CM2 Yolo Bypass Fisheries Enhancement, CM4 Tidal Natural Communities*  
10 *Restoration, CM7 Riparian Natural Community Restoration, CM8 Grassland Natural Community*  
11 *Restoration, CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration, CM11 Natural*  
12 *Communities Enhancement and Management and CM18 Conservation Hatcheries—5,826 acres).*

13 The typical NEPA and CEQA project-level mitigation ratio for those natural communities affected  
14 would be 2:1 for protection of habitat. Using this ratio would indicate that 13,092 acres should be  
15 protected to compensate for the CM1 losses of 6,546 acres of California horned lark and  
16 grasshopper sparrow habitat. The near-term effects of other conservation actions would remove  
17 5,826 acres of modeled habitat, and therefore require 11,652 acres of protection of California  
18 horned lark and grasshopper sparrow nesting habitat using the same typical NEPA and CEQA ratio  
19 (2:1 for protection).

20 The BDCP has committed to near-term goals of protecting 2,000 acres and restoring 1,140 acres of  
21 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of  
22 alkali seasonal wetland complex, and protecting 15,400 acres of non-rice cultivated lands (Table 3-4  
23 in Chapter 3, *Description of Alternatives*). These conservation actions are associated with CM3, CM8,  
24 and CM9 and would occur in the same timeframe as the construction and early restoration losses  
25 thereby avoiding adverse effects of habitat loss on California horned lark and grasshopper sparrow.  
26 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1  
27 and GNC1.2). Grassland protection in CZs 1, 8, and 11 would be associated with vernal pool and  
28 alkali seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a  
29 contiguous matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which  
30 would expand breeding habitat for California horned lark and grasshopper sparrow and reduce the  
31 effects of current levels of habitat fragmentation. Under *CM11 Natural Communities Enhancement*  
32 *and Management*, insect prey populations would be increased on protected lands, enhancing the  
33 foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4).  
34 Cultivated lands that provide habitat for covered and other native wildlife species would provide  
35 approximately 15,400 acres of potential nesting habitat for California horned lark and grasshopper  
36 sparrow (Objective CLNC1.1). Approximately 87% of cultivated lands protected by the late long-  
37 term time period would be in alfalfa and pasture crop types (very high- and high-value crop types  
38 for Swainson's hawk (Objective SH1.2) which would also provide potential nesting habitat for  
39 California horned lark and grasshopper sparrow. This biological objective provides an estimate for  
40 the high proportion of cultivated lands protected in the near-term time period which would provide  
41 nesting habitat for California horned lark and grasshopper sparrow.

42 The combined acres of restoration and protection of 3,660 acres of grassland, vernal pool complex,  
43 and alkali seasonal wetland contained in the near-term Plan goals and the additional detail in the  
44 biological objectives satisfy the typical mitigation that would be applied to the project-level effects of  
45 CM1. However, some portion of the 15,400 acres of cultivated lands protected in the near-term

1 timeframe would need to include suitable crop types for these species in order to avoid the adverse  
2 effect of habitat loss resulting from CM1. The conservation commitment is 5,684 acres short of  
3 meeting the compensation for other near-term effects on California horned lark and grasshopper  
4 sparrow habitat. Mitigation Measure BIO-130, *Compensate for the Near-Term Loss of California*  
5 *Horned Lark and Grasshopper Sparrow Habitat*, would be available to address the adverse effect of  
6 near-term high-value habitat loss by providing crop management requirements for CM1  
7 compensation and requiring additional acreage compensation for the other near-term effects.

8 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
9 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
10 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
11 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
12 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
13 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
14 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

15 California horned lark and grasshopper sparrow are not covered species under the BDCP. For the  
16 BDCP to avoid an adverse effect on individuals, preconstruction surveys for noncovered avian  
17 species would be required to ensure that nests are detected and avoided. Mitigation Measure BIO-  
18 75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be  
19 available to address this adverse effect.

#### 20 **Late Long-Term Timeframe**

21 Based on the habitat model, the study area supports approximately 269,411 acres of potential  
22 habitat for California horned lark and grasshopper sparrow. Alternative 1C as a whole would result  
23 in the permanent loss of and temporary effects on 33,688 acres of modeled California horned lark  
24 and grasshopper sparrow habitat during the term of the Plan (13% of the total habitat in the study  
25 area). The locations of these losses are described above in the analyses of individual conservation  
26 measures. The Plan includes conservation commitments through *CM3 Natural Communities*  
27 *Protection and Restoration*, *CM8 Grassland Natural Community Restoration*, and *CM9 Vernal Pool and*  
28 *Alkali Seasonal Wetland Complex Restoration* to protect 8,000 acres and restore 2,000 acres of  
29 grassland natural community, protect 600 acres of vernal pool complex, protect 150 acres of alkali  
30 seasonal wetland complex and protect 48,625 acres of cultivated lands that provide suitable habitat  
31 for native wildlife species (Table 3-4 in Chapter 3). Grassland restoration and protection would  
32 occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1 and GNC1.2). Grassland protection in CZs 1, 8,  
33 and 11 would be associated with vernal pool and alkali seasonal wetland complexes (Objectives  
34 ASWNC1.1 and VPNC1.1) and would result in a contiguous matrix of grassland, alkali seasonal  
35 wetland, and vernal pool natural communities which would expand breeding habitat for California  
36 horned lark and grasshopper sparrow and reduce the effects of current levels of habitat  
37 fragmentation. Under *CM11 Natural Communities Enhancement and Management*, insect prey  
38 populations would be increased on protected lands, enhancing the foraging value of these natural  
39 communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4). Cultivated lands that provide habitat  
40 for covered and other native wildlife species would provide approximately 15,400 acres of potential  
41 nesting habitat for California horned lark and grasshopper sparrow (Objective CLNC1.1).  
42 Approximately 42,275 acres of cultivated lands protected would be in alfalfa and pasture crop types.  
43 These are very high- and high-value crop types for Swainson's hawk (Objective SH1.2) and would  
44 provide potential nesting habitat for California horned lark and grasshopper sparrow.

1 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*  
2 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*  
3 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
4 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
5 *Material, and AMM7 Barge Operations Plan. All of these AMMs include elements that would avoid or*  
6 *minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are*  
7 *described in detail in BDCP Appendix 3.C, Avoidance and Minimization Measures. California horned*  
8 *lark and grasshopper sparrow are not covered species under the BDCP. For the BDCP to avoid an*  
9 *adverse effect on individuals, preconstruction surveys for noncovered avian species would be*  
10 *required to ensure that nests are detected and avoided. Mitigation Measure BIO-75, Conduct*  
11 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds, would be available to*  
12 *address this adverse effect.*

13 **NEPA Effects:** The loss of California horned lark and grasshopper sparrow habitat and potential for  
14 mortality of these special-status species under Alternative 1C would represent an adverse effect in  
15 the absence of other conservation actions. With habitat protection and restoration associated with  
16 CM3, CM8, CM9, and CM11, guided by biological goals and objectives and by AMM1–AMM7, which  
17 would be in place throughout the construction period, and with implementation of Mitigation  
18 Measure BIO-130, *Compensate for the Near-Term Loss of California Horned Lark and Grasshopper*  
19 *Sparrow Habitat*, the effects of habitat loss under Alternative 1C on California horned lark and  
20 grasshopper sparrow would not be adverse under NEPA. California horned lark and grasshopper  
21 sparrow are not covered species under the BDCP, and the potential for mortality would be an  
22 adverse effect without preconstruction surveys to ensure that nests are detected and avoided.  
23 Mitigation Measure BIO-75 would be available to address this adverse effect.

24 **CEQA Conclusion:**

25 **Near-Term Timeframe**

26 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
27 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
28 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
29 effects of construction would be less than significant under CEQA. Alternative 1C would remove  
30 13,316 acres (8,412 permanent, 4,904 temporary) of modeled breeding habitat for California  
31 horned lark and grasshopper sparrow in the study area in the near-term. These effects would result  
32 from the construction of the water conveyance facilities (CM1, 7,490 acres), and implementing other  
33 conservation measures (*CM2 Yolo Bypass Fisheries Enhancement, CM4 Tidal Natural Communities*  
34 *Restoration, CM7 Riparian Natural Community Restoration, CM8 Grassland Natural Community*  
35 *Restoration, CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration, CM11 Natural*  
36 *Communities Enhancement and Management and CM18 Conservation Hatcheries—5,826 acres).*

37 The typical NEPA and CEQA project-level mitigation ratio for those natural communities affected  
38 would be 2:1 for protection of habitat. Using this ratio would indicate that 14,980 acres should be  
39 protected to compensate for the CM1 losses of 7,490 acres of California horned lark and  
40 grasshopper sparrow habitat. The near-term effects of other conservation actions would remove  
41 5,826 acres of modeled habitat, and therefore require 11,652 acres of protection of California  
42 horned lark and grasshopper sparrow nesting habitat using the same typical NEPA and CEQA ratio  
43 (2:1 for protection).

1 The BDCP has committed to near-term goals of protecting 2,000 acres and restoring 1,140 acres of  
2 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of  
3 alkali seasonal wetland complex, and protecting 15,400 acres of non-rice cultivated lands (Table 3-4  
4 in Chapter 3). These conservation actions are associated with CM3, CM8, and CM9 and would occur  
5 in the same timeframe as the construction and early restoration losses thereby avoiding significant  
6 impacts on California horned lark and grasshopper sparrow. Grassland restoration and protection  
7 would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1 and GNC1.2). Grassland protection in  
8 CZs 1, 8, and 11 would be associated with vernal pool and alkali seasonal wetland complexes  
9 (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous matrix of grassland, alkali  
10 seasonal wetland, and vernal pool natural communities which would expand breeding habitat for  
11 California horned lark and grasshopper sparrow and reduce the effects of current levels of habitat  
12 fragmentation. Under *CM11 Natural Communities Enhancement and Management*, insect prey  
13 populations would be increased on protected lands, enhancing the foraging value of these natural  
14 communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4). Cultivated lands that provide habitat  
15 for covered and other native wildlife species would provide approximately 15,400 acres of potential  
16 nesting habitat for California horned lark and grasshopper sparrow (Objective CLNC1.1).  
17 Approximately 87% of cultivated lands protected by the late long-term time period would be in  
18 alfalfa and pasture crop types (very high- and high-value crop types for Swainson's hawk (Objective  
19 SH1.2) which would also provide potential nesting habitat for California horned lark and  
20 grasshopper sparrow. This biological objective provides an estimate for the high proportion of  
21 cultivated lands protected in the near-term time period which would provide nesting habitat for  
22 California horned lark and grasshopper sparrow.

23 The combined acres of restoration and protection of 3,660 acres of grassland, vernal pool complex,  
24 and alkali seasonal wetland contained in the near-term Plan goals and the additional detail in the  
25 biological objectives satisfy the typical mitigation that would be applied to the project-level effects of  
26 CM1. However, some portion of the 15,400 acres of cultivated lands protected in the near-term  
27 timeframe would need to include suitable crop types for these species in order to avoid the  
28 significant impact of habitat loss resulting from CM1. The conservation commitment is 5,684 acres  
29 short of meeting the compensation for other near-term effects on California horned lark and  
30 grasshopper sparrow habitat. Mitigation Measure BIO-130, *Compensate for the Near-Term Loss of*  
31 *California Horned Lark and Grasshopper Sparrow Habitat*, would address the impact of near-term  
32 high-value habitat loss by providing crop management requirements for CM1 compensation and  
33 requiring additional acreage compensation for the other near-term effects.

34 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
35 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
36 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
37 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
38 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
39 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
40 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

41 California horned lark and grasshopper sparrow are not covered species under the BDCP. For the  
42 BDCP to avoid an adverse effect on individuals, preconstruction surveys for noncovered avian  
43 species would be required to ensure that nests are detected and avoided. Mitigation Measure BIO-  
44 75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would  
45 reduce this potential impact to a less-than-significant level.

1 **Late Long-Term Timeframe**

2 Alternative 1C as a whole would result in the permanent loss of and temporary effects on 33,688  
3 acres of California horned lark and grasshopper sparrow habitat during the term of the Plan (13% of  
4 the total habitat in the study area). The locations of these losses are described above in the analyses  
5 of individual conservation measures. The locations of these losses are described above in the  
6 analyses of individual conservation measures. The Plan includes conservation commitments  
7 through *CM3 Natural Communities Protection and Restoration*, *CM8 Grassland Natural Community*  
8 *Restoration*, and *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration* to protect 8,000  
9 acres and restore 2,000 acres of grassland natural community, protect 600 acres of vernal pool  
10 complex, protect 150 acres of alkali seasonal wetland complex and protect 48,625 acres of  
11 cultivated lands that provide suitable habitat for native wildlife species (Table 3-4 in Chapter 3).  
12 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1  
13 and GNC1.2). Grassland protection in CZs 1, 8, and 11 would be associated with vernal pool and  
14 alkali seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a  
15 contiguous matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which  
16 would expand breeding habitat for California horned lark and grasshopper sparrow and reduce the  
17 effects of current levels of habitat fragmentation. Under *CM11 Natural Communities Enhancement*  
18 *and Management*, insect prey populations would be increased on protected lands, enhancing the  
19 foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4).  
20 Cultivated lands that provide habitat for covered and other native wildlife species would provide  
21 approximately 15,400 acres of potential nesting habitat for California horned lark and grasshopper  
22 sparrow (Objective CLNC1.1). Approximately 42,275 acres of cultivated lands protected would be in  
23 alfalfa and pasture crop types (very high- and high-value crop types for Swainson's hawk under  
24 Objective SH1.2) which would also provide potential nesting habitat for California horned lark and  
25 grasshopper sparrow. The Plan also includes commitments to implement *AMM1 Worker Awareness*  
26 *Training*, *AMM2 Construction Best Management Practices and Monitoring*, *AMM3 Stormwater*  
27 *Pollution Prevention Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention,*  
28 *Containment, and Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel*  
29 *Material, and Dredged Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include  
30 elements that would avoid or minimize the risk of affecting individuals and species habitats adjacent  
31 to work areas. The AMMs are described in detail in BDCP Appendix 3.C, *Avoidance and Minimization*  
32 *Measures*. California horned lark and grasshopper sparrow are not covered species under the BDCP.  
33 For the BDCP to avoid significant impacts on individuals, preconstruction surveys for noncovered  
34 avian species would be required to ensure that nests are detected and avoided. Mitigation Measure  
35 BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would  
36 reduce this impact to a less-than-significant level.

37 Considering Alternative 1C's protection and restoration provisions, which would provide acreages  
38 of new high-value or enhanced habitat in amounts suitable to compensate for habitats lost to  
39 construction and restoration activities, and with the implementation of AMM1-AMM7, Mitigation  
40 Measure BIO-75, and Mitigation Measure BIO-130, the loss of habitat or direct mortality through  
41 implementation of Alternative 1C would not result in a substantial adverse effect through habitat  
42 modifications and would not substantially reduce the number or restrict the range of either species.  
43 Therefore, the loss of habitat or potential mortality under this alternative would have a less-than-  
44 significant impact on California horned lark and grasshopper sparrow.

1           **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**  
2           **Disturbance of Nesting Birds**

3           See Mitigation Measure BIO-75 under Impact BIO-75.

4           **Mitigation Measure BIO-130: Compensate for the Near-Term Loss of California Horned**  
5           **Lark and Grasshopper Sparrow Habitat**

6           DWR will manage and protect sufficient acres of cultivated lands such as pasture, grain and hay  
7           crops, or alfalfa to provide California horned lark and grasshopper sparrow habitat such that the  
8           total acres of habitat impacted in the near-term timeframe are mitigated at a ratio of 2:1  
9           protection. Additional grassland protection, enhancement, and management may be substituted  
10          for the protection of cultivated lands.

11          **Impact BIO-131: Effects on California Horned Lark and Grasshopper Sparrow and Associated**  
12          **with Electrical Transmission Facilities**

13          New transmission lines would increase the risk for bird-power line strikes and/or electrocution,  
14          which could result in injury or mortality of grasshopper sparrow and California horned lark. The  
15          potential for this risk, is considered minimal based on the flight behaviors of each species.  
16          Transmission line poles and towers also provide perching substrate for raptors, which could result  
17          in increased predation pressure. However, this would be expected to have few adverse effects on the  
18          grasshopper sparrow and California horned lark local populations.

19          **NEPA Effects:** New transmission lines would increase the risk for bird-power line strikes, which  
20          could result in injury or mortality of grasshopper sparrow and California horned lark. With the  
21          implementation of *AMM20 Greater Sandhill Crane*, the effect of new transmission lines on California  
22          horned lark and grasshopper sparrow would not be adverse.

23          **CEQA Conclusion:** New transmission lines would increase the risk for bird-power line strikes  
24          and/or electrocution, which could result in injury or mortality of grasshopper sparrow and  
25          California horned lark. However, new transmission lines would have a less-than-significant impact  
26          on grasshopper sparrow and California horned lark based on the species' flight behaviors.

27          **Impact BIO-132: Indirect Effects of Plan Implementation on Grasshopper Sparrow and**  
28          **California Horned Lark**

29          **Indirect construction-and operation-related effects:** Noise and visual disturbances associated  
30          with construction-related activities could result in temporary disturbances that affect California  
31          horned lark and grasshopper sparrow use of modeled habitat. Construction noise above background  
32          noise levels (greater than 50 dBA) could extend 1,900 to 5,250 feet from the edge of construction  
33          activities (BDCP Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of the BDCP*  
34          *Conveyance Facility on Sandhill Crane*, Table 4), although there are no available data to determine  
35          the extent to which these noise levels could affect California horned lark or grasshopper sparrow.  
36          Indirect effects associated with construction include noise, dust, and visual disturbance caused by  
37          grading, filling, contouring, and other ground-disturbing operations. Construction-related noise and  
38          visual disturbances could disrupt nesting and foraging behaviors, and reduce the functions of  
39          suitable habitat which could result in an adverse effect on these species. Mitigation Measure BIO-75,  
40          *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be  
41          available to minimize adverse effects on active nests. The use of mechanical equipment during water

1 conveyance construction could cause the accidental release of petroleum or other contaminants that  
2 could affect these species or their prey in the surrounding habitat. AMM1–AMM7, including *AMM2*  
3 *Construction Best Management Practices and Monitoring*, would minimize the likelihood of such  
4 spills from occurring. The inadvertent discharge of sediment or excessive dust adjacent to  
5 grasshopper sparrow and California horned lark habitat could also have a negative effect on these  
6 species. AMM1–AMM7 would ensure that measures are in place to prevent runoff from the  
7 construction area and the negative effects of dust on wildlife adjacent to work areas.

8 **NEPA Effects:** Indirect effects on California horned lark and grasshopper sparrow as a result of  
9 Alternative 1C implementation could have adverse effects on these species through the modification  
10 of habitat and potential for direct mortality. California horned lark and grasshopper sparrow are not  
11 covered species under the BDCP, and potential mortality would be an adverse effect without  
12 preconstruction surveys to ensure that nests are detected and avoided. In conjunction with AMM1–  
13 AMM7, Mitigation Measure BIO-75 *Conduct Preconstruction Nesting Bird Surveys and Avoid*  
14 *Disturbance of Nesting Birds*, would be available to address this effect.

15 **CEQA Conclusion:** Indirect effects on grasshopper sparrow and California horned lark as a result of  
16 constructing the water conveyance facilities could have a significant impact on these species. The  
17 incorporation of AMM1–AMM7 into the BDCP and the implementation of Mitigation Measure BIO-  
18 75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would  
19 reduce this impact to a less-than-significant level.

20 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**  
21 **Disturbance of Nesting Birds**

22 See discussion of Mitigation Measure BIO-75 under Impact BIO-75.

23 **Impact BIO-133: Periodic Effects of Inundation on Grasshopper Sparrow and California**  
24 **Horned Lark as a Result of Implementation of Conservation Components**

25 Flooding of the Yolo Bypass from Fremont Weir operations (*CM2 Yolo Bypass Fisheries*  
26 *Enhancement*) would increase the frequency and duration of inundation on approximately 777–  
27 2,423 acres of modeled California horned lark and grasshopper sparrow habitat (Table 12-1C-49).

28 Based on hypothetical footprints, implementation of *CM5 Seasonally Inundated Floodplain*  
29 *Restoration* could result in the periodic inundation of up to approximately 656 acres of modeled  
30 habitat (Table 12-1C-49).

31 Reduced foraging habitat availability may be expected during the fledgling period of the nesting  
32 season due to periodic inundation. However, inundation would occur during the nonbreeding  
33 season and would not be expected to have an adverse effect on either species.

34 **NEPA Effects:** Periodic inundation of floodplains would not have adverse effects on grasshopper  
35 sparrow or California horned lark because inundation is expected to occur prior to the breeding  
36 season.

37 **CEQA Conclusion:** Periodic inundation of floodplains would not have a significant impact on  
38 grasshopper sparrow or California horned lark because inundation is expected to occur prior to the  
39 breeding season.

1       **Least Bittern and White-Faced Ibis**

2       This section describes the effects of Alternative 1C, including water conveyance facilities  
3       construction and implementation of other conservation components, on least bittern and white-  
4       faced ibis. Modeled breeding habitat for least bittern and white-faced ibis consists of tidal  
5       freshwater and tidal brackish emergent wetlands, nontidal freshwater emergent wetlands, managed  
6       wetlands, and other natural seasonal wetlands in CZ 2, 4, and 11.

7       Construction and restoration associated with Alternative 1C conservation measures would result in  
8       both temporary and permanent losses of modeled habitat for mountain plover as indicated in Table  
9       12-1C-50. Full implementation of Alternative 1C would include the following biological objectives  
10       over the term of the BDCP which would also benefit least bittern and white-faced ibis (BDCP Chapter  
11       3, Section 3.3, *Biological Goals and Objectives*).

- 12       • Restore or create at least 24,000 acres of tidal freshwater emergent wetland in CZs 1, 2, 4, 5, 6,  
13       and/or 7 (Objective TFEWNC1.1, associated with CM4).
- 14       • Create at least 1,200 acres of nontidal marsh consisting of a mosaic of nontidal perennial aquatic  
15       and nontidal freshwater emergent wetland natural communities (Objective NFEW/NPANC1.1,  
16       associated with CM10).
- 17       • Protect and enhance at least 8,100 acres of managed wetland, at least 1,500 acres of which are  
18       in the Grizzly Island Marsh Complex (Objective MWNC1.1, associated with CM3).

19       As explained below, with the restoration or protection of these amounts of habitat, in addition to  
20       management activities that would enhance habitat for these species and the implementation of  
21       AMM1–AMM7, *AMM27 Selenium Management*, and Mitigation Measure BIO-75, impacts on least  
22       bittern and white-faced ibis would not be adverse for NEPA purposes and would be less than  
23       significant for CEQA purposes.

1 **Table 12-1C-50. Changes in Least Bittern and White-Faced Ibis Modeled Habitat Associated with**  
2 **Alternative 1C (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	Nesting	0	0	0	0	NA	NA
<b>Total Impacts CM1</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>NA</b>	<b>NA</b>
CM2–CM18	Nesting	5,134	13,063	45	45	961–2,672	NA
<b>Total Impacts CM2–CM18</b>		<b>5,134</b>	<b>13,063</b>	<b>45</b>	<b>45</b>	<b>961–2,672</b>	<b>NA</b>
<b>TOTAL IMPACTS</b>		<b>5,134</b>	<b>13,063</b>	<b>45</b>	<b>45</b>	<b>961–2,672</b>	<b>NA</b>

<sup>a</sup> See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-134: Loss or Conversion of Habitat for and Direct Mortality of Least Bittern and**  
5 **White-Faced Ibis**

6 Alternative 1C conservation measures would result in the combined permanent and temporary loss  
7 and conversion of up to 13,108 acres of modeled habitat for least bittern and white-faced ibis  
8 (13,063 acres of permanent loss and conversion and 45 of temporary loss, Table 12-1C-50).

9 Conservation measures that would result in these losses are *CM2 Yolo Bypass Fisheries Enhancement*,  
10 and *CM4 Tidal Natural Communities Restoration*. Habitat enhancement and management activities  
11 (CM11), which include ground disturbance or removal of nonnative vegetation, could result in local  
12 adverse habitat effects. In addition, maintenance activities associated with the long-term operation  
13 of the water conveyance facilities and other BDCP physical facilities could degrade or eliminate least  
14 bittern and white-faced ibis habitat. Each of these individual activities is described below. A  
15 summary statement of the combined impacts, NEPA effects, and a CEQA conclusion follow the  
16 individual conservation measure discussions.

- 17 • *CM1 Water Facilities and Operation*: There would be no permanent or temporary loss of least  
18 bittern and white-faced ibis habitat from the construction of the Alternative 1C conveyance  
19 facilities (Table 12-1C-50).
- 20 • *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo bypass fisheries enhancement  
21 would permanently remove 55 acres of modeled least bittern and white-faced ibis habitat in the  
22 Yolo Bypass in CZ 2. In addition, 45 acres of habitat would be temporarily removed. The loss is  
23 expected to occur during the first 10 years of Alternative 1C implementation.
- 24 • *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and  
25 inundation would permanently remove an estimated 13,008 acres of modeled least bittern and  
26 white-faced ibis habitat in CZ 2, 4, and 11 by the late long-term time period.

- 1 • *CM11 Natural Communities Enhancement and Management*: A variety of habitat management  
2 actions included in CM11 that are designed to enhance wildlife values in restored or protected  
3 habitats could result in localized ground disturbances that could temporarily remove small  
4 amounts of least bittern and white-faced ibis habitat. Ground-disturbing activities, such as  
5 removal of nonnative vegetation and road and other infrastructure maintenance activities,  
6 would be expected to have minor adverse effects on available least bittern and white-faced ibis  
7 habitat.
- 8 • *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground  
9 water conveyance facilities and restoration infrastructure could result in ongoing but periodic  
10 disturbances that could affect least bittern and white-faced ibis use of the surrounding habitat.  
11 Maintenance activities would include vegetation management, levee and structure repair, and  
12 re-grading of roads and permanent work areas. These effects, however, would be reduced by  
13 AMM1–AMM7 described below and Mitigation Measure BIO-75, *Conduct Preconstruction Nesting*  
14 *Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to further reduce  
15 adverse effects.
- 16 • *Injury and Direct Mortality*: Construction-related activities would not be expected to result in  
17 direct mortality of least bittern and white-faced ibis because adults and fledged young would be  
18 expected to avoid contact with construction and other equipment. However, if either species  
19 were to nest in the construction area, equipment operation, noise and visual disturbances could  
20 destroy nests or lead to their abandonment, resulting in mortality of eggs and nestlings.  
21 Mitigation Measure BIO-75 would be available to address these adverse effects.

22 The following paragraphs summarize the combined effects discussed above and describe other  
23 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also  
24 included.

### 25 ***Near-Term Timeframe***

26 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
27 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
28 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
29 effects of construction would not be adverse under NEPA. There would be no impacts resulting from  
30 the construction of the water conveyance facilities (CM1). However, there would be a loss of 5,179  
31 acres (5,134 acres of permanent loss, 45 acres of temporary loss) of modeled habitat for these  
32 species in the near-term. These effects would result from the implementation of *CM2 Yolo Bypass*  
33 *Fisheries Enhancement* and *CM4 Tidal Natural Communities Restoration*.

34 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected would  
35 be 1:1 for restoration/creation and 1:1 protection of least bittern and white-faced ibis habitat. Using  
36 these ratios would indicate that 5,179 acres of restoration and 5,179 acres of protection of least  
37 bittern and white-faced ibis habitat would be required to compensate for the loss of habitat using  
38 the same typical NEPA and CEQA ratios (1:1 for restoration and 1:1 for protection).

39 The BDCP has committed to near-term goals of restoring 8,850 acres of tidal freshwater emergent  
40 wetland and protecting and enhancing 4,800 acres of managed wetland in the Plan Area (Table 3-4  
41 in Chapter 3, *Description of Alternatives*). These conservation actions are associated with CM4 and  
42 CM3 and would occur in the same timeframe as the construction and early restoration losses,  
43 thereby avoiding adverse effects of habitat loss on least bittern and white-faced ibis. The tidal  
44 freshwater emergent wetland would be restored in CZs 1, 2, 4, 5, 6, and/or 7 (Objective TFEWNC1.1

1 in BDCP Chapter 3, *Conservation Strategy*) and would be restored in a way that creates topographic  
2 heterogeneity and in areas that increase connectivity among protected lands (Objective  
3 TFEWNC2.2). The 4,800 acres of managed wetland would be protected and enhanced in CZ 11 and  
4 would benefit these species through the enhancement of degraded areas (such as areas of bare  
5 ground or marsh where the predominant vegetation consists of invasive species such as perennial  
6 pepperweed) to vegetation such as pickleweed-alkali heath-American bulrush plant associations  
7 (Objective MWNC1.1). In addition, at least 400 acres of nontidal marsh would be created, some of  
8 which would provide nesting habitat for least bittern and white-faced ibis. These Plan objectives  
9 represent performance standards for considering the effectiveness of restoration and protection  
10 actions. The acres of restoration and protection contained in the near-term Plan goals satisfy the  
11 typical mitigation that would be applied to the project-level effects of CM1, as well as mitigate the  
12 near-term effects of the other conservation measures.

13 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
14 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
15 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
16 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
17 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that avoid or  
18 minimize the risk of affecting individuals and species habitats adjacent to work areas and storage  
19 sites. The AMMs are described in detail in BDCP Appendix 3.C, *Avoidance and Minimization*  
20 *Measures*. Least bittern and white-faced ibis are not covered species under the BDCP. For the BDCP  
21 to avoid an adverse effect on individuals, preconstruction surveys for noncovered avian species  
22 would be required to ensure that nests are detected and avoided.

### 23 **Late Long-Term Timeframe**

24 Alternative 1C as a whole would result in the permanent loss of and temporary effects on 13,108  
25 acres (13,063 acres of permanent loss, 45 acres of temporary loss) of least bittern and white-faced  
26 ibis habitat during the term of the Plan. The locations of these losses are described above in the  
27 analyses of individual conservation measures. The Plan includes conservation commitments  
28 through *CM4 Tidal Natural Communities Restoration* to restore or create at least 24,000 acres of tidal  
29 freshwater emergent wetland in CZs 1, 2, 4, 5, 6, and/or 7 (Objective TFEWNC1.1). In addition, 1,200  
30 acres of nontidal marsh would be created through *CM10 Nontidal Marsh Restoration* and 8,100 acres  
31 of managed wetland would be protected and enhanced in CZ 11.

32 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
33 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
34 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
35 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
36 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that avoid or  
37 minimize the risk of affecting individuals and species habitats adjacent to work areas and storage  
38 sites. The AMMs are described in detail in BDCP Appendix 3.C, *Avoidance and Minimization*  
39 *Measures*. Least bittern and white-faced ibis are not covered species under the BDCP and in order to  
40 have a less than adverse effect on individuals, preconstruction surveys for noncovered avian species  
41 would be required to ensure that nests are detected and avoided. Mitigation Measure BIO-75,  
42 *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be  
43 available to address this potential effect.

44 **NEPA Effects:** The loss of least bittern and white-faced ibis habitat and potential mortality of these  
45 special-status species under Alternative 1C would represent an adverse effect in the absence of

1 other conservation actions. However, with the habitat protection and restoration associated with  
2 CM3, CM4, CM6, CM7, and CM11, guided by biological goals and objectives and by AMM1-AMM7,  
3 which would be in place throughout the construction period, the effects of habitat loss on least  
4 bittern and white-faced ibis would not be adverse under Alternative 1C. Least bittern and white-  
5 faced ibis are not covered species under the BDCP, and the potential for mortality would be an  
6 adverse effect without preconstruction surveys to ensure that nests are detected and avoided.  
7 Mitigation Measure BIO-75 would be available to address this effect.

8 **CEQA Conclusion:**

9 ***Near-Term Timeframe***

10 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
11 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
12 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
13 impacts of construction would be less than significant under CEQA. There would be no impacts  
14 resulting from the construction of the water conveyance facilities (CM1). However, there would be a  
15 loss of 5,179 acres of modeled habitat (5,134 acres of permanent loss, 45 acres of temporary loss)  
16 for these species in the near-term. These effects would result from the implementation of *CM2 Yolo*  
17 *Bypass Fisheries Enhancement* and *CM4 Tidal Natural Communities Restoration*.

18 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected would  
19 be 1:1 for restoration/creation and 1:1 protection of least bittern and white-faced ibis habitat. Using  
20 these ratios would indicate that 5,179 acres of restoration and 5,179 acres of protection of least  
21 bittern and white-faced ibis habitat would be required to compensate for the loss of habitat using  
22 the same typical NEPA and CEQA ratios (1:1 for restoration and 1:1 for protection).

23 The BDCP has committed to near-term goals of restoring 2,000 acres of tidal freshwater emergent  
24 wetland and 4,800 acres of managed wetland in the Plan Area (Table 3-4 in Chapter 3, *Description of*  
25 *Alternatives*). These conservation actions are associated with CM4 and CM3 and would occur in the  
26 same timeframe as the construction and early restoration losses, thereby avoiding adverse effects of  
27 habitat loss on least bittern and white-faced ibis. The tidal freshwater emergent wetland would be  
28 restored in CZs 1, 2, 4, 5, 6, and/or 7 (Objective TFEWNC1.1 in BDCP Chapter 3, *Conservation*  
29 *Strategy*) and would be restored in a way that creates topographic heterogeneity and in areas that  
30 increase connectivity among protected lands (Objective TFEWNC2.2). The 4,800 acres of managed  
31 wetland would be protected and enhanced in CZ 11 and would benefit these species through the  
32 enhancement of degraded areas (such as areas of bare ground or marsh where the predominant  
33 vegetation consists of invasive species such as perennial pepperweed) to vegetation such as  
34 pickleweed-alkali heath-American bulrush plant associations (Objective MWNC1.1). In addition, at  
35 least 400 acres of nontidal marsh would be created, some of which would provide nesting habitat  
36 for least bittern and white-faced ibis. These Plan objectives represent performance standards for  
37 considering the effectiveness of restoration and protection actions. The acres of restoration and  
38 protection contained in the near-term Plan goals satisfy the typical mitigation that would be applied  
39 to the project-level effects of CM1, as well as mitigate the near-term effects of the other conservation  
40 measures.

41 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
42 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
43 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
44 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*

1 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that avoid or  
2 minimize the risk of affecting individuals and species habitats adjacent to work areas and storage  
3 sites. The AMMs are described in detail in BDCP Appendix 3.C, *Avoidance and Minimization*  
4 *Measures*. Least bittern and white-faced ibis are not covered species under the BDCP. For the BDCP  
5 to have a less-than-significant impact on individuals, preconstruction surveys would be required to  
6 ensure that nests were detected and avoided. Implementation of Mitigation Measure BIO-75,  
7 *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would reduce  
8 the potential impact on nesting least bittern and white-faced ibis to a less-than-significant level.

### 9 **Late Long-Term Timeframe**

10 Alternative 1C as a whole would result in the permanent loss of and temporary effects on 13,108  
11 acres (13,063 acres of permanent loss, 45 acres of temporary loss) of least bittern and white-faced  
12 ibis habitat during the term of the Plan. The locations of these losses are described above in the  
13 analyses of individual conservation measures. The Plan includes conservation commitments  
14 through *CM4 Tidal Natural Communities Restoration* to restore or create at least 24,000 acres of tidal  
15 freshwater emergent wetland in CZs 1, 2, 4, 5, 6, and/or 7 (Objective TFEWNC1.1). In addition, 1,200  
16 acres of nontidal marsh would be created through *CM10 Nontidal Marsh Restoration* and 8,100 acres  
17 of managed wetland would be protected and enhanced in CZ 11.

18 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
19 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
20 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
21 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
22 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that avoid or  
23 minimize the risk of affecting individuals and species habitats adjacent to work areas and storage  
24 sites. The AMMs are described in detail in BDCP Appendix 3.C, *Avoidance and Minimization*  
25 *Measures*. Least bittern and white-faced ibis are not covered species under the BDCP. For the BDCP  
26 to avoid an adverse effect on individuals, preconstruction surveys for noncovered avian species  
27 would be required to ensure that nests were detected and avoided. Implementation of Mitigation  
28 Measure BIO-75 would reduce the potential impact on nesting least bittern and white-faced ibis and  
29 to a less-than-significant level.

30 Considering Alternative 1C's protection and restoration provisions, which would provide acreages  
31 of new high-value or enhanced habitat in amounts suitable to compensate for habitats lost to  
32 construction and restoration activities, and with the implementation of AMM1-AMM7 and  
33 Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of*  
34 *Nesting Birds*, the loss of habitat or direct mortality through implementation of Alternative 1C would  
35 not result in a substantial adverse effect through habitat modifications and would not substantially  
36 reduce the number or restrict the range of the species. Therefore, the loss of habitat or potential  
37 mortality under this alternative would have a less-than-significant impact on least bittern and  
38 white-faced ibis.

### 39 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid** 40 **Disturbance of Nesting Birds**

41 See Mitigation Measure BIO-75 under Impact BIO-75.

1 **Impact BIO-135: Effects on Least Bittern and White-Faced Ibis Associated with Electrical**  
2 **Transmission Facilities**

3 New transmission lines would increase the risk for bird-power line strikes, which could result in  
4 injury or mortality of least bittern and white-faced ibis. The risk for bird-power line strikes, would  
5 be minimized with the incorporation of *AMM20 Greater Sandhill Crane* into the BDCP. This measure  
6 would ensure that conductor and ground lines are fitted with flight diverters in compliance with the  
7 best available practices, such as those specified in the USFWS Avian Protection Guidelines.

8 **NEPA Effects:** New transmission lines would increase the risk for bird-power line strikes, which  
9 could result in injury or mortality of least bittern and white-faced ibis. With the incorporation of  
10 *AMM20 Greater Sandhill Crane* into the BDCP, new transmission lines would not have an adverse  
11 effect on least bittern and white-faced ibis.

12 **CEQA Conclusion:** New transmission lines would increase the risk for bird-power line strikes, which  
13 could result in injury or mortality of least bittern and white-faced ibis. With the incorporation of  
14 *AMM20 Greater Sandhill Crane* into the BDCP, new transmission lines would have a less-than-  
15 significant impact on least bittern and white-faced ibis.

16 **Impact BIO-136: Indirect Effects of Plan Implementation on Least Bittern and White-Faced**  
17 **Ibis**

18 **Indirect construction- and operation-related effects:** Noise and visual disturbances associated  
19 with construction-related activities could result in temporary disturbances that affect least bittern  
20 and white-faced ibis use of modeled habitat. Construction noise above background noise levels  
21 (greater than 50 dBA) could extend 1,900 to 5,250 feet from the edge of construction activities  
22 (BDCP Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of the BDCP Conveyance*  
23 *Facility on Sandhill Crane*, Table 4), although there are no available data to determine the extent to  
24 which these noise levels could affect least bittern or white-faced ibis. Indirect effects associated with  
25 construction include noise, dust, and visual disturbance caused by grading, filling, contouring, and  
26 other ground-disturbing operations. Construction-related noise and visual disturbances could  
27 disrupt nesting and foraging behaviors, and reduce the functions of suitable habitat which could  
28 result in an adverse effect on these species. Mitigation Measure BIO-75, *Conduct Preconstruction*  
29 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to minimize adverse  
30 effects on active nests. The use of mechanical equipment during water conveyance construction  
31 could cause the accidental release of petroleum or other contaminants that could affect these  
32 species or their prey in the surrounding habitat. AMM1–AMM7, including *AMM2 Construction Best*  
33 *Management Practices and Monitoring*, would minimize the likelihood of such spills from occurring.  
34 The inadvertent discharge of sediment or excessive dust adjacent to least bittern and white-faced  
35 ibis could also have a negative effect on these species. AMM1–AMM7 would ensure that measures  
36 are in place to prevent runoff from the construction area and the negative effects of dust on wildlife  
37 adjacent to work areas.

38 **Methylmercury Exposure:** Marsh (tidal and nontidal) and floodplain restoration have the potential  
39 to increase exposure to methylmercury. Mercury is transformed into the more bioavailable form of  
40 methylmercury in aquatic systems, especially areas subjected to regular wetting and drying such as  
41 tidal marshes and flood plains (Alpers et al. 2008). Thus, BDCP restoration activities that create  
42 newly inundated areas could increase bioavailability of mercury (see BDCP Chapter 3, *Conservation*  
43 *Strategy*, for details of restoration). Species sensitivity to methylmercury differs widely and there is  
44 a large amount of uncertainty with respect to species-specific effects. Increased methylmercury

1 associated with natural community and floodplain restoration could indirectly affect least bittern  
2 and white-faced ibis, via uptake in lower trophic levels (as described in the BDCP, Appendix 5.D,  
3 *Contaminants*).

4 In addition, the potential mobilization or creation of methylmercury within the Plan Area varies  
5 with site-specific conditions and would need to be assessed at the project level. *CM12 Methylmercury*  
6 *Management* contains provisions for project-specific Mercury Management Plans. Site-specific  
7 restoration plans that address the creation and mobilization of mercury, as well as monitoring and  
8 adaptive management as described in CM12 would be available to address the uncertainty of  
9 methylmercury levels in restored tidal marsh and potential impacts on least bittern and white-faced  
10 ibis.

11 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in  
12 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,  
13 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,  
14 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz  
15 2009). The effect of selenium toxicity differs widely between species and also between age and sex  
16 classes within a species. In addition, the effect of selenium on a species can be confounded by  
17 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith  
18 2009).

19 The primary source of selenium bioaccumulation in birds is through their diet (Ackerman and  
20 Eagles-Smith 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the  
21 trophic level at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At  
22 Kesterson Reservoir in the San Joaquin Valley, selenium concentrations in invertebrates have been  
23 found to be two to six times the levels in rooted plants. Furthermore, bivalves sampled in the San  
24 Francisco Bay contained much higher selenium levels than crustaceans such as copepods (Stewart et  
25 al. 2004). Studies conducted at the Grasslands in Merced County recorded higher selenium levels in  
26 black-necked stilts which feed on aquatic invertebrates than in mallards and pintails, which are  
27 primarily herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which  
28 forage on bivalves) have much higher levels of selenium levels than shorebirds that prey on aquatic  
29 invertebrates (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high  
30 levels of selenium have a higher risk of selenium toxicity.

31 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations  
32 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to  
33 exacerbate bioaccumulation of selenium in avian species, including least bittern and white-faced  
34 ibis. Marsh (tidal and nontidal) and floodplain restoration have the potential to mobilize selenium,  
35 and therefore increase avian exposure from ingestion of prey items with elevated selenium levels.  
36 Thus, BDCP restoration activities that create newly inundated areas could increase bioavailability of  
37 selenium (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Changes in  
38 selenium concentrations were analyzed in Chapter 8, *Water Quality*, and it was determined that,  
39 relative to Existing Conditions and the No Action Alternative, CM1 would not result in substantial,  
40 long-term increases in selenium concentrations in water in the Delta under any alternative.  
41 However, it is difficult to determine whether the effects of potential increases in selenium  
42 bioavailability associated with restoration-related conservation measures (CM4 and CM5) would  
43 lead to adverse effects on least bittern and white-faced ibis.

1 Because of the uncertainty that exists at this programmatic level of review, there could be a  
2 substantial effect on least bittern and white-faced ibis from increases in selenium associated with  
3 restoration activities. This effect would be addressed through the implementation of *AMM27*  
4 *Selenium Management* (BDCP Appendix 3.C, *Avoidance and Minimization Measures*) which would  
5 provide specific tidal habitat restoration design elements to reduce the potential for  
6 bioaccumulation of selenium and its bioavailability in tidal habitats. Furthermore, the effectiveness  
7 of selenium management to reduce selenium concentrations and/or bioaccumulation would be  
8 evaluated separately for each restoration effort as part of design and implementation. This  
9 avoidance and minimization measure would be implemented as part of the tidal habitat restoration  
10 design schedule.

11 **NEPA Effects:** Indirect effects on least bittern and white-faced ibis as a result of constructing the  
12 water conveyance facilities could have adverse effects on these species in the absence of other  
13 conservation actions. However, the implementation of AMM1–AMM7 would help to reduce this  
14 effect. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid*  
15 *Disturbance of Nesting Birds*, would also be available to address the adverse indirect effects of  
16 construction on active nests. Tidal habitat restoration could result in increased exposure of least  
17 bittern and white-faced ibis to selenium. This effect would be addressed through the  
18 implementation of *AMM27 Selenium Management*, which would provide specific tidal habitat  
19 restoration design elements to reduce the potential for bioaccumulation of selenium and its  
20 bioavailability in tidal habitats.

21 Increased methylmercury associated with natural community and floodplain restoration could  
22 indirectly affect least bittern and white-faced ibis, via uptake in lower trophic levels (as described in  
23 the BDCP, Appendix 5.D, *Contaminants*). However, it is unknown what concentrations of  
24 methylmercury are harmful to the species, and the potential for increased exposure varies  
25 substantially within the study area. *CM12 Methylmercury Management* contains provisions for  
26 project-specific Mercury Management Plans. Site-specific restoration plans that address the creation  
27 and mobilization of mercury, as well as monitoring and adaptive management as described in *CM12*  
28 would better inform potential effects and address the uncertainty of methylmercury levels in  
29 restored tidal marsh in the study area. The site-specific planning phase of marsh restoration would  
30 be the appropriate place to assess the potential for risk of methylmercury exposure for least bittern  
31 and white-faced ibis, once site specific sampling and other information could be developed.

32 **CEQA Conclusion:** Indirect effects on least bittern and white-faced ibis as a result of constructing the  
33 water conveyance facilities could have a significant impact on these species. The incorporation of  
34 AMM1–AMM7 into the BDCP and the implementation of Mitigation Measure BIO-75, *Conduct*  
35 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would reduce this  
36 impact to a less-than-significant level. Increased methylmercury associated with natural community  
37 and floodplain restoration could indirectly affect least bittern and white-faced ibis, via uptake in  
38 lower trophic levels (as described in the BDCP, Appendix 5.D, *Contaminants*). In addition, the  
39 potential mobilization or creation of methylmercury within the Plan Area varies with site-specific  
40 conditions and would need to be assessed at the project level. *CM12 Methylmercury Management*  
41 contains provisions for project-specific Mercury Management Plans. Tidal habitat restoration could  
42 result in increased exposure of least bittern and white-faced ibis to selenium. This effect would be  
43 addressed through the implementation of *AMM27 Selenium Management*, which would provide  
44 specific tidal habitat restoration design elements to reduce the potential for bioaccumulation of  
45 selenium and its bioavailability in tidal habitats. Therefore, the indirect effects of Alternative 1C  
46 implementation would not have a significant impact on least bittern and white-faced ibis.

1           **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**  
2           **Disturbance of Nesting Birds**

3           See Mitigation Measure BIO-75 under Impact BIO-75.

4           **Impact BIO-137: Periodic Effects of Inundation on Least Bittern and White-Faced Ibis as a**  
5           **Result of Implementation of Conservation Components**

6           Flooding of the Yolo Bypass from Fremont Weir operations (*CM2 Yolo Bypass Fisheries*  
7           *Enhancement*) would increase the frequency and duration of inundation on approximately 961-  
8           2,672 acres of modeled least bittern and white-faced ibis habitat (Table 12-1C-50). However, no  
9           adverse effects of increased inundation frequency on nesting habitat would be expected because  
10          wetland vegetation has persisted under the existing Yolo Bypass flooding regime, and changes to  
11          frequency and inundation are within the tolerance of these vegetation types. Inundation would  
12          occur in the nonbreeding season and wetlands supporting habitat would not be expected to be  
13          affected by flood flows.

14          **NEPA Effects:** Periodic inundation of Yolo Bypass would not be expected to have adverse effects on  
15          least bittern or white-faced ibis because wetland vegetation has persisted under the existing Yolo  
16          Bypass flooding regime, and changes to frequency and inundation are within the tolerance of these  
17          vegetation types.

18          **CEQA Conclusion:** Periodic inundation of Yolo Bypass would not be expected to have a significant  
19          impact on least bittern or white-faced ibis because wetland vegetation has persisted under the  
20          existing Yolo Bypass flooding regime, and changes to frequency and inundation are within the  
21          tolerance of these vegetation types.

22          **Loggerhead Shrike**

23          This section describes the effects of Alternative 1C, including water conveyance facilities  
24          construction and implementation of other conservation components, on loggerhead shrike. Modeled  
25          habitat for loggerhead shrike includes both high-value and low-value modeled habitat. High-value  
26          habitat includes grassland and alkali seasonal wetland natural communities in addition to cultivated  
27          lands, including irrigated pasture and grain and hay crops. Low-value habitat includes row crops  
28          such as truck and berry crops and field crops which are not considered to be valuable habitat for the  
29          species but were included in the model as they may provide foraging opportunities.

30          Construction and restoration associated with Alternative 1C conservation measures would result in  
31          both temporary and permanent losses of modeled habitat for loggerhead shrike as indicated in  
32          Table 12-1C-51. Full implementation of Alternative 1C would result in both temporary and  
33          permanent losses of modeled habitat for loggerhead shrike as indicated in Table 12-1C-51. Full  
34          implementation of Alternative 1C would include the following biological objectives over the term of  
35          the BDCP which would also benefit loggerhead shrike (BDCP Chapter 3, Section, 3.3, *Biological Goals*  
36          *and Objective*).

- 37          ● Protect at least 8,000 acres of grassland with at least 2,000 acres protected in CZ 1, at least 1,000  
38          acres protected in CZ 8, at least 2,000 acres protected in CZ 11, and the remainder distributed  
39          among CZs 1, 2, 4, 5, 7, 8, and 11 (Objective GNC1.1, associated with CM3).
- 40          ● Restore at least 2,000 acres of grasslands (Objective GNC1.2, associated with CM8).

- 1 • Protect at least 150 acres of alkali seasonal wetland and at least 600 acres of existing vernal pool  
2 complex in CZs 1, 8, and/or 11 (Objectives ASWNC1.1 and VPNC1.1, associated with CM3).
- 3 • Increase prey availability and accessibility for grassland-foraging species (Objectives ASWNC2.4,  
4 VPNC2.5, and GNC2.4, associated with CM11).
- 5 • Protect at least 48,625 acres of cultivated lands that provide suitable habitat for covered and  
6 other native wildlife species (Objective CLNC1.1, associated with CM3).
- 7 • Maintain and protect the small patches of important wildlife habitats associated with cultivated  
8 lands that occur in cultivated lands within the reserve system, including isolated valley oak  
9 trees, trees and shrubs along field borders and roadsides, remnant groves, riparian corridors,  
10 water conveyance channels, grasslands, ponds, and wetlands (Objective CLNC1.3, associated  
11 with CM3 and CM11).
- 12 • Establish 20- to 30-foot-wide hedgerows along field borders and roadsides within protected  
13 cultivated lands at a minimum rate of 400 linear feet per 100 acres (Objective SH2.2, associated  
14 with CM11).

15 As explained below, with the restoration or protection of these amounts of habitat, in addition to  
16 management activities that would enhance habitat for the species and the implementation of  
17 AMM1–AMM7, and Mitigation Measure BIO-75, impacts on loggerhead shrike would not be adverse  
18 for NEPA purposes and would be less than significant for CEQA purposes.

19 **Table 12-1C-51. Changes in Loggerhead Shrike Modeled Habitat Associated with Alternative 1C**  
20 **(acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	High-value	2,796	2,796	3,750	3,750	NA	NA
	Low-value	2,120	2,120	2,925	2,925	NA	NA
<b>Total Impacts CM1</b>		<b>4,916</b>	<b>4,916</b>	<b>6,675</b>	<b>6,675</b>	<b>NA</b>	<b>NA</b>
CM2–CM18	High-value	5,450	26,198	376	893	777-2,423	3,823
	Low-value	1,801	17,575	97	624	672-1,996	4,315
<b>Total Impacts CM2–CM18</b>		<b>7,251</b>	<b>43,773</b>	<b>473</b>	<b>1,517</b>	<b>1,830-5,646</b>	<b>8,138</b>
<b>Total High-value</b>		<b>8,246</b>	<b>28,994</b>	<b>4,126</b>	<b>4,643</b>		
<b>Total Low-value</b>		<b>3,921</b>	<b>19,695</b>	<b>3,022</b>	<b>3,549</b>		
<b>TOTAL IMPACTS</b>		<b>12,167</b>	<b>48,689</b>	<b>7,149</b>	<b>8,192</b>	<b>1,830-5,646</b>	<b>8,138</b>

<sup>a</sup> See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

1 **Impact BIO-138: Loss or Conversion of Modeled Habitat for and Direct Mortality of**  
2 **Loggerhead Shrike**

3 Alternative 1C conservation measures would result in the combined permanent loss or conversion  
4 and temporary loss of up to 56,912 acres of modeled habitat for loggerhead shrike (of which 33,688  
5 acres is of high-value and 23,224 acres is of low value, Table 12-1C-51). Conservation measures that  
6 would result in these losses are conveyance facilities and transmission line construction, and  
7 establishment and use of borrow and spoil areas (CM1), Yolo Bypass fisheries improvements (CM2),  
8 tidal habitat restoration (CM4), floodplain restoration (CM5), channel margin enhancement (CM6),  
9 riparian restoration, (CM7), grassland restoration (CM8), vernal pool and wetland restoration  
10 (CM9), nontidal marsh restoration (CM10), natural communities enhancement and management  
11 (CM11) and construction of conservation hatcheries (CM18). The majority of habitat loss (33,244  
12 acres) would result from CM4. Habitat enhancement and management activities (CM11), which  
13 include ground disturbance or removal of nonnative vegetation, and the construction of recreational  
14 trails, signs, and facilities, could result in local adverse habitat effects. In addition, maintenance  
15 activities associated with the long-term operation of the water conveyance facilities and other BDCP  
16 physical facilities could degrade or eliminate loggerhead shrike modeled habitat. Each of these  
17 individual activities is described below. A summary statement of the combined impacts and NEPA  
18 effects, and a CEQA conclusion follow the individual conservation measure discussions.

- 19 • *CM1 Water Facilities and Operation:* Construction of Alternative 1C conveyance facilities would  
20 result in the combined permanent and temporary loss of up to 6,546 acres of high-value  
21 loggerhead shrike habitat (2,796 acres of permanent loss, 3,750 acres of temporary loss). In  
22 addition, 5,045 acres of low-value habitat would be removed (2,120 acres of permanent loss or  
23 conversion, 2,925 acres of temporary loss or conversion) from CZ 1, 3, 5, 6, 8, and 9. The  
24 permanent losses would occur at various locations along the western canal route and at the  
25 intake sites along the Sacramento River. The majority of grassland that would be removed  
26 would be in CZ 8, west of the Clifton Court Forebay from the construction of the new forebay and  
27 the associated borrow and spoil areas. Larger areas of annual grassland would be permanently  
28 removed by canal construction south of Rock Slough, south of Discovery Bay and immediately  
29 west of Clifton Court Forebay. Both temporary and permanent losses of grassland would be  
30 created by constructing transmission corridors west of the Plan Area and along the tunnel  
31 alignment in the west Delta. Other temporary losses occur from siphon construction areas, at  
32 safe haven work areas, and at railroad work areas just southwest of Clifton Court Forebay.  
33 Loggerhead shrikes nest in high abundance in these grasslands to the south and to the west of  
34 Clifton Court Forebay. Shrikes were detected using this area at a much higher rate than other  
35 grasslands and areas in the Delta during DHCCP surveys (Appendix 12C, *2009 to 2011 Bay Delta*  
36 *Conservation Plan EIR/EIS Environmental Data Report*). Permanent impacts from CM1 that  
37 overlap with recorded loggerhead shrike nest occurrences include the construction footprint of  
38 the canal (4 occurrences), a bridge associated with Byron Highway (1 occurrence), and a siphon  
39 just south of Highway 4 (1 occurrence). The temporary impacts of potential borrow and spoil  
40 sites (4 occurrences), siphon work areas (3 occurrences), and the footprint for a temporary  
41 transmission line east of Clifton Court Forebay (1 occurrence) also intersects with loggerhead  
42 shrike occurrences. Mitigation Measure BIO-75 would be available to address adverse effects on  
43 nesting loggerhead shrikes adjacent to work areas. Refer to the Terrestrial Biology Map Book for  
44 a detailed view of Alternative 1C construction locations. Construction of the water conveyance  
45 facilities would occur in the near-term timeframe.

- 1       ● *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo bypass fisheries enhancement  
2       would result in the combined permanent and temporary loss of up to 1,274 acres of high-value  
3       loggerhead shrike habitat (898 acres of permanent loss, 376 acres of temporary loss) in the Yolo  
4       Bypass in CZ 2. In addition, 182 acres of low-value habitat would be removed (85 acres of  
5       permanent loss, 97 acres of temporary loss). The loss is expected to occur during the first 10  
6       years of Alternative 1C implementation.
- 7       ● *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and  
8       inundation would permanently remove an estimated 20,880 acres of high-value loggerhead  
9       shrike habitat and 12,364 acres of low-value habitat. The majority of the acres lost would  
10      consist of cultivated lands in CZs 1, 2, 4, 5, 6, and/or 7. Grassland losses would likely occur in the  
11      vicinity of Cache Slough, on Decker Island in the West Delta ROA, on the upslope fringes of  
12      Suisun Marsh, and along narrow bands adjacent to waterways in the South Delta ROA. Tidal  
13      restoration would directly impact and fragment grassland just north of Rio Vista in and around  
14      French and Prospect Islands, and in an area south of Rio Vista around Threemile Slough. Losses  
15      of alkali seasonal wetland complex habitat would likely occur in the south end of the Yolo  
16      Bypass and on the northern fringes of Suisun Marsh.
- 17      ● *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore  
18      seasonally inundated floodplain would permanently and temporarily remove approximately  
19      1,450 acres of high-value loggerhead shrike habitat (933 permanent, 517 temporary). These  
20      losses would be expected after the first 10 years of Alternative 1C implementation along the San  
21      Joaquin River and other major waterways in CZ 7.
- 22      ● *CM7 Riparian Natural Community Restoration*: Riparian restoration would permanently remove  
23      approximately 370 acres of high-value loggerhead shrike habitat as part of tidal restoration and  
24      1,489 acres as part of seasonal floodplain restoration. In addition, 503 acres of low-value habitat  
25      would be removed as a part of tidal restoration and 1,971 acres would be removed as part of  
26      seasonal floodplain restoration through CM7.
- 27      ● *CM8 Grassland Natural Community Restoration and CM9 Vernal Pool and Alkali Seasonal Wetland*  
28      *Complex Restoration*: Temporary construction-related disturbance of grassland habitat would  
29      result from implementation of CM8 and CM9 in CZs 1, 2, 4, 5, 7, 8, and 11. However, all areas  
30      would be restored after the construction periods. Grassland restoration would be implemented  
31      on agricultural lands that also provide habitat for loggerhead shrike and would result in the  
32      conversion of 1,849 acres of cultivated lands to high-value grassland.
- 33      ● *CM10 Nontidal Marsh Restoration*: Implementation of CM10 would result in the permanent  
34      removal of 705 acres of high-value loggerhead shrike habitat and 735 acres of low-value  
35      loggerhead shrike habitat.
- 36      ● *CM11 Natural Communities Enhancement and Management*: A variety of habitat management  
37      actions included in CM11 that are designed to enhance wildlife values in restored or protected  
38      habitats could result in localized ground disturbances that could temporarily remove small  
39      amounts of modeled habitat. Ground-disturbing activities, such as removal of nonnative  
40      vegetation and road and other infrastructure maintenance activities, would be expected to have  
41      minor adverse effects on available habitat and would be expected to result in overall  
42      improvements to and maintenance of habitat values over the term of the BDCP. CM11 would  
43      also include the construction of recreational-related facilities including trails, interpretive signs,  
44      and picnic tables (BDCP Chapter 4, *Covered Activities and Associated Federal Actions*). The  
45      construction of trailhead facilities, signs, staging areas, picnic areas, bathrooms, etc. would be

1 placed on existing, disturbed areas when and where possible. However, approximately 50 acres  
2 of grassland habitat would be lost from the construction of trails and facilities.

3 Habitat management- and enhancement-related activities could disturb loggerhead shrike nests.  
4 If either species were to nest in the vicinity of a worksite, equipment operation could destroy  
5 nests, and noise and visual disturbances could lead to their abandonment, resulting in mortality  
6 of eggs and nestlings. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys*  
7 *and Avoid Disturbance of Nesting Birds*, would be available to address these adverse effects.

- 8 ● *CM18 Conservation Hatcheries*: Implementation of CM18 would remove up to 35 acres of high-  
9 value loggerhead shrike habitat for the development of a delta and longfin smelt conservation  
10 hatchery in CZ 1. Hatchery construction is expected to occur within the first 10 years of Plan  
11 implementation.
- 12 ● *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground  
13 water conveyance facilities and restoration infrastructure could result in ongoing but periodic  
14 disturbances that could affect loggerhead shrike use of the surrounding habitat. Maintenance  
15 activities would include vegetation management, levee and structure repair, and re-grading of  
16 roads and permanent work areas. These effects, however, would be reduced by AMM1–AMM7,  
17 Mitigation Measure BIO-75, and conservation actions as described below.
- 18 ● *Injury and Direct Mortality*: Construction-related activities would not be expected to result in  
19 direct mortality of adult or fledged loggerhead shrike if they were present in the Plan Area,  
20 because they would be expected to avoid contact with construction and other equipment. If  
21 either species were to nest in the construction area, construction-related activities, including  
22 equipment operation, noise and visual disturbances could destroy nests or lead to their  
23 abandonment, resulting in mortality of eggs and nestlings. Mitigation Measure BIO-75 would be  
24 available to address these adverse effects.

25 The following paragraphs summarize the combined effects discussed above and describe other  
26 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also  
27 included.

### 28 ***Near-Term Timeframe***

29 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
30 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
31 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
32 effects of construction would not be adverse under NEPA. Alternative 1C would remove 12,372  
33 acres (8,246 permanent, 4,126 temporary) of high-value habitat for loggerhead shrike in the study  
34 area in the near-term. These effects would result from the construction of the water conveyance  
35 facilities (CM1, 6,546 acres), and implementing other conservation measures (*CM2 Yolo Bypass*  
36 *Fisheries Enhancement*, *CM4 Tidal Natural Communities Restoration*, *CM5 Seasonally Inundated*  
37 *Floodplain Restoration*, *CM7 Riparian Natural Community Restoration*, *CM8 Grassland Natural*  
38 *Community Restoration*, *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*, *CM11*  
39 *Natural Communities Enhancement and Management* and *CM18 Conservation Hatcheries*—5,826  
40 acres). In addition, 6,943 acres (3,921 permanent, 3,022 temporary) of low-value habitat would be  
41 removed or converted in the near-term (CM1, 5,045 acres; *CM2 Yolo Bypass Fisheries Enhancement*,  
42 *CM4 Tidal Natural Communities Restoration*, *CM7 Riparian Natural Community Restoration*, *CM8*  
43 *Grassland Natural Community Restoration*, *CM9 Vernal Pool and Alkali Seasonal Wetland Complex*

1 *Restoration, CM11 Natural Communities Enhancement and Management and CM18 Conservation*  
2 *Hatcheries—1,898 acres).*

3 The typical NEPA and CEQA project-level mitigation ratio for those natural communities affected  
4 would be 2:1 protection of high-value habitat. Using this ratio would indicate that 13,092 acres  
5 should be protected to compensate for the loss of high-value habitat from CM1. The near-term  
6 effects of other conservation actions would require 11,652 acres of protection to compensate for the  
7 loss of high-value shrike habitat using the same typical NEPA and CEQA ratio (2:1 protection for the  
8 loss of high-value habitat). The loss of low-value habitat would not require mitigation because a  
9 large proportion of the low-value habitat would result from the conversion and enhancement to  
10 high-value habitats. In addition, temporary impacts on cultivated lands would be restored relatively  
11 quickly after completion of construction.

12 The BDCP has committed to near-term goals of protecting 2,000 acres and restoring 1,140 acres of  
13 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of  
14 alkali seasonal wetland complex, and protecting 15,400 acres of non-rice cultivated lands (Table 3-4  
15 in Chapter 3, *Description of Alternatives*). These conservation actions are associated with CM3, CM8,  
16 and CM9 and would occur in the same timeframe as the construction and early restoration losses.

17 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1  
18 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali  
19 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous  
20 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would  
21 create larger, more expansive patches of high-value habitat for loggerhead shrike and reduce the  
22 effects of current levels of habitat fragmentation. Under *CM11 Natural Communities Enhancement*  
23 *and Management*, insect prey populations would be increased on protected lands, enhancing the  
24 foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4).  
25 Cultivated lands that provide habitat for covered and other native wildlife species would provide  
26 approximately 15,400 acres of potential high-value habitat for loggerhead shrike (Objective  
27 CLNC1.1). In addition, there is a commitment in the plan (Objective CLNC1.3) to maintain and  
28 protect small patches of trees and shrubs within cultivated lands that would maintain foraging  
29 perches and nesting habitat for the species. The establishment of 20- to 30-foot-wide hedgerows  
30 along field borders and roadsides within protected cultivated lands would also provide high-value  
31 nesting habitat for loggerhead shrike (Objective SH2.2). These Plan objectives represent  
32 performance standards for considering the effectiveness of conservation actions.

33 The combined acres of restoration and protection of 3,660 acres of grassland, vernal pool complex,  
34 and alkali seasonal wetland contained in the near-term Plan goals and the additional detail in the  
35 biological objectives satisfy the typical mitigation that would be applied to the project-level effects of  
36 CM1. However, some portion of the 15,400 acres of cultivated lands protected in the near-term  
37 timeframe would need to include suitable high-value crop types for loggerhead shrike to avoid the  
38 adverse effect of habitat loss resulting from CM1. The conservation commitment is 5,684 acres short  
39 of meeting the compensation for other near-term effects on loggerhead shrike high-value habitat.  
40 Mitigation Measure BIO-138, *Compensate for the Near-Term Loss of High-Value Loggerhead Shrike*  
41 *Habitat*, would be available to address the adverse effect of near-term high-value habitat loss by  
42 providing crop management requirements for CM1 compensation and requiring additional acreage  
43 compensation for the other near-term effects. With the management and enhancement of cultivated  
44 lands including insect prey enhancement through CM3 and CM11, the protection of shrubs and

1 establishment of hedgerows within protected cultivated lands would compensate for any effect from  
2 the loss of low-value loggerhead shrike foraging habitat.

3 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
4 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
5 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
6 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
7 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
8 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
9 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

10 The loggerhead shrike is not a covered species under the BDCP. For the BDCP to avoid an adverse  
11 effect on individuals, preconstruction surveys for noncovered avian species would be required to  
12 ensure that nests are detected and avoided. Mitigation Measure BIO-75, *Conduct Preconstruction*  
13 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to address this effect.

#### 14 **Late Long-Term Timeframe**

15 Alternative 1C as a whole would result in the combined permanent of and temporary effects on  
16 33,688 acres of high-value habitat and 23,244 acres of low-value loggerhead shrike habitat over the  
17 term of the Plan. The locations of these losses are described above in the analyses of individual  
18 conservation measures. The Plan includes conservation commitments through *CM3 Natural*  
19 *Communities Protection and Restoration*, *CM8 Grassland Natural Community Restoration*, and *CM9*  
20 *Vernal Pool and Alkali Seasonal Wetland Complex Restoration* to protect 8,000 acres and restore  
21 2,000 acres of grassland natural community, protect 600 acres of vernal pool complex, protect 150  
22 acres of alkali seasonal wetland complex and protect 48,625 acres of cultivated lands that provide  
23 suitable habitat for native wildlife species (Table 3-4 in Chapter 3). Grassland restoration and  
24 protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1 and GNC1.2). Grassland  
25 protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali seasonal wetland  
26 complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous matrix of  
27 grassland, alkali seasonal wetland, and vernal pool natural communities which would create larger,  
28 more expansive patches of high-value habitat for loggerhead shrike and reduce the effects of current  
29 levels of habitat fragmentation. Under *CM11 Natural Communities Enhancement and Management*,  
30 insect prey populations would be increased on protected lands, enhancing the foraging value of  
31 these natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4). Cultivated lands that  
32 provide habitat for covered and other native wildlife species would provide approximately 48,625  
33 acres of potential high-value habitat for loggerhead shrike (Objective CLNC1.1). In addition, there is  
34 a commitment in the plan (Objective CLNC1.3) to maintain and protect small patches of trees and  
35 shrubs within cultivated lands that would maintain foraging perches and nesting habitat for the  
36 species. The establishment of 20- to 30-foot-wide hedgerows along field borders and roadsides  
37 within protected cultivated lands would also provide high-value nesting habitat for loggerhead  
38 shrike (Objective SH2.2).

39 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
40 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
41 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
42 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
43 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
44 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
45 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*. The loggerhead

1 shrike is not a covered species under the BDCP. For the BDCP to avoid an adverse effect on  
2 individuals, preconstruction surveys for noncovered avian species would be required to ensure that  
3 nests are detected and avoided. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird*  
4 *Surveys and Avoid Disturbance of Nesting Birds*, would be available to address this effect.

5 **NEPA Effects:** The loss of loggerhead shrike habitat and potential for mortality of this special-status  
6 species under Alternative 1C would represent an adverse effect in the absence of other conservation  
7 actions. With habitat protection and restoration associated with CM3, CM8, CM9, and CM11, guided  
8 by biological goals and objectives and by AMM1–AMM7, and with implementation of Mitigation  
9 Measure BIO-138, *Compensate for the Near-Term Loss of High-Value Loggerhead Shrike Habitat*, the  
10 effects of habitat loss on loggerhead shrike under Alternative 1C would not be adverse. Loggerhead  
11 shrike is not a covered species under the BDCP, and potential mortality would be an adverse effect  
12 without preconstruction surveys to ensure that nests are detected and avoided. Mitigation Measure  
13 BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would  
14 be available to address this effect.

15 **CEQA Conclusion:**

16 **Near-Term Timeframe**

17 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
18 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
19 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
20 effects of construction would be less than significant under CEQA. Alternative 1C would remove  
21 12,372 acres (8,246 permanent, 4,126 temporary) of high-value habitat for loggerhead shrike in the  
22 study area in the near-term. These effects would result from the construction of the water  
23 conveyance facilities (CM1, 6,546 acres), and implementing other conservation measures (*CM2 Yolo*  
24 *Bypass Fisheries Enhancement*, *CM4 Tidal Natural Communities Restoration*, *CM5 Seasonally*  
25 *Inundated Floodplain Restoration*, *CM7 Riparian Natural Community Restoration*, *CM8 Grassland*  
26 *Natural Community Restoration*, *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*,  
27 *CM11 Natural Communities Enhancement and Management* and *CM18 Conservation Hatcheries—*  
28 *5,826 acres*). In addition, 6,943 acres (3,921 permanent, 3,022 temporary) of low-value habitat  
29 would be removed or converted in the near-term (CM1, 5,045 acres; *CM2 Yolo Bypass Fisheries*  
30 *Enhancement*, *CM4 Tidal Natural Communities Restoration*, *CM7 Riparian Natural Community*  
31 *Restoration*, *CM8 Grassland Natural Community Restoration*, *CM9 Vernal Pool and Alkali Seasonal*  
32 *Wetland Complex Restoration*, *CM11 Natural Communities Enhancement and Management* and *CM18*  
33 *Conservation Hatcheries—1,898 acres*).

34 The typical NEPA and CEQA project-level mitigation ratio for those natural communities affected  
35 would be 2:1 protection of high-value habitat. Using this ratio would indicate that 13,092 acres  
36 should be protected to compensate for the loss of high-value habitat from CM1. The near-term  
37 effects of other conservation actions would require 11,652 acres of protection to compensate for the  
38 loss of high-value shrike habitat using the same typical NEPA and CEQA ratio (2:1 protection for the  
39 loss of high-value habitat). The loss of low-value habitat would not require mitigation because a  
40 large proportion of the low-value habitat would result from the conversion and enhancement to  
41 high-value habitats. In addition, temporary impacts on cultivated lands would be restored relatively  
42 quickly after completion of construction.

43 The BDCP has committed to near-term goals of protecting 2,000 acres and restoring 1,140 acres of  
44 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of

1 alkali seasonal wetland complex, and protecting 15,400 acres of non-rice cultivated lands (Table 3-4  
2 in Chapter 3). These conservation actions are associated with CM3, CM8, and CM9 and would occur  
3 in the same timeframe as the construction and early restoration losses.

4 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1  
5 and GNC1.2). Grassland protection in CZs 1, 8, and 11 would be associated with vernal pool and  
6 alkali seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a  
7 contiguous matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which  
8 would create larger, more expansive patches of high-value habitat for loggerhead shrike and reduce  
9 the effects of current levels of habitat fragmentation. Under *CM11 Natural Communities*  
10 *Enhancement and Management*, insect prey populations would be increased on protected lands,  
11 enhancing the foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and  
12 GNC2.4). Cultivated lands that provide habitat for covered and other native wildlife species would  
13 provide approximately 15,400 acres of potential high-value habitat for loggerhead shrike (Objective  
14 CLNC1.1). In addition, there is a commitment in the plan (Objective CLNC1.3) to maintain and  
15 protect small patches of trees and shrubs within cultivated lands that would maintain foraging  
16 perches and nesting habitat for the species. The establishment of 20- to 30-foot-wide hedgerows  
17 along field borders and roadsides within protected cultivated lands would also provide high-value  
18 nesting habitat for loggerhead shrike (Objective SH2.2). These Plan objectives represent  
19 performance standards for considering the effectiveness of conservation actions.

20 The combined acres of restoration and protection of 3,660 acres of grassland, vernal pool complex,  
21 and alkali seasonal wetland contained in the near-term Plan goals and the additional detail in the  
22 biological objectives satisfy the typical mitigation that would be applied to the project-level effects of  
23 CM1. However, some portion of the 15,400 acres of cultivated lands protected in the near-term  
24 timeframe would need to include suitable high-value crop types for loggerhead shrike to avoid the  
25 significant impact of habitat loss resulting from CM1. The conservation commitment is 5,684 acres  
26 short of meeting the mitigation needed to compensate for other near-term effects on loggerhead  
27 shrike high-value habitat. Mitigation Measure BIO-138, *Compensate for the Near-Term Loss of High-*  
28 *Value Loggerhead Shrike Habitat* would address the significant impact of near-term high-value  
29 habitat loss by providing crop management requirements for CM1 compensation and requiring  
30 additional acreage compensation for the other near-term effects. With the implementation of  
31 Mitigation Measure BIO-138, the loss of high-value habitat would be reduced to a less-than-  
32 significant level. With the management and enhancement of cultivated lands including insect prey  
33 enhancement through CM3 and CM11, the protection of shrubs and establishment of hedgerows  
34 within protected cultivated lands would compensate for any impact from the loss of low-value  
35 loggerhead shrike foraging habitat.

36 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
37 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
38 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
39 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
40 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
41 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
42 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

43 The loggerhead shrike is not a covered species under the BDCP and in order to avoid an adverse  
44 effect on individuals, preconstruction surveys for noncovered avian species would be required to  
45 ensure that nests are detected and avoided. Mitigation Measure BIO-75, *Conduct Preconstruction*

1 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would reduce this potential impact to a  
2 less-than-significant level.

### 3 **Late Long-Term Timeframe**

4 Alternative 1C as a whole would result in the permanent loss of and temporary effects on 33,688  
5 acres of high-value loggerhead shrike habitat during the term of the Plan. In addition, 23,244 acres  
6 of low-value loggerhead shrike habitat would be impacted. The locations of these losses are  
7 described above in the analyses of individual conservation measures. The Plan includes  
8 conservation commitments through *CM3 Natural Communities Protection and Restoration*, *CM8*  
9 *Grassland Natural Community Restoration*, and *CM9 Vernal Pool and Alkali Seasonal Wetland Complex*  
10 *Restoration* to protect 8,000 acres and restore 2,000 acres of grassland natural community, protect  
11 600 acres of vernal pool complex, protect 150 acres of alkali seasonal wetland complex and protect  
12 48,625 acres of cultivated lands that provide suitable habitat for native wildlife species (Table 3-4 in  
13 Chapter 3). Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11  
14 (Objectives GNC1.1 and GNC1.2). Grassland protection in CZ 1, 8, and 11 would be associated with  
15 vernal pool and alkali seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would  
16 result in a contiguous matrix of grassland, alkali seasonal wetland, and vernal pool natural  
17 communities which would create larger, more expansive patches of high-value habitat for  
18 loggerhead shrike and reduce the effects of current levels of habitat fragmentation. Under *CM11*  
19 *Natural Communities Enhancement and Management*, insect prey populations would be increased on  
20 protected lands, enhancing the foraging value of these natural communities (Objectives ASWNC2.4,  
21 VPNC2.5, and GNC2.4). Cultivated lands that provide habitat for covered and other native wildlife  
22 species would provide approximately 48,625 acres of potential high-value habitat for loggerhead  
23 shrike (Objective CLNC1.1). In addition, there is a commitment in the plan (Objective CLNC1.3) to  
24 maintain and protect small patches of trees and shrubs within cultivated lands that would maintain  
25 foraging perches and nesting habitat for the species. The establishment of 20- to 30-foot-wide  
26 hedgerows along field borders and roadsides within protected cultivated lands would also provide  
27 high-value nesting habitat for loggerhead shrike (Objective SH2.2).

28 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
29 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
30 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
31 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
32 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
33 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
34 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*. The loggerhead  
35 shrike is not a covered species under the BDCP. For the BDCP to avoid an adverse effect on  
36 individuals, preconstruction surveys for noncovered avian species would be required to ensure that  
37 nests are detected and avoided. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird*  
38 *Surveys and Avoid Disturbance of Nesting Birds*, would reduce this potential impact to a less-than-  
39 significant level.

40 Considering Alternative 1C's protection and restoration provisions, which would provide acreages  
41 of new high-value or enhanced habitat in amounts suitable to compensate for habitats lost to  
42 construction and restoration activities, and with the implementation of AMM1-AMM7, Mitigation  
43 Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting*  
44 *Birds*, and Mitigation Measure BIO-138, *Compensate for the Near-Term Loss of High-Value*  
45 *Loggerhead Shrike Habitat*, the loss of habitat or direct mortality through implementation of

1 Alternative 1C would not result in a substantial adverse effect through habitat modifications and  
2 would not substantially reduce the number or restrict the range of the species. Therefore, the loss of  
3 habitat or potential mortality under this alternative would have a less-than-significant impact on  
4 loggerhead shrike.

5 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**  
6 **Disturbance of Nesting Birds**

7 See Mitigation Measure BIO-75 under Impact BIO-75.

8 **Mitigation Measure BIO-138: Compensate for the Near-term Loss of High-Value**  
9 **Loggerhead Shrike Habitat**

10 Because the BDCP does not include acreage commitments for the protection of crop types in the  
11 near-term time period, DWR will manage and protect sufficient acres of cultivated lands such as  
12 pasture, grain and hay crops, or alfalfa as high-value loggerhead shrike habitat such that the  
13 total acres of high-value habitat impacted in the near-term timeframe are mitigated at a ratio of  
14 2:1. Additional grassland protection, enhancement, and management may be substituted for the  
15 protection of high-value cultivated lands.

16 **Impact BIO-139: Effects on Loggerhead Shrike Associated with Electrical Transmission**  
17 **Facilities**

18 New transmission lines would increase the risk for bird-power line strikes and/or electrocution,  
19 which could result in injury or mortality of loggerhead shrike. The risk for bird-power line strikes,  
20 and/or electrocution would be minimized for lesser sandhill crane with the incorporation of *AMM20 Greater*  
21 *Greater Sandhill Crane* into the BDCP. This measure would ensure that conductor and ground lines  
22 are fitted with flight diverters in compliance with the best available practices, such as those  
23 specified in the USFWS Avian Protection Guidelines.

24 **NEPA Effects:** New transmission lines would increase the risk for bird-power line strikes, which  
25 could result in injury or mortality of loggerhead shrike. With the implementation of *AMM20 Greater*  
26 *Sandhill Crane* the effect of new transmission lines on loggerhead shrike would not be adverse.

27 **CEQA Conclusion:** New transmission lines would increase the risk for bird-power line strikes  
28 and/or electrocution, which could result in injury or mortality of loggerhead shrike. With the  
29 incorporation of *AMM20 Greater Sandhill Crane* into the BDCP, new transmission lines would have a  
30 less-than-significant impact on loggerhead shrike.

31 **Impact BIO-140: Indirect Effects of Plan Implementation on Loggerhead Shrike**

32 Noise and visual disturbances associated with construction-related activities could result in  
33 temporary disturbances that affect loggerhead shrike use of modeled habitat. Construction noise  
34 above background noise levels (greater than 50 dBA) could extend 1,900 to 5,250 feet from the edge  
35 of construction activities (BDCP Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of*  
36 *the BDCP Conveyance Facility on Sandhill Crane*, Table 4), although there are no available data to  
37 determine the extent to which these noise levels could affect loggerhead shrike. Indirect effects  
38 associated with construction include noise, dust, and visual disturbance caused by grading, filling,  
39 contouring, and other ground-disturbing operations. If loggerhead shrike were to nest in or adjacent  
40 to work areas, construction and subsequent maintenance-related noise and visual disturbances

1 could mask calls, disrupt foraging and nesting behaviors, and reduce the functions of suitable  
2 nesting habitat for these species. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird*  
3 *Surveys and Avoid Disturbance of Nesting Birds*, would avoid the potential for adverse effects of  
4 construction-related activities on survival and productivity of nesting loggerhead shrike. The use of  
5 mechanical equipment during water conveyance facilities construction could cause the accidental  
6 release of petroleum or other contaminants that could affect loggerhead shrike in the surrounding  
7 habitat. The inadvertent discharge of sediment or excessive dust adjacent to suitable habitat could  
8 also have an adverse effect on the species. AMM1–AMM7, including *AMM2 Construction Best*  
9 *Management Practices and Monitoring*, would minimize the likelihood of such spills and ensure that  
10 measures are in place to prevent runoff from the construction area and negative effects of dust on  
11 active nests.

12 **NEPA Effects:** Indirect effects on loggerhead shrike as a result of Plan implementation could have  
13 adverse effects on these species through the modification of habitat and potential for direct  
14 mortality. The loggerhead shrike is not a covered species under the BDCP and potential mortality  
15 would be an adverse effect without preconstruction surveys to ensure that nests are detected and  
16 avoided. Construction of the new forebay in CZ 8 would have the potential to disrupt nesting  
17 loggerhead shrikes in the highly suitable habitat surrounding Clifton Court Forebay and adjacent to  
18 work areas. In conjunction with AMM1–AMM7, Mitigation Measure BIO-75, *Conduct Preconstruction*  
19 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to address this effect.

20 **CEQA Conclusion:** Indirect effects as a result of Alternative 1C implementation could have a  
21 significant impact on loggerhead shrike. The incorporation of AMM1–AMM7 into the BDCP and the  
22 implementation of Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and*  
23 *Avoid Disturbance of Nesting Birds*, would reduce this impact to a less-than-significant level.

24 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**  
25 **Disturbance of Nesting Birds**

26 See discussion of Mitigation Measure BIO-75 under Impact 75.

27 **Impact BIO-141: Periodic Effects of Inundation on Loggerhead Shrike as a Result of**  
28 **Implementation of Conservation Components**

29 Flooding of the Yolo Bypass from Fremont Weir operations (*CM2 Yolo Bypass Fisheries*  
30 *Enhancement*) would increase the frequency and duration of inundation on approximately 2,121–  
31 4,318 acres of modeled loggerhead shrike habitat (consisting of approximately 894–2,460 acres of  
32 high-value habitat; Table 12-1C-51).

33 Based on hypothetical footprints, implementation of *CM5 Seasonally Inundated Floodplain*  
34 *Restoration* could result in the periodic inundation of up to approximately 7,845 acres of modeled  
35 habitat (Table 12-1C-51), the majority of which would be pasture and other cultivated lands.

36 Reduced foraging habitat availability may be expected during the fledgling period of the nesting  
37 season due to periodic inundation. However, inundation would occur during the nonbreeding  
38 season and would not be expected to have an adverse effect on the species.

39 **NEPA Effects:** Periodic inundation of floodplains would not result in an adverse effect on loggerhead  
40 shrike from the modification of habitat. Reduced foraging habitat availability may be expected  
41 during the fledgling period of the nesting season due to periodic inundation. However, increased  
42 frequency and duration of inundation would occur during the nonbreeding season.

1 **CEQA Conclusion:** Periodic inundation of floodplains would not have a significant impact on  
2 loggerhead shrike because inundation is expected to occur prior to the breeding season.

### 3 **Song Sparrow “Modesto” Population**

4 This section describes the effects of Alternative 1C, including water conveyance facilities  
5 construction and implementation of other conservation components, on Modesto song sparrow. The  
6 Modesto song sparrow is common and ubiquitous throughout the study area, excluding CZ 11, and  
7 modeled habitat for the species includes managed wetlands, tidal freshwater emergent, nontidal  
8 freshwater emergent, and valley/foothill riparian vegetation communities.

9 Construction and restoration associated with Alternative 1C conservation measures would result in  
10 both temporary and permanent removal of Modesto song sparrow habitat in the quantities  
11 indicated in Table 12-1C-52. However, BDCP activities are expected to have little impact on the  
12 population. Full implementation of Alternative 1C would include the following biological objectives  
13 over the term of the BDCP which would also benefit Modesto song sparrow (BDCP Chapter 3,  
14 Section 3.3, *Biological Goals and Objectives*).

- 15 ● Restore or create at least 5,000 acres of valley/foothill riparian natural community, with at least  
16 3,000 acres occurring on restored seasonally inundated floodplain (Objective VFRNC1.1,  
17 associated with CM7).
- 18 ● Protect at least 750 acres of existing valley/foothill riparian natural community in CZ 7 by year  
19 10 (Objective VFRNC1.2, associated with CM3).
- 20 ● Restore or create at least 24,000 acres of tidal freshwater emergent wetland in CZ 1, 2, 4, 5, 6,  
21 and/or 7 (Objective TFEWNC1.1, associated with CM4).
- 22 ● Create at least 1,200 acres of nontidal marsh consisting of a mosaic of nontidal perennial aquatic  
23 and nontidal freshwater emergent wetland natural communities (Objective NFEW/NPANC1.1,  
24 associated with CM10)
- 25 ● Create 500 acres of managed wetlands in CZ 3, 4, 5, or 6 (Objectives GSHC1.3 and GSHC1.4,  
26 associated with CM10).
- 27 ● Increase prey availability and accessibility for grassland-foraging species (Objectives ASWNC2.4,  
28 VPNC2.5, and GNC2.4, associated with CM11).
- 29 ● Maintain and protect the small patches of important wildlife habitats associated with cultivated  
30 lands that occur in cultivated lands within the reserve system, including isolated valley oak  
31 trees, trees and shrubs along field borders and roadsides, remnant groves, riparian corridors,  
32 water conveyance channels, grasslands, ponds, and wetlands (Objective CLNC1.3, associated  
33 with CM3).
- 34 ● Establish 20- to 30-foot-wide hedgerows along field borders and roadsides within protected  
35 cultivated lands at a minimum rate of 400 linear feet per 100 acres (Objective SH2.2, associated  
36 with CM3).

37 As explained below, with the restoration or protection of these amounts of habitat, in addition to  
38 implementation of AMM1–AMM7 and Mitigation Measure BIO-75, impacts on Modesto song  
39 sparrow would not be adverse for NEPA purposes and would be less than significant for CEQA  
40 purposes.

1 **Table 12-1C-52. Changes in Modesto Song Sparrow Modeled Habitat Associated with Alternative 1C**  
2 **(acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	Nesting	43	43	239	239	NA	NA
<b>Total Impacts CM1</b>		<b>43</b>	<b>43</b>	<b>239</b>	<b>239</b>	<b>NA</b>	<b>NA</b>
CM2–CM18	Nesting	1,980	2,816	133	169	81–158	284
<b>Total Impacts CM2–CM18</b>		<b>1,980</b>	<b>2,816</b>	<b>133</b>	<b>169</b>	<b>81–158</b>	<b>284</b>
<b>TOTAL IMPACTS</b>		<b>2,023</b>	<b>2,859</b>	<b>372</b>	<b>408</b>	<b>81–158</b>	<b>284</b>

<sup>a</sup> See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

3  
4 **Impact BIO-142: Loss or Conversion of Habitat for and Direct Mortality of Modesto Song**  
5 **Sparrow**

6 Alternative 1C conservation measures would result in the combined permanent and temporary loss  
7 of up to 3,267 acres of modeled habitat for Modesto song sparrow (2,859 acres of permanent loss  
8 and 408 acres of temporary loss, Table 12-1C-52). Conservation measures that would result in these  
9 losses are conveyance facilities and transmission line construction, and establishment and use of  
10 borrow and spoil areas (CM1), Yolo Bypass fisheries improvements (CM2), tidal habitat restoration  
11 (CM4), and floodplain restoration (CM5). Habitat enhancement and management activities (CM11),  
12 which include ground disturbance or removal of nonnative vegetation, could result in local adverse  
13 habitat effects. In addition, maintenance activities associated with the long-term operation of the  
14 water conveyance facilities and other BDCP physical facilities could degrade or eliminate Modesto  
15 song sparrow modeled habitat. Each of these individual activities is described below. A summary  
16 statement of the combined impacts and NEPA effects, and a CEQA conclusion follows the individual  
17 conservation measure discussions.

- 18 • *CM1 Water Facilities and Operation*: Construction of Alternative 1C conveyance facilities would  
19 result in the combined permanent and temporary loss of up to 282 acres of modeled Modesto  
20 song sparrow habitat (43 acres of permanent loss, 239 acres of temporary loss) from CZ 1, 3, 5,  
21 6, 8, and 9. Impacts would occur from the construction of Intakes 1-5, the construction of the  
22 canal and associated borrow and spoil areas, and temporary work areas throughout the central  
23 Delta. Permanent and temporary impacts on modeled habitat would also occur as a result of the  
24 proposed transmission lines. The CM1 construction footprint overlaps with two Modesto song  
25 sparrow occurrences (one with a temporary barge facility and one with the permanent tunnel  
26 impact) and the species is ubiquitous throughout the Delta. Mitigation Measure BIO-75, *Conduct*

1        *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would require  
2        preconstruction surveys and the establishment of no-disturbance buffers and would be  
3        available to address potential effects on nesting song sparrows. Refer to the Terrestrial Biology  
4        Map Book for a detailed view of Alternative 1C construction locations. Construction of the water  
5        conveyance facilities would occur in the near-term timeframe.

- 6        ● *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo bypass fisheries enhancement  
7        would permanently remove 143 acres of modeled Modesto song sparrow habitat in the Yolo  
8        Bypass in CZ 2. In addition, 133 acres of habitat would be temporarily removed. These losses  
9        would occur in the near-term timeframe and primarily consist of valley/foothill riparian natural  
10       community and managed wetland. The loss is expected to occur during the first 10 years of  
11       Alternative 1C implementation.
- 12       ● *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and  
13       inundation would result in the conversion of an estimated loss of 2,629 acres of modeled  
14       Modesto song sparrow habitat.
- 15       ● *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore  
16       seasonally inundated floodplain would permanently and temporarily remove approximately 80  
17       acres of modeled Modesto song sparrow habitat (44 permanent, 36 temporary). These losses  
18       would be expected to occur along the San Joaquin River and other major waterways in CZ 7. The  
19       BDCP is expected to restore approximately 5,000 acres of valley/foothill riparian natural  
20       community. These lands would be managed as a mosaic of seral stages, age classes, and plant  
21       heights, some of which would provide suitable nesting habitat for Modesto song sparrow.
- 22       ● *CM6 Channel Margin Enhancement*: Channel margin habitat enhancement could result in  
23       removal of small amounts of valley/foothill riparian habitat along 20 miles of river and sloughs.  
24       The extent of this loss cannot be quantified at this time, but the majority of the enhancement  
25       activity would occur along waterway margins where riparian habitat stringers exist, including  
26       levees and channel banks. The improvements would occur within the study area on sections of  
27       the Sacramento, San Joaquin and Mokelumne Rivers, and along Steamboat and Sutter Sloughs.  
28       Some of the restored riparian habitat in the channel margin would be expected to support  
29       nesting habitat for Modesto song sparrow.
- 30       ● *CM11 Natural Communities Enhancement and Management*: A variety of habitat management  
31       actions included in CM11 that are designed to enhance wildlife values in restored or protected  
32       habitats could result in localized ground disturbances that could temporarily remove small  
33       amounts of modeled habitat. Ground-disturbing activities, such as removal of nonnative  
34       vegetation and road and other infrastructure maintenance activities, would be expected to have  
35       minor adverse effects on available habitat and would be expected to result in overall  
36       improvements to and maintenance of habitat values over the term of the BDCP.

37       Habitat management- and enhancement-related activities could affect Modesto song sparrow  
38       nests. If the individuals were to nest in the vicinity of a worksite, equipment operation could  
39       destroy nests, and noise and visual disturbances could lead to their abandonment, resulting in  
40       mortality of eggs and nestlings. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting*  
41       *Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to address these adverse  
42       effects.

- 43       ● *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground  
44       water conveyance facilities and restoration infrastructure could result in ongoing but periodic

1 disturbances that could affect Modesto song sparrow use of the surrounding habitat.  
2 Maintenance activities would include vegetation management, levee and structure repair, and  
3 re-grading of roads and permanent work areas. These effects, however, would be reduced by  
4 AMMs, and conservation actions as described below.

- 5 • Injury and Direct Mortality: Construction-related activities would not be expected to result in  
6 direct mortality of adult or fledged Modesto song sparrow if they were present in the Plan Area,  
7 because they would be expected to avoid contact with construction and other equipment. If  
8 either species were to nest in the construction area, construction-related activities, including  
9 equipment operation, noise and visual disturbances could destroy nests or lead to their  
10 abandonment, resulting in mortality of eggs and nestlings. Mitigation Measure BIO-75 would be  
11 available to address these adverse effects.

12 The following paragraphs summarize the combined effects discussed above and describe other  
13 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also  
14 included.

### 15 ***Near-Term Timeframe***

16 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
17 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
18 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
19 effects of construction would not be adverse under NEPA. Alternative 1C would remove 2,395 acres  
20 of modeled habitat (2,023 permanent, 372 temporary) for Modesto song sparrow in the study area  
21 in the near-term. These effects would result from the construction of the water conveyance facilities  
22 (CM1, 282 acres), and implementing other conservation measures (*CM2 Yolo Bypass Fisheries*  
23 *Enhancement*, *CM4 Tidal Natural Communities Restoration*, and *CM5 Seasonally Inundated Floodplain*  
24 *Restoration*—2,113 acres).

25 Typical NEPA and CEQA project-level mitigation ratios for those natural communities that would be  
26 affected would be 1:1 for restoration/creation and 1:1 protection of habitat. Using these ratios  
27 would indicate that 282 acres of suitable habitat should be restored/created and 282 acres should  
28 be protected to compensate for the CM1 losses of Modesto song sparrow habitat. The near-term  
29 effects of other conservation actions would remove 2,113 acres of modeled habitat, and therefore  
30 require 2,113 acres of restoration/creation and 2,113 acres of protection of Modesto song sparrow  
31 habitat using the same typical NEPA and CEQA ratios (1:1 for restoration/creation and 1:1 for  
32 protection).

33 The BDCP has committed to near-term goals of protecting 750 acres and restoring 800 acres of the  
34 valley/foothill riparian natural community, restoring 2,000 acres of tidal freshwater emergent  
35 wetland, restoring 500 acres of managed wetland, and restoring 400 acres of nontidal marsh in the  
36 Plan Area (Table 3-4 in Chapter 3, *Description of Alternatives*). These conservation actions are  
37 associated with CM3, CM4, CM7, and CM10 and would occur in the same timeframe as the  
38 construction and early restoration losses, thereby avoiding adverse effects of habitat loss on  
39 Modesto song sparrow. The majority of the riparian restoration acres would occur in CZ 7 as part of  
40 a reserve system with extensive wide bands or large patches of valley/foothill riparian natural  
41 community (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*) and  
42 would provide suitable Modesto song sparrow nesting habitat. The tidal freshwater emergent  
43 wetland would be restored in CZs 1, 2, 4, 5, 6, and/or 7 (Objective TFEWNC1.1) and would be  
44 restored in a way that creates topographic heterogeneity and in areas that increase connectivity

1 among protected lands (Objective TFEWNC2.2). The nontidal marsh restoration would occur in  
2 CZs 2, 4, and/or 5, and the managed wetland restoration would occur in CZs 3, 4, 5, or 6. Both the  
3 nontidal marsh and managed wetland restoration are associated with CM10 and would provide  
4 nesting habitat for Modesto song sparrow.

5 The Plan also includes commitments to protect patches of important wildlife habitat on cultivated  
6 lands such as trees and shrubs along borders and roadside, riparian corridors, and wetlands  
7 (Objective CLNC1.3). In addition, 20- to 30-foot-wide hedgerows would be established along field  
8 borders and roadsides, which would provide additional habitat for the species (Objective SH2.2).  
9 The management of protected grasslands to increase insect prey through techniques such as the  
10 avoidance of use of pesticides (Objectives ASWNC2.4, VPNC2.5, and GNC2.4) would provide further  
11 benefits to foraging Modesto song sparrows. These Plan objectives represent performance  
12 standards for considering the effectiveness of conservation actions. The acres of restoration and  
13 protection contained in the near-term Plan goals and the additional detail in the biological objectives  
14 satisfy the typical mitigation that would be applied to the project-level effects of CM1 on Modesto  
15 song sparrow, as well as mitigate the near-term effects of the other conservation measures.

16 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
17 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
18 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
19 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
20 *Material* and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
21 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
22 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

23 Modesto song sparrow is not a covered species under the BDCP. For the BDCP to avoid an adverse  
24 effect on individuals, preconstruction surveys for noncovered avian species would be required to  
25 ensure that nests are detected and avoided. Mitigation Measure BIO-75, *Conduct Preconstruction*  
26 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to address this  
27 adverse effect.

### 28 **Late Long-Term Timeframe**

29 Alternative 1C as a whole would result in the permanent loss of and temporary effects on 3,267  
30 acres (2,859 acres of permanent loss, 408 acres of temporary loss) of modeled Modesto song  
31 sparrow habitat during the term of the Plan. The locations of these losses are described above in the  
32 analyses of individual conservation measures. The Plan includes conservation commitments  
33 through *CM3 Natural Communities Protection and Restoration*, *CM4 Tidal Natural Communities*  
34 *Restoration*, and *CM10 Nontidal Marsh Restoration* to protect 750 acres and restore 5,000 acres of  
35 the valley/foothill riparian natural community, restore 24,000 acres of tidal freshwater emergent  
36 wetland, restore 500 acres of managed wetland, and restore 1,200 acres of nontidal marsh in the  
37 Plan Area (Table 3-4 in Chapter 3, *Description of Alternatives*). Additional acres of valley/foothill  
38 riparian habitat would be restored as a component of channel margin enhancement actions (CM6)  
39 along 20 miles of river and slough channels in the Delta, some of which would be expected to  
40 support nesting habitat for Modesto song sparrow. Of the 5,000 acres of restored riparian natural  
41 communities, a minimum of 3,000 acres of valley/foothill riparian would be restored within the  
42 seasonally inundated floodplain, and 1,000 acres would be managed as dense early to mid-  
43 successional riparian forest (Objectives VFRNC1.1 and VFRNC1.2). Goals and objectives in the Plan

1 for riparian restoration also include the maintenance and enhancement of structural heterogeneity  
2 (Objective VFRNC2.1) which would provide suitable nesting habitat for Modesto song sparrow.

3 The tidal freshwater emergent wetland would be restored in CZs 1, 2, 4, 5, 6, and/or 7 (Objective  
4 TFEWNC1.1) and would be restored in a way that creates topographic heterogeneity and in areas  
5 that increase connectivity among protected lands (Objective TFEWNC2.2). The nontidal marsh  
6 restoration would occur in CZs 2, 4, and/or 5, and the managed wetland restoration would occur in  
7 CZs 3, 4, 5, or 6. Both the nontidal marsh and managed wetland restoration are associated with  
8 CM10 and would provide nesting habitat for Modesto song sparrow.

9 The Plan includes commitments to protect patches of important wildlife habitat on cultivated lands  
10 such as trees and shrubs along borders and roadside, riparian corridors, and wetlands (Objective  
11 CLNC1.3). In addition, 20- to 30-foot-wide hedgerows would be established along field borders and  
12 roadsides, which would provide additional habitat for the species (Objective SH2.2). The  
13 management of protected grasslands to increase insect prey through techniques such as the  
14 avoidance of use of pesticides (Objectives ASWNC2.4, VPNC2.5, and GNC2.4) would provide further  
15 benefits to foraging Modesto song sparrows. These Plan objectives represent performance  
16 standards for considering the effectiveness of conservation actions. The acres of restoration and  
17 protection contained in the near-term Plan goals and the additional detail in the biological objectives  
18 satisfy the typical mitigation that would be applied to the project-level effects of CM1 on Modesto  
19 song sparrow, as well as mitigate the near-term effects of the other conservation measures.

20 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
21 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
22 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
23 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
24 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
25 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
26 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*. Modesto song  
27 sparrow is not a covered species under the BDCP. For the BDCP to avoid an adverse effect on  
28 individuals, preconstruction surveys for noncovered avian species would be required to ensure that  
29 nests are detected and avoided. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird*  
30 *Surveys and Avoid Disturbance of Nesting Birds*, would be available to address this adverse effect.

31 **NEPA Effects:** The loss of Modesto song sparrow habitat and potential for mortality of this special-  
32 status species under Alternative 1C would represent an adverse effect in the absence of other  
33 conservation actions. With habitat protection and restoration associated with CM3, CM4, CM6, CM7,  
34 and CM11, guided by biological goals and objectives and by AMM1–AMM7, which would be in place  
35 throughout the construction period, the effects of habitat loss on Modesto song sparrow under  
36 Alternative 1C would not be adverse. The Modesto song sparrow is not a covered species under the  
37 BDCP, and potential mortality would be an adverse effect without preconstruction surveys to ensure  
38 that nests are detected and avoided. Mitigation Measure BIO-75 would be available to address this  
39 effect.

#### 40 **CEQA Conclusion:**

#### 41 **Near-Term Timeframe**

42 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
43 the near-term BDCP conservation strategy has been evaluated to determine whether it would

1 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
2 effects of construction would be less than significant under CEQA. Alternative 1C would remove  
3 2,395 acres of modeled habitat (2,023 acres permanently, 372 acres temporarily) for Modesto song  
4 sparrow in the study area in the near-term. These effects would result from the construction of the  
5 water conveyance facilities (CM1, 282 acres), and implementing other conservation measures (CM2  
6 *Yolo Bypass Fisheries Enhancement*, CM4 *Tidal Natural Communities Restoration*, and CM5 *Seasonally*  
7 *Inundated Floodplain Restoration*—2,113 acres).

8 Typical NEPA and CEQA project-level mitigation ratios for those natural communities that would be  
9 affected would be 1:1 for restoration/creation and 1:1 protection of habitat. Using these ratios  
10 would indicate that 282 acres of suitable habitat should be restored/created and 282 acres should  
11 be protected to compensate for the CM1 losses of Modesto song sparrow habitat. The near-term  
12 effects of other conservation actions would remove 2,113 acres of modeled habitat, and therefore  
13 require 2,113 acres of restoration/creation and 2,113 acres of protection of Modesto song sparrow  
14 habitat using the same typical NEPA and CEQA ratios (1:1 for restoration/creation and 1:1 for  
15 protection).

16 The BDCP has committed to near-term goals of protecting 750 acres and restoring 800 acres of the  
17 valley/foothill riparian natural community, restoring 2,000 acres of tidal freshwater emergent  
18 wetland, restoring 500 acres of managed wetland, and restoring 400 acres of nontidal marsh in the  
19 Plan Area (Table 3-4 in Chapter 3, *Description of Alternatives*). These conservation actions are  
20 associated with CM3, CM4, CM7, and CM10 and would occur in the same timeframe as the  
21 construction and early restoration losses, thereby avoiding a significant impact of habitat loss on  
22 Modesto song sparrow. The majority of the riparian restoration acres would occur in CZ 7 as part of  
23 a reserve system with extensive wide bands or large patches of valley/foothill riparian natural  
24 community (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*) and  
25 would provide suitable Modesto song sparrow nesting habitat. The tidal freshwater emergent  
26 wetland would be restored in CZs 1, 2, 4, 5, 6, and/or 7 (Objective TFEWNC1.1) and would be  
27 restored in a way that creates topographic heterogeneity and in areas that increase connectivity  
28 among protected lands (Objective TFEWNC2.2). The nontidal marsh restoration would occur in  
29 CZs 2, 4, and/or 5, and the managed wetland restoration would occur in CZs 3, 4, 5, or 6. Both the  
30 nontidal marsh and managed wetland restoration are associated with CM10 and would provide  
31 nesting habitat for Modesto song sparrow.

32 The Plan also includes commitments to protect patches of important wildlife habitat on cultivated  
33 lands such as trees and shrubs along borders and roadside, riparian corridors, and wetlands  
34 (Objective CLNC1.3). In addition, 20- to 30-foot-wide hedgerows would be established along field  
35 borders and roadsides, which would provide additional habitat for the species (Objective SH2.2).  
36 The management of protected grasslands to increase insect prey through techniques such as the  
37 avoidance of use of pesticides (Objectives ASWNC2.4, VPNC2.5, and GNC2.4) would provide further  
38 benefits to foraging Modesto song sparrows. These Plan objectives represent performance  
39 standards for considering the effectiveness of conservation actions. The acres of restoration and  
40 protection contained in the near-term Plan goals and the additional detail in the biological objectives  
41 satisfy the typical mitigation that would be applied to the project-level effects of CM1 on Modesto  
42 song sparrow, as well as mitigate the near-term effects of the other conservation measures.

43 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
44 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
45 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*

1 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
2 *Material, and AMM7 Barge Operations Plan. All of these AMMs include elements that would avoid or*  
3 *minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are*  
4 *described in detail in BDCP Appendix 3.C, Avoidance and Minimization Measures. Modesto song*  
5 *sparrow is not a covered species under the BDCP. For the BDCP to have a less-than-significant*  
6 *impact on individuals, preconstruction surveys for noncovered avian species would be required to*  
7 *ensure that nests were detected and avoided. Implementation of Mitigation Measure BIO-75,*  
8 *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds, would reduce*  
9 *this impact to a less-than-significant level.*

### 10 **Late Long-Term Timeframe**

11 Alternative 1C as a whole would result in the permanent loss of and temporary effects on 3,267  
12 acres (2,859 acres of permanent loss, 408 acres of temporary loss) of modeled Modesto song  
13 sparrow habitat during the term of the Plan. The locations of these losses are described above in the  
14 analyses of individual conservation measures. The Plan includes conservation commitments  
15 through *CM3 Natural Communities Protection and Restoration, CM4 Tidal Natural Communities*  
16 *Restoration, and CM10 Nontidal Marsh Restoration* to protect 750 acres and restore 5,000 acres of  
17 the valley/foothill riparian natural community, restore 24,000 acres of tidal freshwater emergent  
18 wetland, restore 500 acres of managed wetland, and restore 1,200 acres of nontidal marsh in the  
19 Plan Area (Table 3-4 in Chapter 3, *Description of Alternatives*). Additional acres of valley/foothill  
20 riparian habitat would be restored as a component of channel margin enhancement actions (CM6)  
21 along 20 miles of river and slough channels in the Delta, some of which would be expected to  
22 support nesting habitat for Modesto song sparrow. Of the 5,000 acres of restored riparian natural  
23 communities, a minimum of 3,000 acres of valley/foothill riparian would be restored within the  
24 seasonally inundated floodplain, and 1,000 acres would be managed as dense early to mid-  
25 successional riparian forest (Objectives VFRNC1.1 and VFRNC1.2). Goals and objectives in the Plan  
26 for riparian restoration also include the maintenance and enhancement of structural heterogeneity  
27 (Objective VFRNC2.1) which would provide suitable nesting habitat for Modesto song sparrow.

28 The tidal freshwater emergent wetland would be restored in CZs 1, 2, 4, 5, 6, and/or 7 (Objective  
29 TFEWNC1.1) and would be restored in a way that creates topographic heterogeneity and in areas  
30 that increase connectivity among protected lands (Objective TFEWNC2.2). The nontidal marsh  
31 restoration would occur in CZs 2, 4, and/or 5, and the managed wetland restoration would occur in  
32 CZs 3, 4, 5, or 6. Both the nontidal marsh and managed wetland restoration are associated with  
33 CM10 and would provide nesting habitat for Modesto song sparrow.

34 The Plan includes commitments to protect patches of important wildlife habitat on cultivated lands  
35 such as trees and shrubs along borders and roadside, riparian corridors, and wetlands (Objective  
36 CLNC1.3). In addition, 20- to 30-foot-wide hedgerows would be established along field borders and  
37 roadsides, which would provide additional habitat for the species (Objective SH2.2). The  
38 management of protected grasslands to increase insect prey through techniques such as the  
39 avoidance of use of pesticides (Objectives ASWNC2.4, VPNC2.5, and GNC2.4) would provide further  
40 benefits to foraging Modesto song sparrows. These Plan objectives represent performance  
41 standards for considering the effectiveness of conservation actions. The acres of restoration and  
42 protection contained in the near-term Plan goals and the additional detail in the biological objectives  
43 satisfy the typical mitigation that would be applied to the project-level effects of CM1 on Modesto  
44 song sparrow, as well as mitigate the near-term effects of the other conservation measures.

1 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*  
2 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*  
3 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
4 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
5 *Material, and AMM7 Barge Operations Plan. All of these AMMs include elements that would avoid or*  
6 *minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are*  
7 *described in detail in BDCP Appendix 3.C, Avoidance and Minimization Measures. Modesto song*  
8 *sparrow is not a covered species under the BDCP. For the BDCP to minimize direct mortality of*  
9 *individuals, preconstruction surveys for noncovered avian species would be required to ensure that*  
10 *nests are detected and avoided. Implementation of Mitigation Measure BIO-75 Conduct*  
11 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds, would reduce this*  
12 *impact to a less-than-significant level.*

13 Considering Alternative 1C's protection and restoration provisions, which would provide acreages  
14 of new high-value or enhanced habitat in amounts suitable to compensate for habitats lost to  
15 construction and restoration activities, and with the implementation of AMM1-AMM7 and  
16 Mitigation Measure BIO-75, the loss of habitat or direct mortality through implementation of  
17 Alternative 1C would not result in a substantial adverse effect through habitat modifications and  
18 would not substantially reduce the number or restrict the range of either species. Therefore, the loss  
19 of habitat or potential mortality under this alternative would have a less-than-significant impact on  
20 Modesto song sparrow.

21 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**  
22 **Disturbance of Nesting Birds**

23 See Mitigation Measure BIO-75 under Impact BIO-75.

24 **Impact BIO-143: Effects on Modesto Song Sparrow Associated with Electrical Transmission**  
25 **Facilities**

26 New transmission lines would increase the risk for bird-power line strikes, which could result in  
27 injury or mortality of Modesto song sparrow. Existing lines currently pose this risk for Modesto song  
28 sparrow and the incremental increased risk from the construction of new transmission lines is not  
29 expected to adversely affect the population.

30 **NEPA Effects:** The incremental increased risk of bird-powerline strikes from the construction of new  
31 transmission lines would not adversely affect the Modesto song sparrow population.

32 **CEQA Conclusion:** The incremental increased risk of bird-powerline strikes from the construction of  
33 new transmission lines would have a less-than-significant impact on the Modesto song sparrow  
34 population.

35 **Impact BIO-144: Indirect Effects of Plan Implementation on Modesto Song Sparrow**

36 **Indirect construction- and operation-related effects:** Noise and visual disturbances associated  
37 with construction-related activities could result in temporary disturbances that affect Modesto song  
38 sparrow use of modeled habitat. Construction noise above background noise levels (greater than 50  
39 dBA) could extend 1,900 to 5,250 feet from the edge of construction activities (BDCP Appendix 5.J,  
40 Attachment 5J.D, *Indirect Effects of the Construction of the BDCP Conveyance Facility on Sandhill*  
41 *Crane, Table 4), although there are no available data to determine the extent to which these noise*

1 levels could affect Modesto song sparrow. Indirect effects associated with construction include  
2 noise, dust, and visual disturbance caused by grading, filling, contouring, and other ground-  
3 disturbing operations. Construction-related noise and visual disturbances could disrupt nesting and  
4 foraging behaviors, and reduce the functions of suitable habitat which could result in an adverse  
5 effect on these species. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and*  
6 *Avoid Disturbance of Nesting Birds*, would be available to minimize effects on active nests. The use of  
7 mechanical equipment during water conveyance construction could cause the accidental release of  
8 petroleum or other contaminants that could affect these species or their prey in the surrounding  
9 habitat. AMM1–AMM7 including *AMM2 Construction Best Management Practices and Monitoring*  
10 would minimize the likelihood of such spills from occurring. The inadvertent discharge of sediment  
11 or excessive dust adjacent to Modesto song sparrow could also have a negative effect on these  
12 species. AMM1–AMM7 would ensure that measures are in place to prevent runoff from the  
13 construction area and the negative effects of dust on wildlife adjacent to work areas.

14 **Methylmercury Exposure:** Marsh (tidal and nontidal) and floodplain restoration have the potential  
15 to increase exposure to methylmercury. Mercury is transformed into the more bioavailable form of  
16 methylmercury in aquatic systems, especially areas subjected to regular wetting and drying such as  
17 tidal marshes and flood plains (Alpers et al. 2008). Thus, BDCP restoration activities that create  
18 newly inundated areas could increase bioavailability of mercury (see BDCP Chapter 3, *Conservation*  
19 *Strategy*, for details of restoration). Species sensitivity to methylmercury differs widely and there is  
20 a large amount of uncertainty with respect to species-specific effects. Increased methylmercury  
21 associated with natural community and floodplain restoration could indirectly affect Modesto song  
22 sparrow, via uptake in lower trophic levels (as described in the BDCP, Appendix 5.D, *Contaminants*).

23 In addition, the potential mobilization or creation of methylmercury within the Plan Area varies  
24 with site-specific conditions and would need to be assessed at the project level. *CM12 Methylmercury*  
25 *Management* contains provisions for project-specific Mercury Management Plans. Site-specific  
26 restoration plans that address the creation and mobilization of mercury, as well as monitoring and  
27 adaptive management as described in CM12 would be available to address the uncertainty of  
28 methylmercury levels in restored tidal marsh and potential impacts on Modesto song sparrow.

29 **NEPA Effects:** Indirect effects on Modesto song sparrow as a result of constructing the Alternative  
30 1C water conveyance facilities could adversely affect individuals in the absence of other  
31 conservation actions. The incorporation of AMM1–AMM7 into the BDCP and the implementation of  
32 Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of*  
33 *Nesting Birds*, would minimize this adverse effect. The implementation of tidal natural communities  
34 restoration or floodplain restoration could result in increased exposure of Modesto song sparrow to  
35 methylmercury. However, it is unknown what concentrations of methylmercury are harmful to the  
36 species and the potential for increased exposure varies substantially within the study area. Site-  
37 specific restoration plans that address the creation and mobilization of mercury, as well as  
38 monitoring and adaptive management as described in *CM12 Methylmercury Management* would  
39 address the potential impacts of methylmercury levels in restored tidal marsh in the study area. The  
40 site-specific planning phase of marsh restoration would be the appropriate place to assess the  
41 potential for risk of methylmercury exposure for Modesto song sparrow, once site specific sampling  
42 and other information could be developed.

43 **CEQA Conclusion:** Indirect effects on Modesto song sparrow as a result of constructing the water  
44 conveyance facilities could have a significant impact on these species. The incorporation of AMM1–  
45 AMM7 into the BDCP and the implementation of Mitigation Measure BIO-75, *Conduct*

1 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would reduce this  
2 impact to a less-than-significant level. The implementation of tidal natural communities restoration  
3 or floodplain restoration could result in increased exposure of Modesto song sparrow to  
4 methylmercury. However, it is unknown what concentrations of methylmercury are harmful to the  
5 species. Site-specific restoration plans that address the creation and mobilization of mercury, as well  
6 as monitoring and adaptive management as described in *CM12 Methylmercury Management* would  
7 address the potential impacts of methylmercury levels in restored tidal marsh in the study area.

8 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**  
9 **Disturbance of Nesting Birds**

10 See Mitigation Measure BIO-75 under Impact BIO-75.

11 **Impact BIO-145: Periodic Effects of Inundation on Modesto Song Sparrow as a Result of**  
12 **Implementation of Conservation Components**

13 Flooding of the Yolo Bypass (CM2) would inundate 81-158 acres of modeled Modesto song sparrow  
14 habitat. However, inundation would occur during the nonbreeding season. Reduced foraging habitat  
15 availability would be expected during the fledgling period of the nesting season due to periodic  
16 inundation.

17 Based on hypothetical floodplain restoration, construction of setback levees from seasonally  
18 inundated floodplain restoration (CM5) could result in periodic inundation of up to approximately  
19 284 acres of Modesto song sparrow modeled habitat (Table 12-1C-52).

20 The periodic inundation of the Yolo Bypass (CM2) and of seasonal floodplains (CM5) is expected to  
21 restore a more natural flood regime in support of wetland and riparian vegetation types that  
22 support Modesto song sparrow habitat, but may reduce the availability of nesting habitat during  
23 years when flooding extends into the nesting season (past March).

24 **NEPA Effects:** Periodic inundation would not result in an adverse effect on Modesto song sparrow  
25 because increased frequency and duration of inundation would be expected to restore a more  
26 natural flood regime in support of wetland and riparian vegetation types that support Modesto song  
27 sparrow habitat.

28 **CEQA Conclusion:** Periodic inundation would have a less-than-significant impact on Modesto song  
29 sparrow because increased frequency and duration of inundation would be expected to restore a  
30 more natural flood regime in support of wetland and riparian vegetation types that support Modesto  
31 song sparrow habitat.

32 **Bank Swallow**

33 This section describes the effects of Alternative 1C, including construction and implementation of  
34 other conservation components, on bank swallow. Bank swallows nest in colonies along rivers,  
35 streams, or other water and require fine textured sandy soils in vertical banks to create their  
36 burrows. There is little suitable habitat for bank swallow in the study area because most of the  
37 erodible banks have been stabilized with of levee revetment. The placement of rock revetment  
38 prevents the lateral migration of rivers, removing the natural river process that creates vertical  
39 banks through erosion (Bank Swallow Technical Advisory Committee 2013, Stillwater Sciences  
40 2007).An estimated 70-90% of the bank swallow population in California nests along the  
41 Sacramento and Feather Rivers (Bank Swallow Technical Advisory Committee 2013) upstream of

1 the study area. However, there are three CNDDDB records of bank swallow colonies in the study area:  
2 two in CZ 2 north of Fremont Weir, and one in CZ 5 on Brannan Island, just west of Twitchell Island.

3 Construction and restoration associated with Alternative 1C conservation measures would not  
4 result in the direct loss of modeled habitat for bank swallow (Table 12-1C-53). However, indirect  
5 effects of noise and visual disturbance from *CM2 Yolo Bypass Fisheries Enhancements* and *CM4 Tidal*  
6 *Natural Communities Restoration* could impact bank swallow colonies if they were present near  
7 work areas. In addition, there is uncertainty with respect to how water flows upstream of the study  
8 area would affect bank swallow habitat. As explained below, impacts on bank swallow would not be  
9 adverse for NEPA purposes and would be less than significant for CEQA purposes with the  
10 implementation of mitigation measures to monitor colonies and address the uncertainty of  
11 upstream operations on the species.

12 **Table 12-1C-53. Changes in Bank Swallow Modeled Habitat Associated with Alternative 1C (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	Breeding	0	0	0	0	NA	NA
<b>Total Impacts CM1</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>NA</b>	<b>NA</b>
CM2-CM18	Breeding	0	0	0	0	0	0
<b>Total Impacts CM2-CM18</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>TOTAL IMPACTS</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

<sup>a</sup> See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only.

NT = near-term

LLT = late long-term

NA = not applicable

13  
14 **Impact BIO-146: Indirect Effects of Implementation of Conservation Components on Bank**  
15 **Swallow**

16 Noise and visual disturbances during restoration activities from *CM2 Yolo Bypass Fisheries*  
17 *Enhancement*, and *CM4 Tidal Natural Communities Restoration* including operation of earthmoving  
18 equipment and human activities at work sites, could result in temporary disturbances that cause  
19 bank swallow to abandon active nest burrows adjacent to construction areas. Bank swallow colonies  
20 with occupied burrows have been recorded in CZ 2 and CZ 5, and construction-related  
21 disturbances could result in an adverse effect on individuals. Various activities related to *CM11*  
22 *Natural Communities Enhancement and Management* could also have indirect impacts on bank  
23 swallow.

24 **NEPA Effects:** Construction activities associated with habitat restoration could adversely affect bank  
25 swallow colonies. Noise and visual disturbances could result in adverse effects on bank swallows if

1 active colonies were present within 500 feet of work areas. Mitigation Measure BIO-146, *Active Bank*  
2 *Swallow Colonies Shall Be Avoided and Indirect Effects on Bank Swallow Will Be Minimized*, would be  
3 available to address this adverse effect.

4 **CEQA Conclusion:** Construction activities associated with habitat restoration could result in a  
5 significant impact on bank swallow colonies. Noise and visual disturbances could result in  
6 significant impacts on bank swallows if active colonies were present within 500 feet of work areas.  
7 Implementation of Mitigation Measure BIO-146, *Active Bank Swallow Colonies Shall Be Avoided and*  
8 *Indirect Effects on Bank Swallow Will Be Minimized*, would reduce this impact to a less-than-  
9 significant level.

10 **Mitigation Measure BIO-146: Active Bank Swallow Colonies Shall Be Avoided and Indirect**  
11 **Effects on Bank Swallow Will Be Minimized**

12 To the extent practicable, BDCP proponents will not construct conservation components during  
13 the bank swallow nesting season (April 1 through August 31). If construction activities cannot  
14 be avoided during nesting season, a qualified biologist will conduct preconstruction surveys to  
15 determine if active bank swallow nesting colonies are present within 500 feet of work areas. If  
16 no active nesting colonies are present, no further mitigation is required.

17 If active colonies are detected, BDCP proponents will establish a nondisturbance buffer  
18 (determined in coordination with CDFW and the Bank Swallow Technical Advisory Committee)  
19 around the colony during the breeding season. In addition, a qualified biologist will monitor any  
20 active colony within 500 feet of construction to ensure that construction activities do not affect  
21 nest success.

22 **Impact BIO-147: Effects of Upstream Reservoir and Water Conveyance Facilities Operations**  
23 **on Bank Swallow**

24 Bank swallows are a riparian species that have evolved to deal with a dynamic system that changes  
25 with annual variation in variables such as rainfall, or late snowpack runoff. The primary threat to the  
26 species is loss of nesting habitat from the placement of rock revetment for levee stabilization.

27 Because of this limited available habitat, and the reduction of natural river process, the species is  
28 highly sensitive to 1) reductions in winter flows that are necessary to erode banks for habitat  
29 creation, and 2) high flows during the breeding season. The potential impacts of changes in  
30 upstream flows during the breeding season on bank swallows are the flooding of active burrows and  
31 destruction of burrows from increased bank sloughing. Bank swallows arrive in California and begin  
32 to excavate their burrows in March, and the peak egg-laying occurs during April and May (Bank  
33 Swallow Technical Advisory Committee 2013). Therefore, increases in flows after March when the  
34 swallows have nested and laid eggs in the burrows could result in the loss of nests. On the  
35 Sacramento River, breeding season flows between 14,000 and 30,000 cfs have been associated with  
36 localized bank collapses, which resulted in partial or complete colony failure (Stillwater Sciences  
37 2007).

38 The CALSIM II modeling results of mean monthly flow were analyzed for three flow gauge stations  
39 on the Sacramento River (Sacramento River at Keswick, Sacramento River upstream of Red Bluff,  
40 Sacramento River at Verona) and two flow gauge stations on the Feather River (Feather River high-  
41 flow channel at Thermalito Dam, and Feather River at the confluence with the Sacramento River).  
42 Flows were estimated for wet years, above normal years, below normal years, dry years, and critical

1 years. An average also was estimated (see Chapter 5, Section 5.3.1, *Methods for Analysis*, for a  
2 description of the model). Alternative 1C would implement Operational Scenario A, which is the  
3 same operational scenario as Alternative 1A described below.

4 On the Sacramento River, mean monthly flows under Alternative 1A would increase between April  
5 and August in all but wet years at the Keswick flow gauge (Table 1 in Section 11C.1.1 of Appendix  
6 11C, *CALSIM II Model Results Utilized in the Fish Analysis*) and in dry and critical years at the gauge  
7 upstream of Red Bluff (Table 3 in Section 11C.1.1 of Appendix 11C, *CALSIM II Model Results Utilized*  
8 *in the Fish Analysis*) which could lead to inundation of active colonies. However, the flows under  
9 Existing Conditions and the predicted flows in the late long-term without the project (NAA) also  
10 show increases in flows during the breeding season (April through August) in these water year  
11 types. Similar trends are shown for the Feather River (Table 15 in Section 11C.1.1 and Table 17 in  
12 Section 11C.1.1 of Appendix 11C, *CALSIM II Model Results Utilized in the Fish Analysis*). In addition, on  
13 the Sacramento River at the Verona gauge in average, above normal, and wet water years, flows are  
14 predicted to be greater than 14,000 cfs during some months of the breeding season, which could  
15 lead to bank collapse events (Tables 1, 3, and 7 in Section 11C.1.1 of Appendix 11C, *CALSIM II Model*  
16 *Results Utilized in the Fish Analysis*). However, flows of this height are recorded under Existing  
17 Conditions at this flow gauge and are also predicted for the late long-term time without the project  
18 (NAA).

19 **NEPA Effects:** High spring flows on the Sacramento and Feather Rivers may already be impacting  
20 bank swallow colonies during the breeding season, and predicted flows under Alternative 1C would  
21 not be substantially greater than under the No Action Alternative. However, because of the  
22 complexity of variables that dictate suitable habitat for the species, there is uncertainty regarding  
23 the potential for and magnitude of impacts on bank swallow from changes in upstream operations.  
24 Soil type, high winter flows, and low spring flows all contribute to successful nesting of bank  
25 swallow and even moderate changes in seasonal flows could have an adverse effect on breeding  
26 success for the species. Mitigation Measure BIO-147, *Monitor Bank Swallow Colonies and Evaluate*  
27 *Winter and Spring Flows Upstream of the Study Area*, would be available to address the uncertainty of  
28 potential adverse effects of upstream operations on bank swallow.

29 **CEQA Conclusion:** High spring flows on the Sacramento and Feather Rivers may already be  
30 impacting bank swallow colonies during the breeding season, and predicted flows under Alternative  
31 1C would not be substantially greater than under the No Action Alternative. However, because of the  
32 complexity of variables that dictate suitable habitat for the species, there is uncertainty regarding  
33 the potential for and magnitude of impacts on bank swallow from changes in upstream operations.  
34 There are many variables that dictate suitable habitat for the species that cannot be clearly  
35 quantified, and seasonal changes in flow could increase or decrease suitable habitat for bank  
36 swallow depending on soil type and location of current colonies. Implementation of Mitigation  
37 Measure BIO-147, *Monitor Bank Swallow Colonies and Evaluate Winter and Spring Flows Upstream of*  
38 *the Study Area*, would address this potential significant impact and determine if additional  
39 mitigation is required for bank swallow.

#### 40 **Mitigation Measure BIO-147: Monitor Bank Swallow Colonies and Evaluate Winter and** 41 **Spring Flows Upstream of the Study Area**

42 To address the uncertainty of the impact of upstream spring flows on existing bank swallow  
43 habitat, DWR will monitor existing colonies upstream of the study area and collect habitat  
44 suitability data including soil type, number of active burrows per colony, and height of average

1 burrows. In addition, to determine the degree to which reduced winter flows are contributing to  
2 habitat loss, DWR will quantify the winter flows required for river meander to create suitable  
3 habitat through lateral channel migration and bank resurfacing. If impacts of upstream flows on  
4 bank swallow are identified, further mitigation may be required after consultation with CDFW  
5 and the Bank Swallow Technical Advisory Committee. Recommended mitigation for changes in  
6 flow regimes associated with water conveyance includes conservation easements on currently  
7 occupied habitat or revetment removal projects to create habitat for bank swallow (Bank  
8 Swallow Technical Advisory Committee 2013).

### 9 **Yellow-Headed Blackbird**

10 This section describes the effects of Alternative 1C, including water conveyance facilities  
11 construction and implementation of other conservation components, on yellow-headed blackbird.  
12 The habitat model used to assess impacts on yellow-headed blackbird includes nesting habitat and  
13 foraging habitat. Modeled nesting habitat includes tidal freshwater emergent wetland, other natural  
14 seasonal wetland, nontidal freshwater perennial emergent wetland, and managed wetland. Modeled  
15 foraging habitat for yellow-headed blackbird consists of cultivated lands and noncultivated land  
16 cover types known to support abundant insect populations, including corn, pasture, and feedlots.

17 Construction and restoration associated with Alternative 1C conservation measures would result in  
18 both temporary and permanent losses of yellow-headed blackbird modeled habitat as indicated in  
19 Table 12-1C-54. Full implementation of Alternative 1C would include the following biological  
20 objectives over the term of the BDCP which would also benefit yellow-headed blackbird (BDCP  
21 Chapter 3, Section 3.3, *Biological Goals and Objectives*).

- 22 ● Restore or create at least 24,000 acres of tidal freshwater emergent wetland in CZs 1, 2, 4, 5, 6,  
23 and/or 7 (Objective TFEWNC1.1, associated with CM4).
- 24 ● Create at least 1,200 acres of nontidal marsh consisting of a mosaic of nontidal perennial aquatic  
25 and nontidal freshwater emergent wetland natural communities (Objective NFEW/NPANC1.1,  
26 associated with CM10).
- 27 ● Protect and enhance at least 8,100 acres of managed wetland, at least 1,500 acres of which are  
28 in the Grizzly Island Marsh Complex (Objective MWNC1.1, associated with CM3).
- 29 ● Protect at least 8,000 acres of grassland with at least 2,000 acres protected in CZ 1, at least 1,000  
30 acres protected in CZ 8, at least 2,000 acres protected in CZ 11, and the remainder distributed  
31 among CZs 1, 2, 4, 5, 7, 8, and 11 (Objective GNC1.1, associated with CM3).
- 32 ● Restore at least 2,000 acres of grasslands (Objective GNC1.2, associated with CM8).
- 33 ● Protect at least 150 acres of alkali seasonal wetland and at least 600 acres of existing vernal pool  
34 complex in CZs 1, 8, and/or 11 (Objective ASWNC1.1, Objective VPNC1.1, associated with CM3).
- 35 ● Maintain and protect the small patches of important wildlife habitats associated with cultivated  
36 lands that occur in cultivated lands within the reserve system, including isolated valley oak  
37 trees, trees and shrubs along field borders and roadsides, remnant groves, riparian corridors,  
38 water conveyance channels, grasslands, ponds, and wetlands (Objective CLNC1.3, associated  
39 with CM3).
- 40 ● Protect at least 11,050 acres of high- to very high-value breeding-foraging habitat (Table 12-1C-  
41 38) in CZs 1, 2, 3, 4, 7, 8, or 11 (Objective TRBL1.3, associated with CM3).

- Maintain and protect the small patches of important wildlife habitats associated with cultivated lands that occur in cultivated lands within the reserve system, including isolated valley oak trees, trees and shrubs along field borders and roadsides, remnant groves, riparian corridors, water conveyance channels, grasslands, ponds, and wetlands (Objective CLNC1.3, associated with CM3).
- Increase prey abundance and accessibility for grassland-foraging species (Objective GNC2.4, associated with CM11).

As explained below, with the restoration or protection of these amounts of habitat, in addition to management activities to enhance habitats for the species and the implementation of AMM1–AMM7, *AMM27 Selenium Management*, and Mitigation Measure BIO-75, impacts on yellow-headed blackbird would not be adverse for NEPA purposes and would be less than significant for CEQA purposes.

**Table 12-1C-54. Changes in Yellow-Headed Blackbird Modeled Habitat Associated with Alternative 1C**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	Nesting	3	3	152	152	NA	NA
	Foraging	2,756	2,756	3,634	3,634	NA	NA
<b>Total Impacts CM1</b>		<b>2,759</b>	<b>2,759</b>	<b>3,786</b>	<b>3,786</b>	<b>NA</b>	<b>NA</b>
CM2–CM18	Nesting	5,814	13,902	45	46	961–2,678	18
	Foraging	5,612	26,673	376	905	368–1,476	2,701
<b>Total Impacts CM2–CM18</b>		<b>11,426</b>	<b>40,575</b>	<b>421</b>	<b>951</b>	<b>1,495–4,394</b>	<b>2,719</b>
<b>Total Nesting</b>		<b>5,817</b>	<b>13,905</b>	<b>197</b>	<b>198</b>	961–2,678	18
<b>Total Foraging</b>		<b>8,368</b>	<b>29,429</b>	<b>4,010</b>	<b>4,539</b>	368–1,476	2,701
<b>TOTAL IMPACTS</b>		<b>4,185</b>	<b>43,334</b>	<b>4,207</b>	<b>4,737</b>	<b>1,495–4,394</b>	<b>2,719</b>

<sup>a</sup> See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

**Impact BIO-148: Loss of Habitat for and Direct Mortality of Yellow-Headed Blackbird**

Alternative 1C conservation measures would result in the combined permanent and temporary loss of up to 48,071 acres of modeled habitat (14,103 acres of nesting habitat and 33,968 acres of foraging habitat) for yellow-headed blackbird (Table 12-1C-54). Conservation measures that would result in these losses are conveyance facilities and transmission line construction, and establishment and use of borrow and spoil areas (CM1), Yolo Bypass improvements (CM2), tidal habitat

1 restoration (CM4), floodplain restoration (CM5), riparian restoration (CM7), grassland restoration  
2 (CM8), marsh restoration (CM10), and construction of conservation hatcheries (CM18). Habitat  
3 enhancement and management activities (CM11) which include ground disturbance or removal of  
4 nonnative vegetation could result in local adverse habitat effects. In addition, maintenance activities  
5 associated with the long-term operation of the water conveyance facilities and other BDCP physical  
6 facilities could degrade or eliminate yellow-headed blackbird suitable habitat. Each of these  
7 individual activities is described below. A summary statement of the combined impacts and NEPA  
8 effects, and a CEQA conclusion follow the individual conservation measure discussions.

- 9 • *CM1 Water Facilities and Operation*: Construction of Alternative 1C water conveyance facilities  
10 would result in the combined permanent and temporary loss of up to 155 acres of yellow-  
11 headed blackbird nesting habitat (3 acres of permanent loss and 152 acres of temporary loss). In  
12 addition, 6,390 acres of foraging habitat would be removed (2,756 acres of permanent loss,  
13 3,634 acres of temporary loss, Table 12-1C-54). Activities that would impact suitable yellow-  
14 headed blackbird habitat consist of the western channel, tunnel, forebay, and intake  
15 construction, temporary access roads, and construction of transmission lines in CZ 1, 3, 5, 6, 8,  
16 and 9. The largest losses of foraging habitat would occur from loss of corn. There are no  
17 occurrences of yellow-headed blackbird that overlap with the construction footprint for CM1.  
18 Refer to the Terrestrial Biology Map Book for a detailed view of Alternative 1C construction  
19 locations.
- 20 • *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo bypass fisheries enhancement  
21 would result in the permanent removal of 29 acres of breeding habitat and 113 acres of  
22 nonbreeding habitat for yellow-headed blackbird. In addition, CM2 would result in the  
23 temporary loss of 43 acres of breeding habitat for the species. Impacts from CM2 would  
24 primarily occur in the near-term timeframe.
- 25 • *CM4 Tidal Natural Communities Restoration*: Site preparation and inundation from CM4 would  
26 permanently remove or convert an estimated 4,801 acres of breeding habitat. In addition, 3,282  
27 acres of non-breeding habitat would be lost or converted as a result of tidal restoration.  
28 However, the resulting 65,000 acres of tidal natural communities would also provide habitat for  
29 the species, 24,000 acres of which would be tidal freshwater natural communities providing  
30 breeding habitat for yellow-headed blackbird.
- 31 • *CM5 Seasonally Inundated Floodplain Restoration and CM7 Riparian Natural Community*  
32 *Restoration*: Construction of setback levees to restore seasonally inundated floodplain and  
33 riparian restoration actions would permanently and temporarily remove approximately 2,477  
34 acres of suitable yellow-headed blackbird habitat consisting of 2 acres of breeding habitat and  
35 2,475 acres of nonbreeding habitat.
- 36 • *CM8 Grassland Natural Community Restoration*: Restoration of grassland is expected to be  
37 implemented on agricultural lands and would result in the conversion of 230 acres of yellow-  
38 headed blackbird agricultural foraging habitat to grassland foraging habitat in CZs 1, 8, and/or  
39 11. If agricultural lands supporting higher value foraging habitat than the restored grassland  
40 were removed, there would be a loss of yellow-headed blackbird foraging habitat value. CM8  
41 would result in the restoration of 2,000 acres of grassland foraging habitat in the Plan Area.
- 42 • *CM10 Nontidal Marsh Restoration*: Restoration and creation of nontidal freshwater marsh would  
43 result in the permanent conversion of 133 acres of cultivated lands foraging habitat to nontidal  
44 marsh in CZ 2 and CZ 4. Yellow-headed blackbird nesting habitat may develop along the margins  
45 of restored nontidal marsh and restoration would also provide foraging habitat for the species.

- 1 • *CM11 Natural Communities Enhancement and Management*: Habitat management- and  
2 enhancement-related activities could disturb yellow-headed blackbird nests if they were  
3 present near work sites. A variety of habitat management actions included in *CM11 Natural*  
4 *Communities Enhancement and Management* that are designed to enhance wildlife values in  
5 BDCP-protected habitats may result in localized ground disturbances that could temporarily  
6 remove small amounts of yellow-headed blackbird habitat and reduce the functions of habitat  
7 until restoration is complete. Ground-disturbing activities, such as removal of nonnative  
8 vegetation and road and other infrastructure maintenance, would be expected to have minor  
9 effects on available yellow-headed blackbird habitat. These effects cannot be quantified, but are  
10 expected to be minimal and would be avoided and minimized by the AMMs listed below.
- 11 • *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground  
12 water conveyance facilities and restoration infrastructure could result in ongoing but periodic  
13 disturbances that could affect yellow-headed blackbird use of the surrounding habitat.  
14 Maintenance activities would include vegetation management, levee and structure repair, and  
15 re-grading of roads and permanent work areas. These effects, however, would be reduced by  
16 AMMs and conservation actions as described below.
- 17 • *Injury and Direct Mortality*: Construction-related activities would not be expected to result in  
18 direct mortality of adult or fledged yellow-headed blackbird if they were present in the Plan  
19 Area, because they would be expected to avoid contact with construction and other equipment.

20 If yellow-headed blackbird were to nest in the construction area, construction-related activities,  
21 including equipment operation, noise and visual disturbances could destroy nests or lead to  
22 their abandonment, resulting in mortality of eggs and nestlings. Mitigation Measure BIO-75,  
23 *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be  
24 available to address these adverse effects on yellow-headed blackbird.

25 The following paragraphs summarize the combined effects discussed above and describe other  
26 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also  
27 included.

### 28 ***Near-Term Timeframe***

29 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
30 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
31 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
32 effects of construction would not be adverse under NEPA. Alternative 1C would remove 6,014 acres  
33 (5,817 acres of permanent loss, 197 acres of temporary loss) of yellow-headed blackbird nesting  
34 habitat in the study area in the near-term. These effects would result from the construction of the  
35 water conveyance facilities (CM1, 155 acres), and implementing other conservation measures (CM2  
36 *Yolo Bypass Fisheries Enhancement*, CM4 *Tidal Natural Communities Restoration*, and CM5 *Seasonally*  
37 *Inundated Floodplain Restoration*—5,859 acres). In addition, 12,378 acres of yellow-headed  
38 blackbird foraging habitat would be removed or converted in the near-term (CM1, 6,390 acres; CM2  
39 *Yolo Bypass Fisheries Enhancement*, CM4 *Tidal Natural Communities Restoration*, CM5 *Seasonally*  
40 *Inundated Floodplain Restoration*, CM7 *Riparian Natural Community Restoration*, CM8 *Grassland*  
41 *Natural Community Restoration*, CM10 *Nontidal Marsh Restoration*, and CM18 *Conservation*  
42 *Hatcheries*—5,988 acres).

43 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by  
44 CM1 would be 1:1 for restoration/creation and 1:1 protection of nesting habitat, and 1:1 protection

1 of foraging habitat. Using these ratios would indicate that 155 acres of nesting habitat should be  
2 restored/created and 155 acres should be protected to compensate for the CM1 losses of yellow-  
3 headed blackbird nesting habitat. In addition, 6,390 acres of foraging habitat should be protected to  
4 compensate for the CM1 losses of yellow-headed blackbird foraging habitat. The near-term effects of  
5 other conservation actions would require 5,859 acres each of restoration and protection of breeding  
6 habitat and 5,988 acres of protection of foraging habitat using the same typical NEPA and CEQA  
7 ratios (1:1 for restoration and 1:1 for protection of nesting and 1: protection of foraging habitat).

8 The BDCP has committed to near-term goals of restoring 8,850 acres of tidal freshwater emergent  
9 wetland, protecting 4,800 acres of managed wetland, protecting 25 acres and restoring 900 acres of  
10 nontidal marsh, protecting 2,000 acres and restoring 1,140 acres of grassland natural community,  
11 protecting 400 acres of vernal pool complex, protecting 120 acres of alkali seasonal wetland  
12 complex, and protecting 15,600 acres of cultivated lands in the Plan Area (Table 3-4 in Chapter 3,  
13 *Description of Alternatives*). These conservation actions are associated with CM3, CM4, CM8, and  
14 CM10 and would occur in the same timeframe as the construction and early restoration losses.

15 The tidal freshwater emergent wetland would be restored in CZs 1, 2, 4, 5, 6, and/or 7 (Objective  
16 TFEWNC1.1 in BDCP Chapter 3, *Conservation Strategy*) and would be restored in a way that creates  
17 topographic heterogeneity and in areas that increase connectivity among protected lands (Objective  
18 TFEWNC2.2). The 4,800 acres of managed wetland would be protected and enhanced in CZ 11 and  
19 would benefit yellow-headed blackbird through the enhancement of degraded areas (such as areas  
20 of bare ground or marsh where the predominant vegetation consists of invasive species such as  
21 perennial pepperweed) to vegetation such as pickleweed-alkali heath-American bulrush plant  
22 associations (Objective MWNC1.1). In addition, at least 900 acres of nontidal marsh would be  
23 created, some of which would provide nesting habitat for the species.

24 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1  
25 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali  
26 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous  
27 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would  
28 provide grassland foraging habitat for yellow-headed blackbird. Insect prey availability and  
29 abundance would also be increased on protected lands, enhancing the foraging value of these  
30 natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4). Foraging opportunities would  
31 also be improved by enhancing prey populations through the establishment of 20- to 30-foot-wide  
32 hedgerows along field borders and roadsides within protected cultivated lands (Objective  
33 SWHA2.2). Within the cultivated lands, important wildlife habitat such as grasslands, ponds, and  
34 wetlands would also be protected and maintained as part of the cultivated lands reserve system  
35 which would provide additional habitat for yellow-headed blackbird (Objective CLNC1.3).

36 At least 15,600 acres of cultivated lands that provide habitat for covered and other native wildlife  
37 species would be protected in the near-term time period (Objective CLNC1.1), much of which would  
38 provide foraging habitat for yellow-headed blackbird. The acres of restoration and protection  
39 contained in the near-term Plan goals and the additional detail in the biological objectives satisfy the  
40 typical mitigation that would be applied to the project-level effects of CM1 on yellow-headed  
41 blackbird habitat, as well as mitigate the near-term effects of the other conservation measures.

42 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*  
43 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*  
44 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
45 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*

1 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
2 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
3 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

4 The yellow-headed blackbird is not a covered species under the BDCP. For the BDCP to avoid an  
5 adverse effect on individuals, preconstruction surveys for noncovered avian species would be  
6 required to ensure that nests are detected and avoided. Mitigation Measure BIO-75, *Conduct*  
7 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to  
8 address this adverse effect.

### 9 **Late Long-Term Timeframe**

10 The study area supports approximately 82,005 acres of modeled nesting habitat and 333,956 acres  
11 of modeled foraging habitat for yellow-headed blackbird. Alternative 1C as a whole would result in  
12 the permanent loss of and temporary effects on 14,103 acres of potential nesting habitat (17% of the  
13 potential nesting habitat in the study area) and the loss or conversion of 33,968 acres of foraging  
14 habitat (10% of the foraging habitat in the study area). The locations of these losses are described  
15 above in the analyses of individual conservation measures.

16 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*  
17 *Restoration*, *CM4 Tidal Natural Communities Restoration*, *CM8 Grassland Natural Community*  
18 *Restoration*, and *CM10 Nontidal Marsh Restoration* to protect and enhance at least 8,100 acres of  
19 managed wetland, restore or create at least 24,000 acres of tidal freshwater emergent wetland,  
20 create or restore at least 1,200 acres of nontidal marsh, protect 8,000 acres and restore 2,000 acres  
21 of grassland natural community, protect 600 acres of vernal pool complex, protect 150 acres of  
22 alkali seasonal wetland complex, and protect 48,625 acres of cultivated lands that provide suitable  
23 habitat for native wildlife species (Table 3-4 in Chapter 3, *Description of Alternatives*).

24 The tidal freshwater emergent wetland would be restored in CZs 1, 2, 4, 5, 6, and/or 7 (Objective  
25 TFEWNC1.1 in BDCP Chapter 3, *Conservation Strategy*) and would be restored in a way that creates  
26 topographic heterogeneity and in areas that increase connectivity among protected lands (Objective  
27 TFEWNC2.2). The managed wetland would be protected and enhanced in CZ 11 and would benefit  
28 yellow-headed blackbird through the enhancement of degraded areas (such as areas of bare ground  
29 or marsh where the predominant vegetation consists of invasive species such as perennial  
30 pepperweed) to vegetation such as pickleweed-alkali heath-American bulrush plant associations  
31 (Objective MWNC1.1). In addition, at least 1,200 acres of nontidal marsh would be created, some of  
32 which would provide nesting habitat for the species.

33 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1  
34 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali  
35 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous  
36 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would  
37 provide grassland foraging habitat for yellow-headed blackbird. Insect prey availability and  
38 abundance would also be increased on protected lands, enhancing the foraging value of these  
39 natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4). Foraging opportunities would  
40 also be improved by enhancing prey populations through the establishment of 20- to 30-foot-wide  
41 hedgerows along field borders and roadsides within protected cultivated lands (Objective  
42 SWHA2.2). Within the cultivated lands, important wildlife habitat such as grasslands, ponds, and  
43 wetlands would also be protected and maintained as part of the cultivated lands reserve system  
44 which would provide additional habitat for yellow-headed blackbird (Objective CLNC1.3). Of the

1 48,625 acres of cultivated lands that would be protected and enhanced by the late long-term time  
2 period (Objective CLNC1.1), 26,300 acres would be managed in moderate to high-value crop types  
3 for tricolored blackbird (BDCP Chapter 3, Table 3.3-6). These crop types include pasture, sunflower,  
4 alfalfa, and other crop types that would provide high-value foraging habitat for yellow-headed  
5 blackbird.

6 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
7 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
8 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
9 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
10 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
11 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
12 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

13 The yellow-headed blackbird is not a covered species under the BDCP. For the BDCP to avoid an  
14 adverse effect on individuals, preconstruction surveys for noncovered avian species would be  
15 required to ensure that nests are detected and avoided. Mitigation Measure BIO-75, *Conduct*  
16 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to  
17 address this adverse effect.

18 **NEPA Effects:** The loss of yellow-headed blackbird habitat and potential for direct mortality of this  
19 special-status species associated with Alternative 1C would represent an adverse effect in the  
20 absence of other conservation actions. With habitat protection and restoration associated with CM3,  
21 CM4, CM8, CM10, and CM11, guided by biological goals and objectives and by AMM1–AMM7, which  
22 would be in place throughout the construction phase, the effects of habitat loss on yellow-headed  
23 blackbird would not be adverse under Alternative 1C. The yellow-headed blackbird is not a covered  
24 species under the BDCP. For the BDCP to avoid an adverse effect on individuals, preconstruction  
25 surveys for noncovered avian species would be required to ensure that nests are detected and  
26 avoided. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid*  
27 *Disturbance of Nesting Birds*, would be available to address this adverse effect.

## 28 **CEQA Conclusion:**

### 29 **Near-Term Timeframe**

30 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
31 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
32 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
33 effects of construction would be less than significant under CEQA. Alternative 1C would remove  
34 6,014 acres (5,817 acres of permanent loss, 197 acres of temporary loss) of yellow-headed blackbird  
35 nesting habitat in the study area in the near-term. These effects would result from the construction  
36 of the water conveyance facilities (CM1, 155 acres), and implementing other conservation measures  
37 (CM2 *Yolo Bypass Fisheries Enhancement*, CM4 *Tidal Natural Communities Restoration*, and CM5  
38 *Seasonally Inundated Floodplain Restoration*—5,859 acres). In addition, 12,378 acres of yellow-  
39 headed blackbird foraging habitat would be removed or converted in the near-term (CM1, 6,390  
40 acres; CM2 *Yolo Bypass Fisheries Enhancement*, CM4 *Tidal Natural Communities Restoration*, CM5  
41 *Seasonally Inundated Floodplain Restoration*, CM7 *Riparian Natural Community Restoration*, CM8  
42 *Grassland Natural Community Restoration*, CM10 *Nontidal Marsh Restoration*, and CM18 *Conservation*  
43 *Hatcheries*—5,988 acres).

1 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by  
2 CM1 would be 1:1 for restoration/creation and 1:1 protection of nesting habitat, and 1:1 protection  
3 of foraging habitat. Using these ratios would indicate that 155 acres of nesting habitat should be  
4 restored/created and 155 acres should be protected to compensate for the CM1 losses of yellow-  
5 headed blackbird nesting habitat. In addition, 6,390 acres of foraging habitat should be protected to  
6 compensate for the CM1 losses of yellow-headed blackbird foraging habitat. The near-term effects of  
7 other conservation actions would require 5,859 acres each of restoration and protection of breeding  
8 habitat and 5,988 acres of protection of foraging habitat using the same typical NEPA and CEQA  
9 ratios (1:1 for restoration and 1:1 for protection of nesting and 1: protection of foraging habitat).

10 The BDCP has committed to near-term goals of restoring 8,850 acres of tidal freshwater emergent  
11 wetland, protecting 4,800 acres of managed wetland, protecting 25 acres and restoring 900 acres of  
12 nontidal marsh, protecting 2,000 acres and restoring 1,140 acres of grassland natural community,  
13 protecting 400 acres of vernal pool complex, protecting 120 acres of alkali seasonal wetland  
14 complex, and protecting 15,600 acres of cultivated lands in the Plan Area (Table 3-4 in Chapter 3,  
15 *Description of Alternatives*). These conservation actions are associated with CM3, CM4, CM8, and  
16 CM10 and would occur in the same timeframe as the construction and early restoration losses.

17 The tidal freshwater emergent wetland would be restored in CZs 1, 2, 4, 5, 6, and/or 7 (Objective  
18 TFEWNC1.1 in BDCP Chapter 3, *Conservation Strategy*) and would be restored in a way that creates  
19 topographic heterogeneity and in areas that increase connectivity among protected lands (Objective  
20 TFEWNC2.2). The 4,800 acres of managed wetland would be protected and enhanced in CZ 11 and  
21 would benefit yellow-headed blackbird through the enhancement of degraded areas (such as areas  
22 of bare ground or marsh where the predominant vegetation consists of invasive species such as  
23 perennial pepperweed) to vegetation such as pickleweed-alkali heath-American bulrush plant  
24 associations (Objective MWNC1.1). In addition, at least 900 acres of nontidal marsh would be  
25 created, some of which would provide nesting habitat for the species.

26 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1  
27 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali  
28 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous  
29 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would  
30 provide grassland foraging habitat for yellow-headed blackbird. Insect prey availability and  
31 abundance would also be increased on protected lands, enhancing the foraging value of these  
32 natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4). Foraging opportunities would  
33 also be improved by enhancing prey populations through the establishment of 20- to 30-foot-wide  
34 hedgerows along field borders and roadsides within protected cultivated lands (Objective  
35 SWHA2.2). Within the cultivated lands, important wildlife habitat such as grasslands, ponds, and  
36 wetlands would also be protected and maintained as part of the cultivated lands reserve system  
37 which would provide additional habitat for yellow-headed blackbird (Objective CLNC1.3).

38 At least 15,400 acres of cultivated lands that provide habitat for covered and other native wildlife  
39 species would be protected in the near-term time period (Objective CLNC1.1), much of which would  
40 provide foraging habitat for yellow-headed blackbird. The acres of restoration and protection  
41 contained in the near-term Plan goals and the additional detail in the biological objectives satisfy the  
42 typical mitigation that would be applied to the project-level effects of CM1 on yellow-headed  
43 blackbird habitat, as well as mitigate the near-term effects of the other conservation measures.

44 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
45 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*

1 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
2 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
3 *Material, and AMM7 Barge Operations Plan. All of these AMMs include elements that would avoid or*  
4 *minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are*  
5 *described in detail in BDCP Appendix 3.C, Avoidance and Minimization Measures.*

6 The yellow-headed blackbird is not a covered species under the BDCP. For the BDCP to avoid an  
7 adverse effect on individuals, preconstruction surveys for noncovered avian species would be  
8 required to ensure that nests are detected and avoided. The implementation of Mitigation Measure  
9 BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would  
10 reduce potential impacts on nesting yellow-headed blackbird to a less-than-significant level.

### 11 **Late Long-Term Timeframe**

12 The study area supports approximately 82,005 acres of modeled nesting habitat and 333,956 acres  
13 of modeled foraging habitat for yellow-headed blackbird. Alternative 1C as a whole would result in  
14 the permanent loss of and temporary effects on 14,103 acres of potential nesting habitat (17% of the  
15 potential nesting habitat in the study area) and the loss or conversion of 33,968 acres of foraging  
16 habitat (10% of the foraging habitat in the study area). The locations of these losses are described  
17 above in the analyses of individual conservation measures.

18 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*  
19 *Restoration, CM4 Tidal Natural Communities Restoration, CM8 Grassland Natural Community*  
20 *Restoration, and CM10 Nontidal Marsh Restoration* to protect and enhance at least 8,100 acres of  
21 managed wetland, restore or create at least 24,000 acres of tidal freshwater emergent wetland,  
22 create or restore at least 1,200 acres of nontidal marsh, protect 8,000 acres and restore 2,000 acres  
23 of grassland natural community, protect 600 acres of vernal pool complex, protect 150 acres of  
24 alkali seasonal wetland complex, and protect 48,625 acres of cultivated lands that provide suitable  
25 habitat for native wildlife species (Table 3-4 in Chapter 3, *Description of Alternatives*).

26 The tidal freshwater emergent wetland would be restored in CZs 1, 2, 4, 5, 6, and/or 7 (Objective  
27 TFEWNC1.1 in BDCP Chapter 3, *Conservation Strategy*) and would be restored in a way that creates  
28 topographic heterogeneity and in areas that increase connectivity among protected lands (Objective  
29 TFEWNC2.2). The managed wetland would be protected and enhanced in CZ 11 and would benefit  
30 yellow-headed blackbird through the enhancement of degraded areas (such as areas of bare ground  
31 or marsh where the predominant vegetation consists of invasive species such as perennial  
32 pepperweed) to vegetation such as pickleweed-alkali heath-American bulrush plant associations  
33 (Objective MWNC1.1). In addition, at least 1,200 acres of nontidal marsh would be created, some of  
34 which would provide nesting habitat for the species.

35 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1  
36 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali  
37 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous  
38 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would  
39 provide grassland foraging habitat for yellow-headed blackbird. Insect prey availability and  
40 abundance would also be increased on protected lands, enhancing the foraging value of these  
41 natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4). Foraging opportunities would  
42 also be improved by enhancing prey populations through the establishment of 20- to 30-foot-wide  
43 hedgerows along field borders and roadsides within protected cultivated lands (Objective  
44 SWHA2.2). Within the cultivated lands, important wildlife habitat such as grasslands, ponds, and

1 wetlands would also be protected and maintained as part of the cultivated lands reserve system  
2 which would provide additional habitat for yellow-headed blackbird (Objective CLNC1.3). Of the  
3 48,625 acres of cultivated lands that would be protected and enhanced by the late long-term time  
4 period (Objective CLNC1.1), 26,300 acres would be managed in moderate to high-value crop types  
5 for tricolored blackbird (BDCP Chapter 3, Table 3.3-6). These crop types include pasture, sunflower,  
6 alfalfa, and other crop types that would provide high-value foraging habitat for yellow-headed  
7 blackbird.

8 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
9 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
10 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
11 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
12 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
13 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
14 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

15 The yellow-headed blackbird is not a covered species under the BDCP. For the BDCP to avoid an  
16 adverse effect on individuals, preconstruction surveys for noncovered avian species would be  
17 required to ensure that nests are detected and avoided. Implementation of Mitigation Measure BIO-  
18 75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would  
19 reduce this potential impact to a less-than-significant level.

20 Considering Alternative 1C's protection and restoration provisions, which would provide acreages  
21 of new or enhanced habitat in amounts necessary to compensate for habitat lost to construction and  
22 restoration activities, and with the implementation of AMM1–AMM7 and Mitigation Measure BIO-  
23 75, the loss of habitat or direct mortality through implementation of Alternative 1C would not result  
24 in a substantial adverse effect through habitat modifications and would not substantially reduce the  
25 number or restrict the range of either species. Therefore, the loss of habitat or potential mortality  
26 under this alternative would have a less-than-significant impact on yellow-headed blackbird.

#### 27 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid** 28 **Disturbance of Nesting Birds**

29 See Mitigation Measure BIO-75 under Impact BIO-75.

#### 30 **Impact BIO-149: Effects on Yellow-Headed Blackbird Associated with Electrical Transmission** 31 **Facilities**

32 New transmission lines would increase the risk for bird-power line strikes, which could result in  
33 injury or mortality of yellow-headed blackbirds. Transmission line poles and towers also provide  
34 perching substrate for raptors, which could result in increased predation pressure on yellow-headed  
35 blackbirds. The existing network of transmission lines in the study area currently poses this risk for  
36 yellow-headed blackbirds, and any incremental risk associated with the new transmission line  
37 corridors would be expected to be low. *AMM20 Greater Sandhill Crane* would further minimize the  
38 risk for bird-power line strikes with the installation of flight diverters on new and selected existing  
39 transmission lines.

40 **NEPA Effects:** New transmission lines would increase the risk for bird-power line strikes, which  
41 could result in injury or mortality of yellow-headed blackbird. Transmission line poles and towers  
42 also provide perching substrate for raptors, which could result in increased predation pressure on

1 yellow-headed blackbirds. The existing network of transmission lines in the study area currently  
2 poses this risk for yellow-headed blackbirds, and any incremental risk associated with the new  
3 transmission line corridors would not be expected to have an adverse effect on yellow-headed  
4 blackbirds. *AMM20 Greater Sandhill Crane* would further minimize the risk for bird-power line  
5 strikes.

6 **CEQA Conclusion:** New transmission lines would increase the risk for bird-power line strikes, which  
7 could result in injury or mortality of yellow-headed blackbird. Transmission line poles and towers  
8 also provide perching substrate for raptors, which could result in increased predation pressure on  
9 yellow-headed blackbirds. The existing network of transmission lines in the study area currently  
10 poses this risk for yellow-headed blackbirds, and any incremental risk associated with the new  
11 transmission line corridors would have a less-than-significant impact on yellow-headed blackbird.  
12 *AMM20 Greater Sandhill Crane* would further minimize the risk for bird-power line strikes.

### 13 **Impact BIO-150: Indirect Effects of Plan Implementation on Yellow-Headed Blackbird**

14 **Indirect construction- and operation-related effects:** Noise and visual disturbances associated  
15 with construction-related activities could result in temporary disturbances that affect yellow-  
16 headed blackbird use of suitable habitat. Construction noise above background noise levels (greater  
17 than 50 dBA) could extend 1,900 to 5,250 feet from the edge of construction activities (BDCP  
18 Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of the BDCP Conveyance Facility on*  
19 *Sandhill Crane*, Table 4), although there are no available data to determine the extent to which these  
20 noise levels could affect yellow-headed blackbird. Indirect effects associated with construction  
21 include noise, dust, and visual disturbance caused by grading, filling, contouring, and other ground-  
22 disturbing operations. Construction-related noise and visual disturbances could disrupt nesting and  
23 foraging behaviors, and reduce the functions of suitable habitat which could result in an adverse  
24 effect on these species. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and*  
25 *Avoid Disturbance of Nesting Birds*, would be available to minimize adverse effects on active nests.  
26 The use of mechanical equipment during water conveyance construction could cause the accidental  
27 release of petroleum or other contaminants that could affect the species in the surrounding habitat.  
28 *AMM1–AMM7*, including *AMM2 Construction Best Management Practices and Monitoring*, would  
29 minimize the likelihood of such spills from occurring. The inadvertent discharge of sediment or  
30 excessive dust adjacent to yellow-headed blackbird habitat could also have a negative effect on the  
31 species. *AMM1–AMM7* would ensure that measures are in place to prevent runoff from the  
32 construction area and the negative effects of dust on wildlife adjacent to work areas.

33 **Methylmercury Exposure:** Covered activities have the potential to exacerbate bioaccumulation of  
34 mercury in avian species, including yellow-headed blackbird. Marsh (tidal and nontidal) and  
35 floodplain restoration have the potential to increase exposure to methylmercury. Mercury is  
36 transformed into the more bioavailable form of methylmercury in aquatic systems, especially areas  
37 subjected to regular wetting and drying such as tidal marshes and flood plains (Alpers et al. 2008).  
38 Thus, BDCP restoration activities that create newly inundated areas could increase bioavailability of  
39 mercury (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Species sensitivity  
40 to methylmercury differs widely and there is a large amount of uncertainty with respect to species-  
41 specific effects. Increased methylmercury associated with natural community and floodplain  
42 restoration could indirectly affect yellow-headed blackbird, via uptake in lower trophic levels (as  
43 described in the BDCP, Appendix 5.D, *Contaminants*).

1 In addition, the potential mobilization or creation of methylmercury within the study area varies  
2 with site-specific conditions and would need to be assessed at the project level. *CM12 Methylmercury*  
3 *Management* contains provisions for project-specific Mercury Management Plans. Site-specific  
4 restoration plans that address the creation and mobilization of mercury, as well as monitoring and  
5 adaptive management as described in CM12 would be available to address the uncertainty of  
6 methylmercury levels in restored tidal marsh and potential impacts on yellow-headed blackbird.

7 **NEPA Effects:** Noise and visual disturbances from the construction of water conveyance facilities  
8 could reduce yellow-headed blackbird use of modeled habitat adjacent to work areas. Moreover,  
9 operation and maintenance of the water conveyance facilities, including the transmission facilities,  
10 could result in ongoing but periodic postconstruction disturbances that could affect yellow-headed  
11 blackbird use of the surrounding habitat. Mitigation Measure BIO-75, *Conduct Preconstruction*  
12 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to address adverse  
13 effects on nesting individuals in addition to AMM1–AMM7. The implementation of tidal natural  
14 communities restoration or floodplain restoration could result in increased exposure of yellow-  
15 headed blackbird to methylmercury, in restored tidal areas. However, it is unknown what  
16 concentrations of methylmercury are harmful to these species and the potential for increased  
17 exposure varies substantially within the study area. Site-specific restoration plans that address the  
18 creation and mobilization of mercury, as well as monitoring and adaptive management as described  
19 in CM12, would address the uncertainty of methylmercury levels in restored tidal marsh in the study  
20 area and better inform potential impacts on yellow-headed blackbird. The site-specific planning  
21 phase of marsh restoration would be the appropriate place to assess the potential for risk of  
22 methylmercury exposure for yellow-headed blackbird, once site specific sampling and other  
23 information could be developed.

24 **CEQA Conclusion:** Noise, the potential for hazardous spills, increased dust and sedimentation, and  
25 operations and maintenance of the water conveyance facilities under Alternative 1C would have a  
26 less-than-significant impact on yellow-headed blackbird with the implementation of Mitigation  
27 Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting*  
28 *Birds*, and AMM1–AMM7. The implementation of tidal natural communities restoration or floodplain  
29 restoration could result in increased exposure of yellow-headed blackbird to methylmercury.  
30 However, it is unknown what concentrations of methylmercury are harmful to this species. Site-  
31 specific restoration plans that address the creation and mobilization of mercury, as well as  
32 monitoring and adaptive management as described in CM12, would better inform potential impacts  
33 and address the uncertainty of methylmercury levels in restored tidal marsh in the study area.

#### 34 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid** 35 **Disturbance of Nesting Birds**

36 See Mitigation Measure BIO-75 under Impact BIO-75.

#### 37 **Impact BIO-151: Periodic Effects of Inundation of Yellow-Headed Blackbird Nesting Habitat** 38 **as a Result of Implementation of Conservation Components**

39 Flooding of the Yolo Bypass (CM2) would inundate 961–2,678 acres of nesting habitat and 368–  
40 2,678 acres of foraging habitat (Table 12-1C-54). Based on hypothetical floodplain restoration,  
41 construction of setback levees for *CM5 Seasonally Inundated Floodplain Restoration* could result in  
42 periodic inundation of approximately 18 acres of nesting habitat and 2,701 acres of nonbreeding  
43 habitat (Table 12-1C-54) resulting in the temporary loss of these habitats. Foraging yellow-headed

1 blackbirds would be expected to move to adjacent suitable foraging habitat when the bypass is  
2 inundated, as they do under the current flooding regime. However, this inundation could reduce the  
3 availability of nesting habitat during years when flooding extends into the nesting season (past  
4 March). The periodic inundation of the Yolo Bypass (CM2) and of other floodplains (CM5) is  
5 expected to restore a more natural flood regime in support of wetland and riparian vegetation types  
6 that support nesting habitat.

7 **NEPA Effects:** Implementation of CM2 and CM5 would result in periodic inundation of nesting and  
8 foraging habitat for yellow-headed blackbird. Periodic inundation would not have an adverse effect  
9 on yellow-headed blackbird because inundation is expected to take place outside of the breeding  
10 season, and, although foraging habitat may be temporarily unavailable, birds would be expected to  
11 move to adjacent foraging habitat.

12 **CEQA Conclusion:** Implementation of CM2 and CM5 would result in periodic inundation of nesting  
13 and foraging habitat for yellow-headed blackbird. Periodic inundation would have a less-than-  
14 significant impact on yellow-headed blackbird because inundation is expected to take place outside  
15 of the breeding season, and, although foraging habitat would be temporarily unavailable, birds  
16 would be expected to move to adjacent foraging habitat.

### 17 **Riparian Brush Rabbit**

18 The habitat model used to assess effects on the riparian brush rabbit consists of 38 vegetation  
19 associations within the valley/foothill riparian natural community and adjacent grasslands. The  
20 vegetation associations were selected based on a review of understory and overstory composition  
21 from Hickson and Keeler-Wolf (2007) and species habitat requirements.

22 Just until recently, the only known naturally occurring populations of riparian brush rabbits were  
23 confined to Caswell Memorial State Park (MSP), a 258-acre park supporting riparian oak woodland  
24 on the Stanislaus River immediately southeast of the study area, and in the south Delta southwest of  
25 Lathrop, which is within the study area (Williams and Basey 1986; Williams et al. 2002) (Figure 12-  
26 46). On October 11, 2012 a single female riparian brush rabbit was captured near Durham Ferry  
27 Road in riparian habitat along the San Joaquin River between Caswell MSP and Lathrop (Bradbury  
28 pers. comm.). This is only the second naturally occurring population documented outside of Caswell  
29 MSP. Factors considered in assessing the value of adversely affected habitat for riparian brush  
30 rabbit, to the extent information was available, included size and degree of isolation of habitat  
31 patches, proximity to recorded species occurrences, and adjacency to conserved lands.

32 Construction and restoration associated with Alternative 1C conservation measures would result in  
33 both temporary and permanent losses of riparian brush rabbit modeled habitat as indicated in Table  
34 12-1C-55. Full implementation of Alternative 1C would also include biological objectives over the  
35 term of the BDCP to benefit the riparian brush rabbit (BDCP Chapter 3, *Conservation Strategy*). The  
36 conservation strategy for the riparian brush rabbit, with conservation principles involves  
37 protecting, restoring or creating, and maintaining habitat and corridors near the largest remaining  
38 fragments of habitat and extant populations; providing high-water refugia from flooding; and  
39 managing feral predators (dogs and cats) in areas occupied by the species. The conservation  
40 measures that will be implemented to achieve the biological goals and objectives are summarized  
41 below.

- 42 • Provide a range of elevations in restored floodplains that transition from frequently flooded  
43 (e.g., every 1 to 2 years) to infrequently flooded (e.g., every 10 years or more) areas to provide a

- 1 range of habitat conditions, upland habitat values, and refugia from flooding during most flood  
2 events (Objective L1.5, associated with CM3, CM5, and CM8).
- 3 ● Increase the size and connectivity of the reserve system by acquiring lands adjacent to and  
4 between existing conservation lands (Objective L1.6, associated with CM3).
  - 5 ● Allow floods to promote fluvial processes, such that bare mineral soils are available for natural  
6 recolonization of vegetation, desirable natural community vegetation is regenerated, and  
7 structural diversity is promoted, or implement management actions that mimic those natural  
8 disturbances (Objective L2.1, associated with CM3, CM5, and CM11).
  - 9 ● Protect and improve habitat linkages that allow terrestrial covered and other native species to  
10 move between protected habitats within and adjacent to the Plan Area (Objective L3.1,  
11 associated with CM3-CM8, and CM11).
  - 12 ● Restore or create 5,000 acres of valley/foothill riparian natural community, with at least 3,000  
13 acres occurring on restored seasonally inundated floodplain (Objective VFRNC1.1, associated  
14 with CM3 and CM7).
  - 15 ● Protect 750 acres of existing valley/foothill riparian natural community in CZ 7 by year 10  
16 (Objective VFRNC1.2, associated with CM3).
  - 17 ● Maintain 1,000 acres of early- to mid-successional vegetation with a well-developed understory  
18 of dense shrubs on restored seasonally inundated floodplain (Objective VFRNC2.2, associated  
19 with CM5, CM7, and CM11).
  - 20 ● Of the 750 acres of protected valley/foothill riparian natural community protected under  
21 Objective VFRNC1.2, protect at least 200 acres of suitable riparian brush rabbit habitat (defined  
22 in CM7 Riparian Natural Community Restoration) that is occupied by the species or contiguous  
23 with occupied habitat (Objective RBR1.1, associated with 3).
  - 24 ● Of the 1,000 acres of early- to midsuccessional riparian habitat maintained under VFRNC2.2,  
25 maintain at least 800 acres within the range of the riparian brush rabbit (CZ 7), in areas that are  
26 adjacent to or that facilitate connectivity with occupied or potentially occupied habitat  
27 (Objective RBR1.2, associated with CM3, CM7, and CM11).
  - 28 ● Of the 5,000 acres of valley/foothill riparian natural community restored under Objective  
29 VFRNC1.1, restore/create and maintain at least 300 acres of early- to mid-successional riparian  
30 habitat that meets the ecological requirements of the riparian brush rabbit and that is within or  
31 adjacent to or that facilitates connectivity with existing occupied or potentially occupied habitat  
32 (Objective 1.3, associated with CM3, CM7, and CM11).
  - 33 ● Create and maintain high-water refugia in the 300 acres of restored riparian brush rabbit  
34 habitat and the 200 acres of protected riparian brush rabbit habitat, through the retention,  
35 construction and/or restoration of high-ground habitat on mounds, berms, or levees, so that  
36 refugia are no further apart than 66 feet (Objective RBR1.4, associated with CM7 and CM11).
  - 37 ● In protected riparian areas that are occupied by riparian brush rabbit, monitor for and control  
38 nonnative predators that are known to prey on riparian brush rabbit (Objective RBR1.5,  
39 associated with CM11).
  - 40 ● Of the 8,000 acres of grasslands protected under Objective GNC1.1 and the 2,000 acres of  
41 grasslands restored under Objective GNC1.2, protect or restore grasslands on the landward side

1 of levees adjacent to restored floodplain to provide flood refugia and foraging habitat for  
2 riparian brush rabbit (Objective RBR1.6m associated with CM3 and CM8).

3 As explained below, with the restoration and protection of these amounts of habitat, in addition to  
4 implementation of the AMMs to reduce potential effects, impacts on riparian brush rabbit would not  
5 be adverse for NEPA purposes and would be less than significant for CEQA purposes.

6 **Table 12-1C-55. Changes in Riparian Brush Rabbit Modeled Habitat Associated with Alternative 1C**  
7 **(acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	Riparian	0	0	4	4	NA	NA
	Grassland	41	41	39	39	NA	NA
<b>Total Impacts CM1</b>		<b>41</b>	<b>41</b>	<b>43</b>	<b>43</b>	<b>NA</b>	<b>NA</b>
CM2–CM18	Riparian	0	62	0	35	0	264
	Grassland	0	44	0	20	0	423
<b>Total Impacts CM2–CM18</b>		<b>0</b>	<b>106</b>	<b>0</b>	<b>55</b>	<b>0</b>	<b>687</b>
<b>TOTAL IMPACTS</b>		<b>41</b>	<b>147</b>	<b>43</b>	<b>98</b>	<b>0</b>	<b>687</b>

<sup>a</sup> See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only.

NT = near-term

LLT = late long-term

NA = not applicable

8

9 **Impact BIO-152: Loss or Conversion of Habitat for and Direct Mortality of Riparian Brush**  
10 **Rabbit**

11 Alternative 1C conservation measures would result in the permanent and temporary losses  
12 combined of up to 101 acres of riparian habitat and 144 acres of associated grassland habitat for the  
13 riparian brush rabbit in the study area (Table 12-1C-55). The hypothetical footprint for levee  
14 construction under CM5, overlaps with one occurrence record for riparian brush rabbit, south of the  
15 Interstate 5/Interstate 205 interchange. Conservation measures resulting in permanent habitat loss  
16 include conveyance facilities construction (CM1), tidal natural communities restoration (CM4), and  
17 floodplain restoration (CM5). Each of these individual activities is described below. A summary  
18 statement of the combined impacts and NEPA effects and a CEQA conclusion follow the individual  
19 conservation measure discussions.

- 20 • *CM1 Water Facilities and Operation*: Development of Alternative 1C water conveyance facilities  
21 would result in the permanent removal of approximately 13,741 acres of associated grassland  
22 habitat and in the temporary removal of 4 acres of riparian habitat and 39 acres of grassland  
23 habitat for riparian brush rabbit in CZ 8 (Table 12-1C-55). The riparian habitat that would be

1 removed is of low value for the riparian brush rabbit as it consists of several small, isolated  
2 patches surrounded by agricultural lands northeast of Clifton Court Forebay. The associated  
3 grasslands are also of low value for the species: They consist of long, linear strips that abut  
4 riparian habitat, but extend several miles from the riparian habitat and, therefore, provide few if  
5 any opportunities for adjacent cover. Trapping efforts conducted for the riparian brush rabbit in  
6 this area were negative (BDCP Appendix 3.E, *Conservation Principles for the Riparian Brush*  
7 *Rabbit and Riparian Woodrat*). Refer to the Terrestrial Biology Map Book for a detailed view of  
8 Alternative 1C construction locations.

- 9 ● *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and  
10 inundation would permanently remove approximately 19 acres of riparian habitat and 18 acres  
11 of associated grassland habitat for the riparian brush rabbit in CZ 7 in the late long-term. The  
12 riparian habitat that would be removed consists of relatively small and isolated patches along  
13 canals and irrigation ditches surrounded by agricultural lands in the Union Island and Roberts  
14 Island areas, and several small patches along the San Joaquin River. The habitat that would be  
15 removed is not adjacent to any existing conserved lands, and is several miles north and  
16 northeast of the northernmost riparian brush rabbit record located northeast of Paradise Cut  
17 (Williams et al. 2002). Although the final footprint for tidal natural communities restoration  
18 would differ from the hypothetical footprint, compliance monitoring would be implemented to  
19 ensure that acreage limits are not exceeded and the measures described in AMM25 *Riparian*  
20 *Woodrat and Riparian Brush Rabbit* require that tidal natural communities restoration avoid  
21 removal of any habitat occupied by the riparian brush rabbit.
- 22 ● *CM5 Seasonally Inundated Floodplain Restoration*: Levee construction associated with floodplain  
23 restoration would result in the permanent removal of approximately 43 acres of riparian habitat  
24 and 26 acres of associated grassland habitat for the riparian brush rabbit in CZ 7 in the late  
25 long-term. Levee construction would also result in the temporary removal of 35 acre riparian  
26 habitat and 20 acres of grassland habitat for the riparian brush rabbit. Although the effects are  
27 considered temporary, five years to several decades may be required for ecological succession  
28 to occur and for restored riparian habitat to replace the function of habitat that has been  
29 affected. The value of this habitat for riparian brush rabbit is high: although it consists of small  
30 patches and narrow bands of riparian vegetation, these areas are in proximity to, or contiguous  
31 with, habitat with recorded occurrences of riparian brush rabbit. The hypothetical footprint for  
32 levee construction overlaps with one occurrence record for riparian brush rabbit, south of the  
33 Interstate 5/Interstate 205 interchange.

34 Although the final floodplain restoration design would differ from the hypothetical footprint  
35 used for this effects analysis, restoration of the river floodplain in CZ 7 would be targeted in the  
36 general area of the riparian brush rabbit population. Implementation of adaptive management  
37 described in AMM25 would ensure that riparian brush rabbit habitat permanently removed  
38 does not exceed maximum allowable habitat loss for this species.

- 39 ● *CM11 Natural Communities Enhancement and Management*: A variety of habitat management  
40 actions included in CM11 that are designed to enhance wildlife values in BDCP protected  
41 habitats may result in localized ground disturbances that could temporarily remove small  
42 amounts of riparian brush rabbit habitat. Passive recreation in the reserve system could result  
43 in disturbance of individual riparian brush rabbits foraging in the ecotone between riparian and  
44 adjacent open habitats. However, *AMM37 Recreation* limits trail development adjacent to  
45 riparian corridors within the range of the riparian brush rabbit. With this minimization measure  
46 in place, recreation related effects on the riparian brush rabbit are expected to be minimal.

1 Enhancement and management actions in riparian brush rabbit habitat within the reserve  
2 system may include invasive plant removal, planting and maintaining vegetation to improve and  
3 sustain habitat characteristics for the species, and creating and maintaining flood refugia. These  
4 activities are expected to have minor adverse effects on available riparian brush rabbit habitat  
5 and are expected to result in overall improvements to and maintenance of riparian brush rabbit  
6 habitat values over the term of the BDCP. These effects cannot be quantified, but are expected to  
7 be minimal and would be avoided and minimized through the AMMs listed below.

- 8 ● Operations and maintenance: Ongoing maintenance of BDCP facilities are not expected to  
9 adversely affect the riparian brush rabbit because the species is not expected to occur in the  
10 vicinity of proposed facilities.
- 11 ● Recreation: Passive recreation in the reserve system could result in disturbance of individual  
12 riparian brush rabbits foraging in the ecotone between riparian and adjacent open habitats.  
13 However, AMM37, described in the BDCP in Appendix 3.C, *Avoidance and Minimization*  
14 *Measures*, limits trail development adjacent to riparian corridors within the range of the riparian  
15 brush rabbit. With this minimization measure in place, recreation related effects on the riparian  
16 brush rabbit are expected to be minimal.
- 17 ● Injury and direct mortality: Water conveyance facility construction is not is not likely to result in  
18 injury or mortality of individual riparian brush rabbits because the species is not likely to be  
19 present in the areas that would be affected by this activity, based on live trapping results (BDCP  
20 Appendix 3.E, *Conservation Principles for the Riparian Brush Rabbit and Riparian Woodrat*). Tidal  
21 natural communities restoration would not result in injury or mortality of the riparian brush  
22 rabbit because tidal natural communities restoration projects would be designed to avoid  
23 occupied riparian brush rabbit habitat and, if that is not possible, rabbits would be trapped and  
24 relocated as described in AMM25 (see BDCP Appendix 3.C). Activities associated with  
25 construction of setback levees for floodplain restoration could result in injury or mortality of  
26 riparian brush rabbits: however, preconstruction surveys, construction monitoring, and other  
27 measures would be implemented to avoid and minimize injury or mortality of this species  
28 during construction (AMM25).

29 The following paragraphs summarize the combined effects discussed above and describe other  
30 BDCP conservation actions that offset or avoid these effects. NEPA effects and a CEQA conclusion  
31 are also included.

### 32 ***Near-Term Timeframe***

33 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
34 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
35 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
36 effects of construction would not be adverse under NEPA.

37 Alternative 1C would result in permanent and temporary effects combined on 4 acres of riparian  
38 habitat and 41 acres of grassland habitat for riparian brush rabbit in the near-term as a result of  
39 construction of the water conveyance facilities (CM1). The habitat would be lost in the  
40 valley/foothill riparian and grassland natural communities. All the near-term loss of riparian brush  
41 rabbit habitat would be in an area not likely to be occupied by the species. Habitat loss in CZ 7, in  
42 areas known or likely to be occupied, would occur during the early long-term and late long-term

1 implementation periods. Riparian restoration would be phased to minimize temporal habitat loss.  
2 There would be no near-term losses resulting from CM2–CM18.

3 Typical NEPA project-level mitigation ratios for these natural communities that would be affected  
4 and that are identified in the biological goals and objectives for riparian brush rabbit in Chapter 3 of  
5 the BDCP would be 1:1 for restoration and 1:1 for protection of the valley/foothill riparian natural  
6 community, and 2:1 for protection of grassland. Using these ratios would indicate that 4 acres of  
7 riparian habitat should be restored, 4 acres of riparian habitat should be protected, and 82 acres of  
8 grassland should be protected for riparian brush rabbit for near-term losses.

9 The BDCP has committed to near-term restoration of 800 acres of riparian (Objective VFRNC1.1 and  
10 an unknown number of associated acres of grassland and protection of 750 acres of riparian  
11 (Objective VFRNC1.2) with an unknown number of associated acres of grassland (Table 3-4 in  
12 Chapter 3). In addition, the species-specific biological goals and objectives (RBR1.1–RBR1.6) would  
13 inform the near-term protection and restoration efforts. The natural community restoration and  
14 protection activities are expected to be concluded during the first 10 years of plan implementation,  
15 which is close enough in time to the occurrence of impacts to constitute adequate mitigation for  
16 NEPA purposes. These commitments are more than sufficient to support the conclusion that the  
17 near-term effects of Alternative 1C would be not be adverse under NEPA, because the number of  
18 acres required to meet the typical ratios described above would be only 4 acres of riparian habitat  
19 restored and protected, and 82 acres of grassland protected.

20 The plan also contains commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
21 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
22 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
23 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
24 *Material*, *AMM7 Barge Operations Plan*, *AMM10 Restoration of Temporarily Affected Natural*  
25 *Communities*, *AMM25 Riparian Woodrat and Riparian Brush Rabbit*, and *AMM37 Recreation*. These  
26 AMMs contain elements that avoid or minimize the risk of BDCP activities affecting habitats and  
27 species adjacent to work areas and storage sites. The AMMs are described in detail in BDCP  
28 Appendix 3.C, *Avoidance and Minimization Measures*.

### 29 **Late Long-Term Timeframe**

30 There are 6,012 acres of modeled riparian brush rabbit habitat in the Plan Area, consisting of  
31 2,909 acres of riparian habitat and 3,103 acres of associated grassland habitat. Alternative 1C as a  
32 whole would result in permanent and temporary effects combined on 101 acres of modeled riparian  
33 habitat and 144 acres of modeled grassland habitat for riparian brush rabbit in CZ 6, CZ 7, and CZ 8.  
34 Habitat lost in CZ 6 and CZ 8 is fragmented, isolated, and unlikely to support the species. Habitat  
35 would also be lost in areas in CZ 7 that provide high-value habitat for the species.

36 The BDCP would restore 5,000 acres and protect 750 acres of valley/foothill riparian natural  
37 community, a portion of which is expected to consist of suitable riparian brush rabbit habitat  
38 (Objectives VFRNC1.1 and VFRNC1.2). Objective RBR1.2 requires that at least 800 acres of early- to  
39 midsuccessional riparian natural community be conserved in CZ 7, in areas that are adjacent to or  
40 that facilitate connectivity with existing occupied or potentially occupied habitat. This would consist  
41 of 200 acres of protected habitat (Objective RBR1.1) and 600 acres of restored habitat. The 800  
42 acres to be conserved would consist of early successional riparian vegetation suitable for riparian  
43 brush rabbit. The conserved habitat would also be part of a larger, more contiguous, and less patchy  
44 area of protected and restored riparian natural community than what currently exists in CZ 7 and

1 would be contiguous with existing modeled riparian brush rabbit habitat. The species-specific  
2 objectives further require that the 200 acres of protected riparian habitat (Objective RBR1.4) and at  
3 least 300 acres of the restored riparian habitat (Objective RBR1.3) meet more specific ecological  
4 requirements of riparian brush rabbit, including large patches of dense riparian brush; ecotonal  
5 edges that transition from brush species to grasses and forbs, scaffolding plants to support vines  
6 that grow above flood levels; a tree canopy that is open, if present; and high-ground refugia from  
7 flooding. In protected riparian areas that are occupied by riparian brush rabbit, nonnative predators  
8 that are known to prey on riparian brush rabbit would be monitored and controlled (RBR1.5).

9 In addition to restoration and protection of riparian habitat for the riparian brush rabbit, Alternative  
10 1C would protect, and, if necessary, create or restore grasslands adjacent to suitable riparian  
11 vegetation in areas outside the floodplain levees (Objective RBR1.6). These grasslands are expected  
12 to provide additional foraging opportunities for the riparian brush rabbit and upland refugia during  
13 flood events. The actual acreage of grassland to be restored or protected for riparian brush rabbit  
14 would depend on site-specific needs adjacent to restored and protected riparian habitat (CM3).  
15 Grasslands on the landward side of levees adjacent to restored floodplain will be restored or  
16 protected as needed to provide flood refugia and foraging habitat for riparian brush rabbit  
17 (Objective RBR1.6).

18 In addition to grasslands protected and restored outside the levees for riparian brush rabbit as  
19 needed, the floodplains will transition from areas that flood frequently (e.g., every 1 to 2 years) to  
20 areas that flood infrequently (e.g., every 10 years or more) (Objective L1.5): these infrequently  
21 flooded areas will provide refuge for the riparian brush rabbit during most years. Alternative 1C  
22 would also create and maintain mounds, levee sections, or other high areas in restored and  
23 protected riparian areas (Objective RBR1.4) that are designed specifically to provide flood refugia  
24 for the riparian brush rabbit (BDCP Appendix 3.F, *Conservation Principles for the Riparian Brush  
25 Rabbit and Riparian Woodrat*). Additionally, nonnative predators that are known to prey on riparian  
26 brush rabbit (e.g., feral dogs and cats) would be monitored in protected and restored riparian areas  
27 that are occupied by riparian brush rabbit (Objective RBR1.5), and controlled as needed (CM11).

28 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and  
29 Plant Species*) estimates that the restoration and protection actions discussed above, as well as the  
30 restoration of valley/foothill riparian and grassland that could overlap with the species model,  
31 would result in the restoration of 800 acres of riparian and 79 acres of grassland modeled habitat  
32 for riparian brush rabbit. In addition, protection of valley/foothill riparian and grassland could  
33 overlap with the species model and would result in the protection of 200 acres of riparian and 317  
34 acres of grassland riparian brush rabbit modeled habitat.

35 **NEPA Effects:** In the near-term, the loss of riparian brush rabbit habitat under Alternative 1C would  
36 not be an adverse effect because there is little likelihood of riparian brush rabbits being present and  
37 because the BDCP has committed to protecting and restoring the acreage required to meet the  
38 typical mitigation ratios described above. In the late long-term, the losses of riparian brush rabbit  
39 riparian and grassland habitat associated with Alternative 1C, in the absence of other conservation  
40 actions, would represent an adverse effect as a result of habitat modification and potential direct  
41 mortality of a special-status species. However, with habitat protection and restoration associated  
42 with the conservation components, guided by landscape-scale goals and objectives and by AMM1-  
43 AMM7, AMM10, AMM25, and AMM37, the effects of Alternative 1C as a whole on riparian brush  
44 rabbit would not be adverse.

1 **CEQA Conclusion:**

2 **Near-Term Timeframe**

3 Because the water conveyance facilities construction is being evaluated at the project level, the near-  
4 term BDCP conservation strategy has been evaluated to determine whether it would provide  
5 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the impacts of  
6 construction would be less than significant under CEQA.

7 Alternative 1C would result in permanent and temporary effects combined on 4 acres of riparian  
8 habitat and 41 acres of grassland habitat for riparian brush rabbit in the near-term as a result of  
9 construction of the water conveyance facilities (CM1). The habitat would be lost in the  
10 valley/foothill riparian and grassland natural communities. All the near-term loss of riparian brush  
11 rabbit habitat would be in an area not likely to be occupied by the species. Habitat loss in CZ 7, in  
12 areas known or likely to be occupied, would occur during the early long-term and late long-term  
13 implementation periods. Riparian restoration would be phased to minimize temporal habitat loss.  
14 There would be no near-term losses resulting from CM2–CM18.

15 Typical CEQA project-level mitigation ratios for these natural communities that would be affected  
16 and that are identified in the biological goals and objectives for riparian brush rabbit in Chapter 3 of  
17 the BDCP would be 1:1 for restoration and 1:1 for protection of the valley/foothill riparian natural  
18 community, and 2:1 for protection of grassland. Using these ratios would indicate that 4 acres of  
19 riparian habitat should be restored, 4 acres of riparian habitat should be protected, and 82 acres of  
20 grassland should be protected for riparian brush rabbit for near-term losses.

21 The BDCP has committed to near-term restoration of 800 acres of riparian (Objective VFRNC1.1)  
22 and an unknown number of associated acres of grassland and protection of 750 acres of riparian  
23 (Objective VFRNC1.2) with an unknown number of associated acres of grassland (Table 3-4 in  
24 Chapter 3). In addition, the species-specific biological goals and objectives (RBR1.1-RBR1.6) would  
25 inform the near-term protection and restoration efforts. The natural community restoration and  
26 protection activities are expected to be concluded during the first 10 years of plan implementation,  
27 which is close enough in time to the occurrence of impacts to constitute adequate mitigation for  
28 CEQA purposes. These commitments are more than sufficient to support the conclusion that the  
29 near-term impacts of Alternative 1C would be less than significant under CEQA, because the number  
30 of acres required to meet the typical ratios described above would be only 8 acres of riparian  
31 habitat protected, 8 acres of riparian habitat restored, and 360 acres of grassland habitat

32 The plan also contains commitments to implement AMM1–AMM7, AMM10, AMM25, and AMM37.  
33 These AMMs contain elements that avoid or minimize the risk of BDCP activities affecting habitats  
34 and species adjacent to work areas and storage sites. The AMMs are described in detail in BDCP  
35 Appendix 3.C, *Avoidance and Minimization Measures*.

36 **Late Long-Term Timeframe**

37 There are 6,012 acres of modeled riparian brush rabbit habitat in the Plan Area, consisting of  
38 2,909 acres of riparian habitat and 3,103 acres of associated grassland habitat. Alternative 1C would  
39 result in permanent and temporary effects combined on 101 acres of modeled riparian habitat and  
40 144 acres of modeled grassland habitat for riparian brush rabbit in CZ 6, CZ 7, and CZ 8. Habitat lost  
41 in CZ 6 and CZ 8 is fragmented, isolated, and unlikely to support the species. Habitat would also be  
42 lost in areas in CZ 7 that provide high-value habitat for the species.

1 The BDCP would restore 5,000 acres and protect 750 acres of valley/foothill riparian natural  
2 community, a portion of which is expected to consist of suitable riparian brush rabbit habitat  
3 (Objectives VFRNC1.1 and VFRNC1.2). Objective RBR1.2 requires that at least 800 acres of early- to  
4 midsuccessional riparian natural community be conserved in CZ 7, in areas that are adjacent to or  
5 that facilitate connectivity with existing occupied or potentially occupied habitat. This would consist  
6 of 200 acres of protected habitat (Objective RBR1.1) and 600 acres of restored habitat. The 800  
7 acres to be conserved would consist of early successional riparian vegetation suitable for riparian  
8 brush rabbit. The conserved habitat would also be part of a larger, more contiguous, and less patchy  
9 area of protected and restored riparian natural community than what currently exists in CZ 7 and  
10 would be contiguous with existing modeled riparian brush rabbit habitat. The species-specific  
11 objectives further require that the 200 acres of protected riparian habitat (Objective RBR1.4) and at  
12 least 300 acres of the restored riparian habitat (Objective RBR1.3) meet more specific ecological  
13 requirements of riparian brush rabbit, including large patches of dense riparian brush; ecotonal  
14 edges that transition from brush species to grasses and forbs, scaffolding plants to support vines  
15 that grow above flood levels; a tree canopy that is open, if present; and high-ground refugia from  
16 flooding. In protected riparian areas that are occupied by riparian brush rabbit, nonnative predators  
17 that are known to prey on riparian brush rabbit would be monitored and controlled (RBR1.5).

18 In addition to restoration and protection of riparian habitat for the riparian brush rabbit, the BDCP  
19 would protect, and, if necessary, create or restore grasslands adjacent to suitable riparian vegetation  
20 in areas outside the floodplain levees (Objective RBR1.6). These grasslands are expected to provide  
21 additional foraging opportunities for the riparian brush rabbit and upland refugia during flood  
22 events. The actual acreage of grassland to be restored or protected for riparian brush rabbit would  
23 depend on site-specific needs adjacent to restored and protected riparian habitat (CM3). Grasslands  
24 on the landward side of levees adjacent to restored floodplain will be restored or protected as  
25 needed to provide flood refugia and foraging habitat for riparian brush rabbit (Objective RBR1.6).

26 In addition to grasslands protected and restored outside the levees for riparian brush rabbit as  
27 needed, the floodplains will transition from areas that flood frequently (e.g., every 1 to 2 years) to  
28 areas that flood infrequently (e.g., every 10 years or more) (Objective L1.5): these infrequently  
29 flooded areas will provide refuge for the riparian brush rabbit during most years. The Plan would  
30 also create and maintain mounds, levee sections, or other high areas in restored and protected  
31 riparian areas (Objective RBR1.4) that are designed specifically to provide flood refugia for the  
32 riparian brush rabbit (BDCP Appendix 3.F, *Conservation Principles for the Riparian Brush Rabbit and*  
33 *Riparian Woodrat*). Additionally, nonnative predators that are known to prey on riparian brush  
34 rabbit (e.g., feral dogs and cats) would be monitored in protected and restored riparian areas that  
35 are occupied by riparian brush rabbit (Objective RBR1.5), and controlled as needed (CM11).

36 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*  
37 *Plant Species*) estimates that the restoration and protection actions discussed above, as well as the  
38 restoration of valley/foothill riparian and grassland that could overlap with the species model,  
39 would result in the restoration of 800 acres of riparian and 79 acres of grassland modeled habitat  
40 for riparian brush rabbit. In addition, protection of valley/foothill riparian and grassland could  
41 overlap with the species model and would result in the protection of 200 acres of riparian and 317  
42 acres of grassland riparian brush rabbit modeled habitat.

43 Only a small proportion of the habitat losses would be considered occupied and of high value.  
44 Alternative 1C conservation measures provide for large acreages of riparian brush rabbit riparian  
45 and grassland habitat to be protected and restored, and the BDCP includes AMM1–AMM7, AMM10,

1 AMM25, and AMM37 directed at minimizing or avoiding potential impacts during construction and  
2 operation of the conservation measures. Overall, Alternative 1C would provide a substantial net  
3 benefit to the riparian brush rabbit through the increase in available habitat and habitat in protected  
4 status.

5 Considering the habitat restoration and protection associated with CM3, CM7, CM8 and CM11,  
6 guided by species-specific goals and objectives and by AMM1–AMM7, AMM10, AMM25, and AMM37,  
7 the temporary and permanent losses of riparian and grassland habitat and potential direct mortality  
8 of riparian brush rabbit as a result of implementing Alternative 1C would not represent a substantial  
9 adverse effect through habitat modifications and would not substantially reduce the number or  
10 restrict the range of the species. The loss of habitat and potential mortality of riparian brush rabbits  
11 would be a less-than-significant impact under CEQA.

### 12 **Impact BIO-153: Indirect Effects of Plan Implementation on Riparian Brush Rabbit**

13 Noise and visual disturbance adjacent to construction activities could indirectly affect the use of  
14 modeled riparian brush rabbit riparian habitat and of associated grassland habitat in the study area.  
15 These construction activities would include water conveyance (including transmission line)  
16 construction in CZ 8, tidal natural community restoration construction, and construction of setback  
17 levees. Water conveyance construction would potentially affect acres of adjacent riparian habitat  
18 and of associated grassland habitat: this construction would occur in CZ 8 where there is suitable  
19 habitat for the species but surveys by ESRP did not indicate the species is present in this area;  
20 therefore, the potential for adverse noise and visual effects from conveyance facility construction  
21 would be minimal. Tidal natural communities restoration construction would also potentially affect  
22 adjacent riparian habitat and associated grassland habitat for this species: however, adverse effects  
23 on the species are unlikely because tidal natural communities restoration projects would be sited to  
24 avoid areas occupied by riparian brush rabbit. The activity most likely to result in noise and visual  
25 disturbance to riparian brush rabbit is the construction of setback levees for floodplain restoration,  
26 which would take place in CZ 7, where the species is known to occur. The use of mechanical  
27 equipment during construction might cause the accidental release of petroleum or other  
28 contaminants that would affect the riparian brush rabbit in adjacent habitat, if the species is present.

29 **NEPA Effects:** Implementation of the AMMs listed above as part of implementing Alternative 1C  
30 would avoid the potential for substantial adverse effects on riparian brush rabbits, either indirectly  
31 or through habitat modifications or result in a substantial reduction in numbers or a restriction in  
32 the range of riparian brush rabbits. Therefore, indirect effects of Alternative 1C would not have an  
33 adverse effect on riparian brush rabbit.

34 **CEQA Conclusion:** Indirect effects from conservation measure operations and maintenance as well  
35 as construction-related noise and visual disturbances could affect riparian brush rabbit in riparian  
36 and grassland habitats. The use of mechanical equipment during construction could cause the  
37 accidental release of petroleum or other contaminants that could affect riparian brush rabbit. The  
38 inadvertent discharge of sediment or excessive dust adjacent to riparian brush rabbit habitat could  
39 also have a negative effect on the species. With implementation of AMM1–AMM7, AMM10, AMM25,  
40 and AMM37 as part of Alternative 1C, the BDCP would avoid the potential for substantial adverse  
41 effects on riparian brush rabbits, either indirectly or through habitat modifications and would not  
42 result in a substantial reduction in numbers or a restriction in the range of riparian brush rabbits.  
43 Indirect effects of Alternative 1C would have a less-than-significant impact on riparian brush rabbit.

1 **Impact BIO-154: Periodic Effects of Inundation of Riparian Brush Rabbit Habitat as a Result of**  
2 **Implementation of Conservation Components**

3 *CM5 Seasonally Inundated Floodplain Restoration* is the only covered activity expected to result in  
4 periodic inundation of riparian brush rabbit habitat. This activity would periodically inundate  
5 approximately 264 acres of riparian habitat (9% of riparian habitat in the Plan Area) and 423 acres  
6 of associated grassland habitat (14% of associated grassland habitat in the Plan Area) for the  
7 riparian brush rabbit. The area between existing levees that would be breached and the newly  
8 constructed setback levees would be inundated through seasonal flooding. The potentially  
9 inundated areas consist of high-value habitat for the species: although they consist of small patches  
10 and narrow bands of riparian vegetation, many of these areas are in proximity to, or contiguous  
11 with, habitat with recorded occurrences of riparian brush rabbit. The restored floodplain would  
12 include a range of elevations from lower lying areas that flood frequently (e.g., every 1 to 2 years) to  
13 higher elevation areas that flood infrequently (e.g., every 10 years or more).

14 Seasonal flooding in restored floodplains can result in injury or mortality of individuals if riparian  
15 brush rabbits occupy these areas and cannot escape flood waters. One recorded occurrence of  
16 riparian brush rabbit (Williams et al. 2002), just west of Stewart Road in Mossdale, is in the area that  
17 would be seasonally flooded based on the hypothetical restoration footprint.

18 **NEPA Effects:** Floodplain restoration under CM5 would periodically affect only a small proportion of  
19 the modeled riparian brush rabbit habitat in the study area. The adverse effects of periodic  
20 inundation on the riparian brush rabbit would be minimized through construction and maintenance  
21 of flood refugia to allow riparian brush rabbits to escape inundation. Therefore, implementing  
22 Alternative 1C, including AMM1–AMM7, AMM10, AMM25, and AMM37, would not be expected to result  
23 in substantial adverse effects on riparian brush rabbit, either directly or through habitat  
24 modifications and would not result in a substantial reduction in numbers or a restriction in the  
25 range of riparian brush rabbits. Therefore, Alternative 1C would not adversely affect the species.

26 **CEQA Conclusion:** Floodplain restoration under CM5 would periodically affect only a small  
27 proportion of the modeled riparian brush rabbit habitat in the study area. The overall effect of  
28 seasonal inundation on existing riparian natural communities may instead be beneficial. Historically,  
29 flooding was the main natural disturbance regulating ecological processes in riparian areas, and  
30 flooding promotes the germination and establishment of many native riparian plants. In the late  
31 long-term, seasonal inundation in areas currently occupied by riparian vegetation may contribute to  
32 the establishment of high-value habitat for covered riparian species, such as the riparian brush  
33 rabbit. Long-term management of riparian areas would ensure that refugia also exist along the  
34 edges of seasonally inundated habitat.

35 The adverse effects of periodic inundation on the riparian brush rabbit would be minimized through  
36 construction and maintenance of flood refugia to allow riparian brush rabbits to escape inundation.  
37 Therefore, implementing Alternative 1C, including AMM1–AMM7, AMM10, AMM25, and AMM37,  
38 would not be expected to result in substantial adverse effects on riparian brush rabbit, either  
39 directly or through habitat modifications and would not result in a substantial reduction in numbers  
40 or a restriction in the range of riparian brush rabbits. Periodic inundation of riparian and grassland  
41 habitat for riparian brush rabbit under Alternative 1C would have a less-than-significant impact on  
42 the species.

## 1 Riparian Woodrat

2 The habitat model used to assess effects for the riparian woodrat consists of selected plant alliances  
3 from the valley/foothill riparian natural community, geographically constrained to the south Delta  
4 portion of the BDCP area in CZ 7, south of SR 4 and Old River Pipeline along the Stanislaus, San  
5 Joaquin, Old, and Middle Rivers. Valley/foothill riparian areas along smaller drainages (Paradise Cut,  
6 Tom Paine Slough), and some larger streams in the northern portion of CZ 7 were excluded from the  
7 riparian woodrat habitat model due to a lack of trees or riparian corridors that were too narrow.  
8 Factors considered in assessing the value of affected habitat for the riparian woodrat, to the extent  
9 that information is available, include habitat patch size and connectivity.

10 The riparian woodrat is not known to occur in the study area. The only verified extant population of  
11 riparian woodrats rangewide is 2 miles east of the southern end of the study area in Caswell  
12 Memorial State Park along the Stanislaus River (Williams 1986:1–112; 1993). Riparian woodrat may  
13 occur in small patches of valley oak riparian forest along the San Joaquin River from the southern tip  
14 of the study area north to approximately the Interstate 5 overcrossing near Lathrop (Figure 12-47).

15 Construction and restoration associated with Alternative 1C conservation measures would result in  
16 both temporary and permanent losses of riparian woodrat modeled habitat as indicated in Table 12-  
17 1C-56. Tidal habitat restoration, floodplain restoration, and protection and management of natural  
18 communities could affect modeled riparian woodrat habitat. However, because the species is not  
19 known to occur in the study area it is not expected to be affected by BDCP actions unless the species  
20 were to establish in the study area over the term of the BDCP. Full implementation of Alternative 1C  
21 would also include biological objectives over the term of the BDCP to benefit the riparian woodrat  
22 (BDCP Chapter 3, *Conservation Strategy*). The conservation strategy for the riparian woodrat  
23 involves providing opportunities for population expansion into the Plan Area from adjacent lands to  
24 the south and southeast. The strategy focuses on restoring and maintaining suitable habitat at the  
25 southernmost end of CZ 7, providing connectivity with existing populations to the south and  
26 southeast, and creating and maintaining flood refugia. This conservation approach is consistent with  
27 the recovery plan (U.S. Fish and Wildlife Service 1998) and conservation principles (BDCP, Appendix  
28 3.E). The conservation measures that will be implemented to achieve the biological goals and  
29 objectives are summarized below.

- 30 ● Provide a range of elevations in restored floodplains that transition from frequently flooded  
31 (e.g., every 1 to 2 years) to infrequently flooded (e.g., every 10 years or more) areas to provide a  
32 range of habitat conditions, upland habitat values, and refugia from flooding during most flood  
33 events (Objective L1.5, associated with CM3, CM5, and CM8).
- 34 ● Increase the size and connectivity of the reserve system by acquiring lands adjacent to and  
35 between existing conservation lands (Objective L1.6, associated with CM3).
- 36 ● Protect and improve habitat linkages that allow terrestrial covered and other native species to  
37 move between protected habitats within and adjacent to the Plan Area (Objective L3.1,  
38 associated with CM3-CM8, and CM11).
- 39 ● Restore or create 5,000 acres of valley/foothill riparian natural community, with 3,000 acres  
40 occurring on restored seasonally inundated floodplain (Objective VFRNC1.1, associated with  
41 CM3 and CM7).
- 42 ● Protect 750 acres of existing valley/foothill riparian natural community in CZ 7 by year 10  
43 (Objective VFRNC1.2, associated with CM3).

- 1 • Restore, maintain and enhance structural heterogeneity with adequate vertical and horizontal  
2 overlap among vegetation components and over adjacent riverine channels, freshwater  
3 emergent wetlands, and grasslands (Objective VFRNC2.1, associated with CM5, CM7, and CM11).
- 4 • Of the 5,000 acres of valley/foothill riparian natural community restored under Objective  
5 VFRNC1.1, restore/create and maintain 300 acres riparian habitat in CZ 7 that meets the  
6 ecological requirements of the riparian woodrat (i.e., dense willow understory and oak  
7 overstory) and that is adjacent to or facilitates connectivity with existing occupied or potentially  
8 occupied habitat (Objective RW1.1, associated with CM3, CM7, CM11).
- 9 • Provide and maintain high-water refugia in the 300 acres of riparian woodrat habitat restored  
10 under Objective RW1.1 through the retention, construction, and/or restoration of high-ground  
11 habitat on mounds, berms, or levees, so that refugia are no further apart than 67 feet (Objective  
12 RW1.2, associated with CM7 and CM11).

13 As explained below, with the restoration and protection of these amounts of habitat, in addition to  
14 implementation of the AMMs to reduce potential effects, impacts on riparian woodrat would not be  
15 adverse for NEPA purposes and would be less than significant for CEQA purposes.

16 **Table 12-1C-56. Changes in Riparian Woodrat Modeled Habitat Associated with Alternative 1C**  
17 **(acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	Riparian	0	0	1	1	NA	NA
<b>Total Impacts CM1</b>		<b>0</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>NA</b>	<b>NA</b>
CM2–CM18	Riparian	0	51	0	33	0	203
<b>Total Impacts CM2–CM18</b>		<b>0</b>	<b>51</b>	<b>0</b>	<b>33</b>	<b>0</b>	<b>203</b>
<b>TOTAL IMPACTS</b>		<b>0</b>	<b>51</b>	<b>1</b>	<b>34</b>	<b>0</b>	<b>203</b>

<sup>a</sup> See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only.

NT = near-term

LLT = late long-term

NA = not applicable

18

19 **Impact BIO-155: Loss or Conversion of Habitat for and Direct Mortality of Riparian Woodrat**

20 Alternative 1C conservation measures would result in the permanent loss of up to 51 acres of  
21 habitat and temporary loss of up to 34 acres of habitat for riparian woodrat (Table 12-1C-56).  
22 Construction of Alternative 1C water conveyance facilities (CM1), tidal natural communities  
23 restoration and seasonally inundated floodplain restoration would remove habitat. Each of these  
24 individual activities is described below. A summary statement of the combined impacts and NEPA  
25 effects and a CEQA conclusion follow the individual conservation measure discussions.

- 1       ● *CM1 Water Facilities and Operation*: Development of Alternative 1C water conveyance facilities  
2       would result in the temporary removal of 1 acre of modeled habitat for the riparian woodrat in  
3       CZ 9 (Table 12-1C-56). The modeled habitat that would be removed is of low value for the  
4       riparian woodrat as is consists of several small, isolated patches surrounded by agricultural  
5       lands northeast of Clifton Court Forebay. Trapping efforts conducted for the riparian woodrat in  
6       this area were negative (BDCP Appendix 3.E, *Conservation Principles for the Riparian Brush*  
7       *Rabbit and Riparian Woodrat*). Refer to the Terrestrial Biology Map Book for a detailed view of  
8       Alternative 1C construction locations.
  
- 9       ● *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and  
10       inundation would permanently remove approximately 10 acres of modeled habitat for the  
11       riparian woodrat in CZ 7. This habitat is of low value, consisting of a small, isolated patch  
12       surrounded by agricultural lands, and the species has a relatively low likelihood of being present  
13       in these areas. The measures described in *AMM25 Riparian Woodrat and Riparian Brush Rabbit*,  
14       require that tidal natural communities restoration avoid removal of any habitat occupied by the  
15       riparian woodrat. Because the estimates of habitat loss due to tidal inundation are based on  
16       projections of where restoration may occur, actual habitat loss is expected to be lower because  
17       sites would be selected to minimize effects on riparian woodrat.
  
- 18       ● *CM5 Seasonally Inundated Floodplain Restoration*: Levee construction associated with floodplain  
19       restoration would result in the permanent removal of approximately 41 acres of modeled  
20       habitat for the riparian woodrat in CZ 7. The value of this habitat for riparian woodrat is  
21       moderate. Although the habitat consists of small patches and narrow bands of riparian  
22       vegetation and no riparian woodrats have detected in CZ 7, the riparian patches are in proximity  
23       to each other along the San Joaquin River. There are two species occurrences immediately south  
24       of CZ 7, one of which is less than 1.5 mile from the southernmost patch of riparian habitat  
25       potentially affected by levee construction.

26       The final floodplain restoration design would differ from the hypothetical footprint used for this  
27       effects analysis. However, monitoring and adaptive management described in *CM11 Natural*  
28       *Communities Enhancement and Management* and *AMM25* would ensure that modeled habitat  
29       permanently removed as a result of floodplain restoration does not exceed the amount  
30       estimated based on the hypothetical footprint. Habitat loss is expected to be lower than 41 acres  
31       because sites would be selected and restoration designed to minimize effects on the riparian  
32       woodrat. If natural flooding is insufficient to maintain appropriate riparian woodrat vegetation  
33       structure, the vegetation would be actively managed to provide suitable habitat structure as  
34       described in *CM11 Natural Communities Enhancement and Management*.

35       Levee construction would also result in the temporary removal of 33 acres of modeled habitat  
36       for the riparian woodrat. Although the effects are considered temporary, 5 years to several  
37       decades may be required for ecological succession to occur and for restored riparian habitat to  
38       replace the function of habitat that has been affected.

- 39       ● *CM11 Natural Communities Enhancement and Management*: A variety of habitat management  
40       actions included in *CM11* that are designed to enhance wildlife values in BDCP protected  
41       habitats may result in localized ground disturbances that could temporarily remove small  
42       amounts of riparian woodrat habitat. Enhancement and management actions in riparian  
43       woodrat habitat within the reserve system may include invasive plant removal, planting and  
44       maintaining vegetation to improve and sustain habitat characteristics for the species, and  
45       creating and maintaining flood refugia. These activities are expected to have minor adverse

1 effects on available riparian woodrat habitat and are expected to result in overall improvements  
2 to and maintenance of riparian woodrat habitat values over the term of the BDCP. These effects  
3 cannot be quantified, but are expected to be minimal and would be avoided and minimized  
4 through the AMMs listed below.

- 5 ● Operations and maintenance: The only ongoing effects on the riparian woodrat are those  
6 potentially resulting from habitat enhancement and management activities. Enhancement and  
7 management actions in riparian woodrat habitat within the reserve system may include invasive  
8 plant removal, planting and maintaining vegetation to improve and sustain habitat  
9 characteristics for the species, and creating and maintaining flood refugia. These activities may  
10 result in harassment of riparian woodrats through noise and visual disturbance which would be  
11 minimized with implementation of AMM1–AMM7, AMM10, and AMM25.
- 12 ● Injury and direct mortality: Water conveyance facility construction is not likely to result in  
13 injury or mortality of individual riparian woodrats because the species is not likely to be present  
14 in the areas that would be affected by this activity, based on live trapping results (BDCP  
15 Appendix 3.E, Conservation Principles for the Riparian Brush Rabbit and Riparian Woodrat).  
16 Tidal natural communities restoration would not result in injury or mortality of the riparian  
17 woodrats because tidal natural communities restoration projects would be designed to avoid  
18 occupied riparian woodrat habitat and if that is not possible to trap and relocate the species  
19 (AMM25). Activities associated with construction of setback levees for floodplain restoration  
20 could result in injury or mortality of riparian woodrats: however, preconstruction surveys,  
21 construction monitoring, and other measures would be implemented under AMM25 to avoid  
22 and minimize injury or mortality of this species during construction, as described in Appendix  
23 3.C. If occupied riparian woodrat habitat cannot be avoided, mortality would be avoided through  
24 implementation of a trapping and relocation program. The program will be developed in  
25 coordination with USFWS, and relocation will be to a site approved by USFWS prior to  
26 construction activities.

27 The following paragraphs summarize the combined effects discussed above and describe other  
28 BDCP conservation actions that offset or avoid these effects. NEPA effects and a CEQA conclusion are  
29 also included.

### 30 ***Near-Term Timeframe***

31 Because water conveyance facilities construction is being evaluated at the project level, the near-  
32 term BDCP strategy has been analyzed to determine whether it would provide sufficient habitat  
33 protection or restoration in an appropriate timeframe to ensure that the construction effects would  
34 not be adverse under NEPA.

35 Alternative 1C would result in temporary effects on 1 acre of modeled habitat for riparian woodrat  
36 in the near-term as a result of construction of the water conveyance facilities (CM1). The habitat  
37 would be lost in the valley/foothill riparian. All the near-term loss of riparian woodrat habitat would  
38 result from CM1 conveyance facility construction in CZ 9, and would occur in an area not likely to be  
39 occupied by the species. Habitat loss in CZ 7, in areas known or likely to be occupied, would occur  
40 during the early long-term and late long-term implementation periods. Riparian restoration would  
41 be phased to minimize temporal habitat loss. There would be no near-term losses from CM2–CM18.

42 Typical NEPA project-level mitigation ratios for these natural communities that would be affected  
43 and that are identified in the biological goals and objectives for riparian woodrat in Chapter 3 of the

1 BDCP would be 1:1 for restoration and 1:1 for protection of the valley/foothill riparian natural  
2 community. Using these ratios would indicate that 1 acre of riparian habitat should be restored and  
3 1 acre of riparian habitat should be protected for riparian woodrat for near-term losses.

4 The BDCP has committed to near-term restoration of 800 acres of riparian (Objective VFRNC1.1)  
5 and protection of 750 acres of riparian (Objective VFRNC1.2) (Table 3-4 in Chapter 3). In addition,  
6 the species-specific biological goals and objectives (RW1.1 and RW1.2) would inform the near-term  
7 protection and restoration efforts. The natural community restoration and protection activities are  
8 expected to be concluded during the first 10 years of plan implementation, which is close enough in  
9 time to the occurrence of impacts to constitute adequate mitigation for NEPA purposes. These  
10 commitments are more than sufficient to support the conclusion that the near-term effects of  
11 Alternative 1C would not be adverse under NEPA, because only 1 acre of modeled habitat would be  
12 temporarily affected and there is only limited potential for minor adverse effects on woodrats or its  
13 habitat from implementation of CM11.

14 These effects cannot be quantified, but are expected to be minimal and would be avoided and  
15 minimized through the BDCP's commitment to *AMM1 Worker Awareness Training, AMM2*  
16 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*  
17 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
18 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
19 *Material, AMM7 Barge Operations Plan, AMM10 Restoration of Temporarily Affected Natural*  
20 *Communities, and AMM25 Riparian Woodrat and Riparian Brush Rabbit. The AMMs are described in*  
21 *detail in BDCP Appendix 3.C, Avoidance and Minimization Measures.*

#### 22 **Late Long-Term Timeframe**

23 The study area supports approximately 2,166 acres of modeled riparian woodrat habitat.  
24 Alternative 1C as a whole would result in the permanent loss of and temporary removal of 85 acres  
25 of modeled habitat for riparian woodrat habitat during the late long-term. None of this habitat is  
26 considered occupied.

27 The BDCP would restore 5,000 acres and protect 750 acres of valley/foothill riparian natural  
28 community, a portion of which is expected to consist of suitable riparian brush rabbit habitat  
29 (Objectives VFRNC1.1 and VFRNC1.2). Objective RW1.1 requires at least 300 acres of riparian  
30 habitat that meets the ecological requirements of the riparian woodrat (e.g., dense willow  
31 understory and oak overstory) and that is adjacent to or facilitates connectivity with existing  
32 occupied or potentially occupied habitat to be restored in CZ 7. The conserved habitat would also be  
33 part of a larger, more contiguous, and less patchy area of protected and restored riparian natural  
34 community than what currently exists in CZ 7 and would be contiguous with existing modeled  
35 riparian woodrat habitat. The species-specific objective further requires that the 300 acres of  
36 restored riparian habitat meet more specific ecological requirements of riparian woodrat (e.g.,  
37 dense willow understory and oak overstory). Additionally, assuming the protected riparian natural  
38 community would provide riparian woodrat habitat proportional to the amount of modeled habitat  
39 in this natural community in the Plan Area (12% of the riparian natural community in the Plan Area  
40 is modeled riparian woodrat habitat), the protection of 750 acres of riparian natural community  
41 (CM3) would provide an estimated 90 acres of protected riparian woodrat habitat that is  
42 comparable to or of higher value than existing modeled grassland habitat. All riparian protection  
43 would occur during the near-term period, to offset early riparian losses.

1 The Plan would also create and maintain mounds, levee sections, or other high areas in restored and  
2 protected riparian areas (Objective RW1.2) that are designed specifically to provide flood refugia for  
3 the riparian woodrat (Appendix 3.E, *Conservation Principles for the Riparian Brush Rabbit and*  
4 *Riparian Woodrat*). In addition, the restored floodplains would transition from areas that flood  
5 frequently (e.g., every 1 to 2 years) to areas that flood infrequently (e.g., every 10 years or more)  
6 (Objective L1.5): these infrequently flooded areas would provide refuge for the riparian woodrat  
7 during most years.

8 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*  
9 *Plant Species*) estimates that the restoration and protection actions discussed above, as well as the  
10 restoration of valley/foothill riparian that could overlap with the species model, would result in the  
11 restoration of 300 acres of modeled habitat for riparian woodrat. In addition, protection of  
12 valley/foothill riparian could overlap with the species model and would result in the protection of  
13 90 acres riparian woodrat modeled habitat.

14 Although there are no records of occurrences of the riparian woodrat in the study area, habitat  
15 restoration in CZ 7, in the vicinity of occurrences south of the study area, would increase  
16 opportunities for northward expansion of the species into the study area. Implementation of  
17 Alternative 1C conservation measures is not expected to adversely affect the riparian woodrat for  
18 the following reasons.

- 19 ● There are no riparian woodrat occurrences in the Plan Area.
- 20 ● The habitat that would be removed consists of small patches that are of moderate value for the  
21 species.
- 22 ● The habitat that would be removed permanently is a small proportion of the total habitat in the  
23 Plan Area (2%).
- 24 ● Avoidance and minimization measures would be implemented to avoid injury or mortality of  
25 riparian woodrats, and to minimize loss of occupied habitat.
- 26 ● Floodplain restoration would be designed to provide flood refugia so that flooding would not  
27 adversely affect any riparian woodrats that occupy restored floodplains.

28 **NEPA Effects:** Alternative 1C would provide a substantial benefit to the riparian woodrat through  
29 the net increase in available habitat and a net increase of habitat in protected status. These  
30 protected areas would be managed and monitored to support the species. The affected habitat is  
31 currently unoccupied and habitat removal is not expected to result in a discernible change in the  
32 abundance or distribution of riparian woodrats if they occupy study area habitats. Should the  
33 species be detected in the study area, AMM1-AMM7, AMM10, and AMM25 would avoid and  
34 minimize the effects of conservation component construction and implementation. Therefore, the  
35 loss of habitat and potential mortality of individuals would not have an adverse effect on riparian  
36 woodrat under Alternative 1C.

### 37 **CEQA Conclusion:**

#### 38 **Near-Term Timeframe**

39 Because the water conveyance facilities construction is being evaluated at the project level, the near-  
40 term BDCP conservation strategy has been evaluated to determine whether it would provide  
41 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the impacts of  
42 construction would be less than significant under CEQA.

1 Alternative 1C would result in temporary effects on 1 acre of modeled habitat for riparian woodrat  
2 in the near-term as a result of construction of the water conveyance facilities (CM1). The habitat  
3 would be lost in the valley/foothill riparian. All the near-term loss of riparian woodrat habitat would  
4 result from CM1 conveyance facility construction in CZ 9, and would occur in an area not likely to be  
5 occupied by the species. Habitat loss in CZ 7, in areas known or likely to be occupied, would occur  
6 during the early long-term and late long-term implementation periods. Riparian restoration would  
7 be phased to minimize temporal habitat loss. There would be no near-term losses from CM2–CM18.

8 Typical CEQA project-level mitigation ratios for these natural communities that would be affected  
9 and that are identified in the biological goals and objectives for riparian woodrat in Chapter 3 of the  
10 BDCP would be 1:1 for restoration and 1:1 for protection of the valley/foothill riparian natural  
11 community. Using these ratios would indicate that 1 acre of riparian habitat should be restored and  
12 1 acre of riparian habitat should be protected for riparian woodrat for near-term losses.

13 The BDCP has committed to near-term restoration of 800 acres of riparian (Objective VFRNC1.1)  
14 and protection of 750 acres of riparian (Objective VFRNC1.2) (Table 3-4 in Chapter 3). In addition,  
15 the species-specific biological goals and objectives (RW1.1 and RW1.2) would inform the near-term  
16 protection and restoration efforts.

17 The natural community restoration and protection activities are expected to be concluded during  
18 the first 10 years of plan implementation, which is close enough in time to the occurrence of impacts  
19 to constitute adequate mitigation for CEQA purposes. These commitments are more than sufficient  
20 to support the conclusion that the near-term impacts of Alternative 1C would be less than significant  
21 under CEQA, because the number of acres required to meet the typical ratios described above would  
22 be only 1 acre of riparian habitat protected and 1 acre of riparian habitat restored.

23 These commitments are more than sufficient to support the conclusion that the near-term effects of  
24 Alternative 1C would not be significant under CEQA, because only 1 acre of modeled habitat would  
25 be temporarily affected and there is only limited potential for minor adverse effects on woodrats or  
26 its habitat from implementation of CM11.

27 These effects cannot be quantified, but are expected to be minimal and would be avoided and  
28 minimized through the BDCP's commitment to AMM1–AMM7, AMM10, and AMM25. The AMMs are  
29 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

### 30 ***Late Long-Term Timeframe***

31 Based on modeled habitat, the study area supports approximately 2,166 acres of modeled riparian  
32 woodrat habitat. Alternative 1C as a whole would result in the permanent loss of and temporary  
33 removal of 85 acres of modeled habitat for riparian woodrat habitat during the late long-term. None  
34 of this habitat is considered occupied.

35 The BDCP would restore 5,000 acres and protect 750 acres of valley/foothill riparian natural  
36 community, a portion of which is expected to consist of suitable riparian brush rabbit habitat  
37 (Objectives VFRNC1.1 and VFRNC1.2). Objective RW1.1 requires at least 300 acres of riparian  
38 habitat that meets the ecological requirements of the riparian woodrat (e.g., dense willow  
39 understory and oak overstory) and that is adjacent to or facilitates connectivity with existing  
40 occupied or potentially occupied habitat to be restored in CZ 7. The conserved habitat would also be  
41 part of a larger, more contiguous, and less patchy area of protected and restored riparian natural  
42 community than what currently exists in CZ 7 and would be contiguous with existing modeled  
43 riparian woodrat habitat. The species-specific objective further requires that the 300 acres of

1 restored riparian habitat meet more specific ecological requirements of riparian woodrat (e.g.,  
2 dense willow understory and oak overstory). Additionally, assuming the protected riparian natural  
3 community would provide riparian woodrat habitat proportional to the amount of modeled habitat  
4 in this natural community in the Plan Area (12% of the riparian natural community in the Plan Area  
5 is modeled riparian woodrat habitat), the protection of 750 acres of riparian natural community  
6 (CM3) would provide an estimated 90 acres of protected riparian woodrat habitat that is  
7 comparable to or of higher value than existing modeled grassland habitat. All riparian protection  
8 would occur during the near-term period, to offset early riparian losses.

9 The Plan would also create and maintain mounds, levee sections, or other high areas in restored and  
10 protected riparian areas (Objective RW1.2) that are designed specifically to provide flood refugia for  
11 the riparian woodrat (Appendix 3.E, *Conservation Principles for the Riparian Brush Rabbit and*  
12 *Riparian Woodrat*). In addition, the restored floodplains would transition from areas that flood  
13 frequently (e.g., every 1 to 2 years) to areas that flood infrequently (e.g., every 10 years or more)  
14 (Objective L1.5): these infrequently flooded areas would provide refuge for the riparian woodrat  
15 during most years.

16 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*  
17 *Plant Species*) estimates that the restoration and protection actions discussed above, as well as the  
18 restoration of valley/foothill riparian that could overlap with the species model, would result in the  
19 restoration of 300 acres of modeled habitat for riparian woodrat. In addition, protection of  
20 valley/foothill riparian could overlap with the species model and would result in the protection of  
21 90 acres riparian woodrat modeled habitat.

22 Although there are no records of occurrences of the riparian woodrat in the study area, habitat  
23 restoration in CZ 7, in the vicinity of occurrences south of the study area, would increase  
24 opportunities for northward expansion of the species into the study area. Implementation of  
25 Alternative 1C conservation measures is not expected to adversely affect the riparian woodrat for  
26 the following reasons.

- 27 ● There are no riparian woodrat occurrences in the Plan Area.
- 28 ● The habitat that would be removed consists of small patches that are of moderate value for the  
29 species.
- 30 ● The habitat that would be removed permanently is a small proportion of the total habitat in the  
31 Plan Area (2%).
- 32 ● Avoidance and minimization measures would be implemented to avoid injury or mortality of  
33 riparian woodrats, and to minimize loss of occupied habitat.
- 34 ● Floodplain restoration would be designed to provide flood refugia so that flooding would not  
35 adversely affect any riparian woodrats that occupy restored floodplains.

36 Alternative 1C would provide a substantial benefit to the riparian woodrat through the net increase  
37 in available habitat and a net increase of habitat in protected status. These protected areas would be  
38 managed and monitored to support the species. The affected habitat is currently unoccupied and  
39 habitat removal is not expected to result in a discernible change in the abundance or distribution of  
40 riparian woodrats if they occupy study area habitats. Should the species be detected in the study  
41 area, AMM1-AMM7, AMM10, and AMM25 would avoid and minimize the effects of conservation  
42 component construction and implementation. Therefore, the loss of habitat and potential mortality  
43 of individuals would not have a significant impact on riparian woodrat.

1 **Impact BIO-156: Indirect Effects of Plan Implementation on Riparian Woodrat**

2 Noise and visual disturbance adjacent to construction activities could indirectly affect the use of  
3 modeled habitat for riparian woodrat. These effects are related construction activities associated  
4 with water conveyance construction, tidal natural communities restoration construction, and  
5 construction of setback levees. Indirect effects on the species from construction associated with tidal  
6 natural communities restoration are unlikely because tidal natural communities restoration projects  
7 would be sited to avoid areas occupied by riparian woodrat. The activity most likely to result in  
8 noise and visual disturbance to riparian woodrat is the construction of setback levees.

9 **NEPA Effects:** Implementation of the AMMs listed above as part of implementing BDCP Alternative  
10 1C would avoid the potential for substantial adverse effects on riparian woodrats, either indirectly  
11 or through habitat modifications or result in a substantial reduction in numbers or a restriction in  
12 the range of riparian woodrats. Therefore, indirect effects of Alternative 1C would not have an  
13 adverse effect on riparian woodrat

14 **CEQA Conclusion:** Should the species be detected in the study area, indirect effects of conservation  
15 measure construction and implementation could impact riparian woodrat and its habitat. AMM1-  
16 AMM7, AMM10, and AMM25 would avoid and minimize the impact.

17 **Impact BIO-157: Periodic Effects of Inundation of Riparian Woodrat Habitat as a Result of**  
18 **Implementation of Conservation Components**

19 *CM5 Seasonally Inundated Floodplain Restoration* is the only covered activity expected to result in  
20 periodic inundation of riparian woodrat habitat. Floodplain restoration would result in periodic  
21 inundation of up to 203 acres of riparian woodrat habitat (9% of the riparian woodrat habitat in the  
22 Plan Area). The area between existing levees that would be breached and the newly constructed  
23 setback levees would be inundated through seasonal flooding. The potentially inundated areas  
24 consist of moderate-value habitat for the species. Although the habitat consists of small patches and  
25 narrow bands of riparian vegetation and no riparian woodrats have detected in CZ 7, the riparian  
26 patches are in proximity to each other along the San Joaquin River and there are two species  
27 occurrences immediately south of CZ 7, one of which is less than 1 mile from the southernmost  
28 patch of riparian habitat potentially affected by levee construction. The restored floodplains would  
29 transition from areas that flood frequently (e.g., every 1 to 2 years) to areas that flood infrequently  
30 (e.g., every 10 years or more).

31 **NEPA Effects:** Alternative 1C's periodic inundation of 203 acres of riparian habitat for riparian  
32 woodrat is not expected to result in substantial adverse effects on riparian woodrat, either directly  
33 or through habitat modifications and would not result in a substantial reduction in numbers or a  
34 restriction in the range of riparian woodrat. The effects of periodic inundation on the riparian  
35 woodrat would be minimized through construction and maintenance of flood refugia to allow  
36 riparian woodrats to escape inundation. Therefore, the periodic inundation of riparian woodrat  
37 habitat would not adversely affect the species.

38 **CEQA Conclusion:** Floodplain restoration under CM5 would periodically affect a total of 203 acres of  
39 riparian habitat for riparian woodrat, representing 9% of the 2,166 acres of modeled riparian  
40 woodrat habitat in the study area. The impact of periodic inundation on the riparian woodrat would  
41 be minimized through construction and maintenance of flood refugia to allow riparian woodrats to  
42 escape inundation, as described in AMM25. Implementation of CM5 would not be expected to result  
43 in significant impacts on riparian woodrat, either directly or through habitat modifications, and

1 would not result in a substantial reduction in numbers or a restriction in the range of riparian  
2 woodrats. Periodic inundation of riparian woodrat habitat under Alternative 1C would have a less-  
3 than-significant impact.

#### 4 **Salt Marsh Harvest Mouse**

5 The habitat model used to assess effects on the salt marsh harvest mouse includes six habitat types:  
6 primary tidal marsh habitat, secondary tidal marsh habitat (low marsh), secondary upland habitat  
7 adjacent to tidal marsh habitat, primary habitat within managed wetlands, secondary habitat within  
8 managed wetlands (dominated by plants characteristic of low marsh), and upland habitats within  
9 managed wetland boundaries. The tidal and managed wetland habitats were discriminated  
10 recognizing that regardless of habitat value, managed wetlands are at high risk of catastrophic  
11 flooding and have lower long-term conservation value than tidal wetlands.

12 Construction and restoration associated with Alternative 1C conservation measures would result in  
13 effects on modeled salt marsh harvest mouse habitat, which would include permanent losses and  
14 habitat conversions (i.e., existing habitat converted to greater or lesser valued habitat for the species  
15 post-restoration) as indicated in Table 12-1C-57. All of the effects on the species would take place  
16 over an extended period of time as tidal marsh is restored in the Plan Area. Full implementation of  
17 Alternative 1C would also include the following conservation actions over the term of the BDCP to  
18 benefit salt marsh harvest mouse (BDCP Chapter 3, *Conservation Strategy*).

- 19 ● Restore or create 6,000 acres of tidal brackish emergent wetland in CZ 11 to be consistent with  
20 the final Recovery Plan for Tidal Marsh Ecosystems of Northern and Central California  
21 (Objective TBEWNC1.1, associated with CM4)
- 22 ● Within the 6,000 acres of tidal brackish emergent wetland restored or created, distribute 1,500  
23 acres of middle and high marsh (primary salt marsh harvest mouse habitat) to contribute to  
24 total (existing and restored) acreage targets for each complex as specified in the final Recovery  
25 Plan for Tidal Marsh Ecosystems of Northern and Central California (Objective TBEWNC1.2,  
26 associated with CM4).
- 27 ● Limit perennial pepperweed to no more than 10% cover in the tidal brackish emergent wetland  
28 natural community within the reserve system (Objective TBEWNC2.1).
- 29 ● Protect and enhance at least 1,500 acres of managed wetland in Grizzly Island Marsh Complex  
30 for the benefit of salt marsh harvest mouse (Objective MWNC1.1, associated with CM3).
- 31 ● Protect or restore grasslands adjacent to restored tidal brackish emergent wetlands to provide  
32 at least 200 feet of adjacent grasslands beyond the sea level rise accommodation area (Objective  
33 GNC1.4, associated with CM3 and CM8).
- 34 ● Provide viable habitat areas for salt marsh harvest mouse within the 1,500 acres of restored or  
35 created middle and high marsh as defined in the final Recovery Plan for Tidal Marsh Ecosystems  
36 of Northern and Central California (Objective SMHM1.1).
- 37 ● Provide viable habitat areas for salt marsh harvest mouse within the 1,500 acres of managed  
38 wetland protected and enhanced in the Grizzly Island Marsh Complex as defined in the final  
39 Recovery Plan for Tidal Marsh Ecosystems of Northern and Central California, and increase  
40 population levels above the current baseline (Objective SMHM1.2).

1 As explained below, with the restoration and protection of these amounts of habitat, in addition to  
 2 AMMs to minimize potential effects, impacts on the salt marsh harvest mouse would not be adverse  
 3 for NEPA purposes and would be less than significant for CEQA purposes.

4 **Table 12-1C-57. Changes in Salt Marsh Harvest Mouse Modeled Habitat Associated with**  
 5 **Alternative 1C (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	(CM1 Outside of species range)	0	0	0	0	NA	NA
<b>Total Impacts CM1</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>NA</b>	<b>NA</b>
CM2-CM18	TBEW Primary	64	67	0	0	0	0
	TBEW Secondary	0	0	0	0	0	0
	Upland Secondary	8	9	0	0	0	0
	MW Wetland Primary	1,913	5,323	0	0	0	0
	MW Wetland Secondary	315	807	0	0	0	0
	MW Upland	165	762	0	0	0	0
<b>Total Impacts CM2-CM18</b>		<b>2,465</b>	<b>6,968</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>TOTAL IMPACTS</b>		<b>2,645</b>	<b>6,968</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

<sup>a</sup> See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.  
<sup>b</sup> See discussion below for a description of applicable CMs.  
<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.  
<sup>d</sup> Periodic effects were estimated for the late long-term only.

TBEW = tidal brackish emergent wetland  
 MW = managed wetland  
 NT = near-term  
 LLT = late long-term  
 NA = not applicable

6

7 **Impact BIO-158: Loss or Conversion of Habitat for and Direct Mortality of Salt Marsh Harvest**  
 8 **Mouse**

9 Alternative 1C tidal restoration (CM4) would be the only conservation measure resulting in effects  
 10 on salt marsh harvest mouse habitat. Habitat enhancement and management activities (CM11),  
 11 which include ground disturbance or removal of nonnative vegetation, could result in local adverse  
 12 habitat effects. Each of these activities is described in detail below. A summary statement of the  
 13 combined impacts and NEPA and CEQA conclusions follows the individual conservation measure  
 14 discussions.

- 1       ● *CM4 Tidal Natural Communities Restoration* would result in effects on 6,968 acres of salt marsh  
2 harvest mouse modeled habitat, which would include 5,376 acres of permanent losses and 1,592  
3 acres of habitat conversions. Salt marsh harvest mouse may be displaced temporarily from areas  
4 of converted habitat but these areas would ultimately provide suitable habitat for the species.  
5 However, 1,058 of these acres would be downgraded from primary habitat (67 acres of primary  
6 tidal brackish emergent wetland and 991 acres of primary managed wetland) to secondary tidal  
7 brackish emergent wetland. The hypothetical restoration footprints in Suisun Marsh overlap  
8 with 13 CNDDDB records for salt marsh harvest mouse (California Department of Fish and  
9 Wildlife 2013); however, the BDCP's conservation actions assume that all suitable habitat in  
10 Suisun Marsh is occupied by the species.
- 11       ● *CM11 Natural Communities Enhancement and Management*: As described in the BDCP, the  
12 restoration of at least 1,500 acres of tidal brackish emergent wetland would be managed to  
13 provide viable habitat for salt marsh harvest mouse and the protection of 1,500 acres of  
14 managed wetland specifically to be managed for salt marsh harvest mouse. A variety of habitat  
15 management actions included in CM11 that are designed to enhance and manage these areas for  
16 salt marsh harvest mouse and may result in localized ground disturbances that could  
17 temporarily remove small amounts of salt marsh harvest mouse habitat. The restoration of tidal  
18 brackish emergent wetlands, the protection managed wetlands, and the protection and/or  
19 restoration of grasslands within 200 feet of restored salt marsh harvest mouse habitat would  
20 also have enhancement and management actions that would include invasive species control,  
21 nonnative wildlife control, and vegetation management. Ground-disturbing activities, such as  
22 removal of nonnative vegetation are expected to have minor effects on habitat and are expected  
23 to result in overall improvements to and maintenance of salt marsh harvest mouse habitat  
24 values over the term of the BDCP. These effects cannot be quantified, but are expected to be  
25 minimal and would be avoided and minimized by the AMMs listed below.
- 26       ● *Injury and Direct Mortality*: The use of heavy equipment and handtools may result in injury or  
27 mortality to salt marsh harvest mouse during restoration, enhancement, and management  
28 activities. However, preconstruction surveys, construction monitoring, and other measures  
29 would be implemented to avoid and minimize injury or mortality of this species during these  
30 activities, as required by the AMMs listed below.

31       The following paragraphs summarize the combined effects discussed above and describe other  
32 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA impact conclusions are  
33 also included.

#### 34       ***Near-Term Timeframe***

35       The near-term BDCP conservation strategy has been evaluated to determine whether it would  
36 provide sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that  
37 the effects of near-term covered activities would not be adverse under NEPA and would be less than  
38 significant under CEQA. Alternative 1C would effect 2,465 acres of salt marsh harvest mouse  
39 modeled habitat in the study area in the near-term. These effects include 1,517 acres of permanent  
40 loss and 948 acres of converted habitat. Most of the habitat converted would be from primary  
41 habitats (599 acres consisting of 64 acres of tidal brackish emergent wetland and 534 acres of  
42 managed wetland) to secondary tidal brackish emergent wetland.

43       The BDCP has committed to near-term goals of restoring 2,000 acres of tidal brackish emergent  
44 wetland, the protection and/or restoration of grasslands within 200 feet of restored tidal wetlands,

1 and the protection and enhancement of 1,500 acres of managed wetlands for salt marsh harvest  
2 mouse. Though there would be a net loss of modeled habitat, all of these losses (97%) are to  
3 managed wetlands, which according to the U.S. Fish and Wildlife Service are at high risk of  
4 catastrophic flooding (U.S. Fish and Wildlife Service 2010) and have lower long-term conservation  
5 value than tidal wetlands. The species-specific biological goals and objectives would inform the  
6 near-term protection and restoration efforts. These Plan goals represent performance standards for  
7 considering the effectiveness of restoration actions. The acres of protection and restoration  
8 contained in the near-term Plan goals would keep pace with the loss of habitat and effects on salt  
9 marsh harvest mouse habitat.

10 Other factors relevant to effects on salt marsh harvest mouse are listed below.

- 11 ● Tidal restoration actions would not immediately displace salt marsh harvest mouse in managed  
12 wetlands as noted in the specie's draft recovery plan because the conversion of managed  
13 wetland to tidal marsh would be gradual. Tidal marsh restoration is often accomplished by  
14 breaching levees and converting diked nontidal marsh currently occupied by salt marsh harvest  
15 mouse populations to tidal wetlands, their historic condition. Conversion of these subsided  
16 areas requires sedimentation and accretion over time to restore marsh plains, resulting in a  
17 prolonged period (sometimes a decade or more) in which resident mice populations are  
18 displaced by uninhabitable aquatic areas (U.S. Fish and Wildlife Service 2010). Despite these  
19 temporary adverse effects, the draft recovery plan and Suisun Marsh Plan advocate strongly for  
20 restoration of tidal wetlands through the conversion of managed wetlands. These plans are  
21 based on the premise that managed wetlands are at high risk of loss of salt marsh harvest mouse  
22 habitat from a variety of factors, including flooding from levee failure and cessation of active  
23 management (which is often necessary to maintain habitat values in managed wetlands).  
24 Therefore, the temporary effects under Alternative 1C would be consistent with those deemed  
25 acceptable in the draft recovery plan for salt marsh harvest mouse and the Suisun Marsh Plan.
- 26 ● Restoration in Suisun Marsh would be carefully phased over time to offset adverse effects of  
27 restoration as it occurs. This phasing would ensure that temporal loss as a result of tidal natural  
28 communities restoration does not adversely affect the salt marsh harvest mouse population,  
29 ensure that short-term population loss is relatively small and incremental, and maintain local  
30 source populations to recolonize newly restored areas. The tidal restoration projects in Suisun  
31 Marsh would be implemented in 150-acre or greater patches that provide viable habitat areas  
32 for the salt marsh harvest mouse habitat consistent with the draft tidal marsh recovery plan  
33 (U.S. Fish and Wildlife Service 2010).
- 34 ● The salt marsh harvest mouse population would be monitored during the phasing process (see  
35 BDCP Chapter 3, Section 3.4.4.3.4.), and adaptive management would be applied to ensure  
36 maintenance of the population as described in the BDCP (BDCP Chapter 3, Section 3.4.4.4 and  
37 Section 3.6).
- 38 ● The BDCP commits to manage reserve areas so that perennial pepperweed cover is no more  
39 than 10% in tidal brackish emergent wetlands (Objective TBEWNC2.1), which would benefit  
40 pickleweed production in the marsh. Salt marsh harvest mouse depends on pickleweed for  
41 forage and cover.

42 Because there would be no project-level effects on salt marsh harvest mouse resulting from CM1,  
43 the analysis of the effects of conservation actions does not include a comparison with standard  
44 ratios used for project level NEPA analyses.

1 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*  
2 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*  
3 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment and*  
4 *Countermeasure Plan, and AMM26 Salt Marsh Harvest Mouse and Suisun Shrew*. All of these AMMs  
5 include elements that avoid or minimize the risk of affecting habitats and species adjacent to work  
6 areas. The AMMs are described in detail in BDCP Appendix 3.C.

### 7 **Late Long-Term Timeframe**

8 The study area supports approximately 35,588 acres of salt marsh harvest mouse modeled habitat.  
9 Alternative 1C as a whole would result in effects on 6,968 acres of saltmarsh harvest mouse  
10 modeled habitat over the term of the Plan, which would include 5,376 acres of permanent losses and  
11 1,592 acres of habitat conversions. These effects (loss and conversion) would be to 20% of the  
12 modeled habitat in the study area. Most of these effects (99%) would be to managed wetlands,  
13 which though are known to be occupied by salt marsh harvest mouse are at high risk of catastrophic  
14 flooding and have a lower long-term conservation value than tidal wetlands (U.S. Fish and Wildlife  
15 Service 2010). Effects on up to 20% of the species' habitat in the Plan Area may diminish the salt  
16 marsh harvest mouse population in the Plan Area and result in reduced genetic diversity, thereby  
17 putting the local population at risk of local extirpation due to random environmental fluctuations or  
18 catastrophic events. This effect is expected to be greatest if large amounts of habitat are removed at  
19 one time in Suisun Marsh and are not effectively restored for many years, and if there are no  
20 adjacent lands with salt marsh harvest mouse populations to recolonize restored areas.

21 The Plan includes a commitment to restore or create 6,000 acres to tidal brackish emergent wetland,  
22 1,500 acres of which would target middle and high marsh habitat (primary habitat for salt marsh  
23 harvest mouse) (Objectives TBEWNC1.1, TBEWNC1.2, SMHM1.1, associated with CM4), the  
24 protection of 6,500 acres of managed wetlands, 1,500 acres of which would be specifically managed  
25 for salt marsh harvest mouse (Objectives SMHM1.2 and MWNC1.1, associated with CM3), and the  
26 protection and/or restoration of grassland adjacent to tidal restoration (areas within 200 feet of  
27 tidal restoration) to provide upland refugia for salt marsh harvest mouse (Objectives GNC1.4,  
28 associated with CM3 and CM8). Other factors relevant to effects on salt marsh harvest are listed  
29 below.

- 30 • Tidal restoration actions would not immediately displace salt marsh harvest mouse in managed  
31 wetlands as noted in the draft recovery plan for salt marsh harvest mouse because the  
32 conversion of managed wetland to tidal marsh occurs gradually. Tidal marsh restoration is often  
33 accomplished by breaching levees and converting diked nontidal marsh currently occupied by  
34 salt marsh harvest mouse populations to tidal wetlands, their historic condition. Conversion of  
35 these subsided areas requires sedimentation and accretion over time to restore marsh plains,  
36 resulting in a prolonged period (sometimes a decade or more) in which resident mice  
37 populations are displaced by uninhabitable aquatic areas (U.S. Fish and Wildlife Service 2010).  
38 Despite these temporary adverse effects, the draft recovery plan and Suisun Marsh Plan  
39 advocate strongly for restoration of tidal wetlands through the conversion of managed wetlands.  
40 These plans are based on the premise that managed wetlands are at high risk of loss of salt  
41 marsh harvest mouse habitat from a variety of factors, including flooding from levee failure and  
42 cessation of active management (which is often necessary to maintain habitat values in managed  
43 wetlands). Therefore, the temporary effects under BDCP are consistent with those deemed  
44 acceptable in the draft recovery plan for salt marsh harvest mouse and the Suisun Marsh Plan.

- 1       ● In order to ensure that temporal loss as a result of tidal natural communities restoration does  
2       not adversely affect the salt marsh harvest mouse population, restoration in Suisun Marsh  
3       would be carefully phased over time to offset adverse effects of restoration as it occurs, ensure  
4       that short-term population loss is relatively small and incremental, and maintain local source  
5       populations to recolonize newly restored areas. The tidal restoration projects in Suisun Marsh  
6       would be implemented in 150-acre or greater patches that provide viable habitat areas for the  
7       salt marsh harvest mouse habitat consistent with the draft tidal marsh recovery plan (U.S. Fish  
8       and Wildlife Service 2010).
- 9       ● The salt marsh harvest mouse population would be monitored during the phasing process (see  
10       BDCP Chapter 3, Section 3.4.4.3.4.), and adaptive management would be applied to ensure  
11       maintenance of the population as described in the BDCP (BDCP Chapter 3, Section 3.4.4.4 and  
12       Section 3.6).
- 13       ● The BDCP commits to manage reserve areas so that perennial pepperweed cover is no more  
14       than 10% in tidal brackish emergent wetlands (Objective TBEWNC2.1), which would benefit  
15       pickleweed production in the marsh. Salt marsh harvest mouse depends on pickleweed for  
16       forage and cover.
- 17       ● The habitat that would be restored and protected would consist of large blocks of contiguous  
18       tidal brackish emergent wetland that has a large proportion of pickleweed-dominated  
19       vegetation suitable for the species. This would provide greater habitat connectivity and greater  
20       habitat value, which is expected to accommodate larger populations and to therefore increase  
21       population resilience to random environmental events and climate change.

22       The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*  
23       *Plant Species*) estimates that the restoration and protection actions discussed above could result in  
24       the restoration of 6,046 acres and the protection of 1,550 acres of modeled habitat for salt marsh  
25       harvest mouse.

26       **NEPA Effects:** In the absence of other conservation actions, the effects on salt marsh harvest mouse  
27       habitat from Alternative 1C in the would represent an adverse effect as a result of habitat  
28       modification and potential direct mortality of a special-status species. However, the BDCP has  
29       committed to habitat protection, restoration, management, and enhancement associated with CM3,  
30       CM4, CM8 and CM11. This habitat protection, restoration, management, and enhancement would be  
31       guided by species-specific goals and objectives and by AMM1–AMM5 and AMM26, which would be  
32       in place throughout the construction period. Considering these commitments, losses and  
33       conversions of salt marsh harvest mouse habitat and potential mortality of individuals under  
34       Alternative 1C would not be adverse.

35       **CEQA Conclusion:**

36       **Near-Term Timeframe**

37       The near-term BDCP conservation strategy has been evaluated to determine whether it would  
38       provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
39       impacts of near-term covered activities would be less than significant. Alternative 1C would impact  
40       2,465 acres of salt marsh harvest mouse modeled habitat in the study area in the near-term. These  
41       effects include 1,517 acres of permanent loss and 948 acres of converted habitat. Most of the habitat  
42       converted would be to primary habitats (599 acres consisting of 64 acres of tidal brackish emergent  
43       wetland and 534 acres of managed wetland) to secondary tidal brackish emergent wetland.

1 The BDCP has committed to near-term goals of restoring 2,000 acres of tidal brackish emergent  
2 wetland, the protection and/or restoration of grasslands within 200 feet of restored tidal wetlands,  
3 and the protection and enhancement of 1,500 acres of managed wetlands for salt marsh harvest  
4 mouse. Though there would be a net loss of modeled habitat, nearly all of these losses (97%) are to  
5 managed wetlands, which according to the U.S. Fish and Wildlife Service are at high risk of  
6 catastrophic flooding (U.S. Fish and Wildlife Service 2010) and have lower long-term conservation  
7 value than tidal wetlands. The species-specific biological goals and objectives would inform the  
8 near-term protection and restoration efforts. These Plan goals represent performance standards for  
9 considering the effectiveness of restoration actions. The acres of protection and restoration  
10 contained in the near-term Plan goals would keep pace with the loss of habitat and effects on salt  
11 marsh harvest mouse habitat.

12 Other factors relevant to effects on salt marsh harvest mouse are listed below.

- 13 ● Tidal restoration actions would not immediately displace salt marsh harvest mouse in managed  
14 wetlands as noted in the specie's draft recovery plan because the conversion of managed  
15 wetland to tidal marsh would be gradual. Tidal marsh restoration is often accomplished by  
16 breaching levees and converting diked nontidal marsh currently occupied by salt marsh harvest  
17 mouse populations to tidal wetlands, their historic condition. Conversion of these subsided  
18 areas requires sedimentation and accretion over time to restore marsh plains, resulting in a  
19 prolonged period (sometimes a decade or more) in which resident mice populations are  
20 displaced by uninhabitable aquatic areas (U.S. Fish and Wildlife Service 2010). Despite these  
21 temporary adverse effects, the draft recovery plan and Suisun Marsh Plan advocate strongly for  
22 restoration of tidal wetlands through the conversion of managed wetlands. These plans are  
23 based on the premise that managed wetlands are at high risk of loss of salt marsh harvest mouse  
24 habitat from a variety of factors, including flooding from levee failure and cessation of active  
25 management (which is often necessary to maintain habitat values in managed wetlands).  
26 Therefore, the temporary effects under Alternative 1C would be consistent with those deemed  
27 acceptable in the draft recovery plan for salt marsh harvest mouse and the Suisun Marsh Plan.
- 28 ● To ensure that temporal loss as a result of tidal natural communities restoration does not  
29 adversely affect the salt marsh harvest mouse population, restoration in Suisun Marsh would be  
30 carefully phased over time to offset adverse effects of restoration as it occurs, ensure that short-  
31 term population loss is relatively small and incremental, and maintain local source populations  
32 to recolonize newly restored areas. The tidal restoration projects in Suisun Marsh would be  
33 implemented in 150-acre or greater patches that provide viable habitat areas for the salt marsh  
34 harvest mouse habitat consistent with the draft tidal marsh recovery plan (U.S. Fish and Wildlife  
35 Service 2010).
- 36 ● The salt marsh harvest mouse population would be monitored during the phasing process (see  
37 BDCP Chapter 3, Section 3.4.4.3.4.), and adaptive management would be applied to ensure  
38 maintenance of the population as described in the BDCP (BDCP Chapter 3, Section 3.4.4.4 and  
39 Section 3.6).
- 40 ● The BDCP commits to manage reserve areas so that perennial pepperweed cover is no more  
41 than 10% in tidal brackish emergent wetlands (Objective TBEWNC2.1), which would benefit  
42 pickleweed production in the marsh. Salt marsh harvest mouse depends on pickleweed for  
43 forage and cover.

1 Because there would be no project-level impacts on salt marsh harvest mouse from CM1, the  
2 analysis of the impacts of conservation actions does not include a comparison with standard ratios  
3 used for project level CEQA analyses.

4 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
5 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
6 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment and*  
7 *Countermeasure Plan*, and *AMM26 Salt Marsh Harvest Mouse and Suisun Shrew*. All of these AMMs  
8 include elements that avoid or minimize the risk of affecting habitats and species adjacent to work  
9 areas. The AMMs are described in detail in BDCP Appendix 3.C.

10 These commitments are more than sufficient to support the conclusion that the near-term effects of  
11 Alternative 1C would be less than significant under CEQA.

### 12 **Late Long-Term Timeframe**

13 Based on modeled habitat, the study area supports approximately 35,588 acres of salt marsh  
14 harvest mouse modeled habitat. Alternative 1C as a whole would result in effects on 6,968 acres of  
15 saltmarsh harvest mouse modeled habitat over the term of the Plan, which would include 5,376  
16 acres of permanent losses and 1,592 acres of habitat conversions. The Plan includes a commitment  
17 to restore or create 6,000 acres of tidal brackish emergent wetland, 1,500 acres of which would  
18 target middle and high marsh habitat (primary habitat for salt marsh harvest mouse) (Objectives  
19 TBEWNC1.1, TBEWNC1.2, and SMHM1.1, associate with CM4); the protection of 6,500 acres of  
20 managed wetlands, 1,500 acres of which would be specifically managed for salt marsh harvest  
21 mouse (Objectives SMHM1.2 and MWNC1.1, associated with CM3), and the protection and/or  
22 restoration of grassland adjacent to tidal restoration (areas within 200 feet of tidal restoration) to  
23 provide upland refugia for salt marsh harvest mouse (Objectives GNC1.4, associated with CM3 and  
24 CM8). Other factors relevant to effects on salt marsh harvest mouse include:

- 25 ● Tidal restoration actions would not immediately displace salt marsh harvest mouse in managed  
26 wetlands as noted in the draft recovery plan for salt marsh harvest mouse because the  
27 conversion of managed wetland to tidal marsh would be gradual. Tidal marsh restoration is  
28 often accomplished by breaching levees and converting diked nontidal marsh currently  
29 occupied by salt marsh harvest mouse populations to tidal wetlands, their historic condition.  
30 Conversion of these subsided areas requires sedimentation and accretion over time to restore  
31 marsh plains, resulting in a prolonged period (sometimes a decade or more) in which resident  
32 mice populations are displaced by uninhabitable aquatic areas (U.S. Fish and Wildlife Service  
33 2010). Despite these temporary adverse effects, the draft recovery plan and Suisun Marsh Plan  
34 advocate strongly for restoration of tidal wetlands through the conversion of managed wetlands.  
35 These plans are based on the premise that managed wetlands are at high risk of loss of salt  
36 marsh harvest mouse habitat from a variety of factors, including flooding from levee failure and  
37 cessation of active management (which is often necessary to maintain habitat values in managed  
38 wetlands). Therefore, the temporary effects under BDCP are consistent with those deemed  
39 acceptable in the draft recovery plan for salt marsh harvest mouse and the Suisun Marsh Plan.
- 40 ● In order to ensure that temporal loss as a result of tidal natural communities restoration does  
41 not adversely affect the salt marsh harvest mouse population, restoration in Suisun Marsh  
42 would be carefully phased over time to offset adverse effects of restoration as it occurs, ensure  
43 that short-term population loss is relatively small and incremental, and maintain local source  
44 populations to recolonize newly restored areas. The tidal restoration projects in Suisun Marsh

1 would be implemented in 150-acre or greater patches that provide viable habitat areas for the  
2 salt marsh harvest mouse habitat consistent with the draft tidal marsh recovery plan (U.S. Fish  
3 and Wildlife Service 2010).

- 4 ● The salt marsh harvest mouse population would be monitored during the phasing process (see  
5 BDCP Chapter 3, Section 3.4.4.3.4.), and adaptive management would be applied to ensure  
6 maintenance of the population as described in the BDCP (BDCP Chapter 3, Section 3.4.4.4 and  
7 Section 3.6).
- 8 ● The BDCP commits to manage reserve areas so that perennial pepperweed cover is no more  
9 than 10% in tidal brackish emergent wetlands (Objective TBEWNC2.1), which would benefit  
10 pickleweed production in the marsh. Salt marsh harvest mouse depends on pickleweed for  
11 forage and cover.
- 12 ● The habitat that would be restored and protected would consist of large blocks of contiguous  
13 tidal brackish emergent wetland that has a large proportion of pickleweed-dominated  
14 vegetation suitable for the species. This would provide greater habitat connectivity and greater  
15 habitat value, which is expected to accommodate larger populations and to therefore increase  
16 population resilience to random environmental events and climate change.

17 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*  
18 *Plant Species*) estimates that the restoration and protection actions discussed above could result in  
19 the restoration of 6,046 acres and the protection of 1,550 acres of modeled habitat for salt marsh  
20 harvest mouse.

21 Alternative 1C would result in substantial modifications to salt marsh harvest mouse habitat in the  
22 absence of other conservation actions. However, with habitat protection, restoration, management,  
23 and enhancement associated with CM3, CM4, CM8, and CM11, guided by species-specific goals and  
24 objectives and by AMM1-AMM5, and AMM26, which would be in place throughout the construction  
25 phase, Alternative 1C over the term of the BDCP would not result in a substantial adverse effect  
26 through habitat modifications and would not substantially reduce the number or restrict the range  
27 of the species. Therefore, the alternative would have a less-than-significant impact on salt marsh  
28 harvest mouse.

### 29 **Impact BIO-159: Indirect Effects of Plan Implementation on Salt Marsh Harvest Mouse**

30 Construction/disturbance activities associated tidal restoration (CM4), grassland restoration (CM8),  
31 and management and enhancement activities (CM11) could result in temporary noise and visual  
32 disturbances to salt marsh harvest mouse occurring within 100 feet of these areas over the term of  
33 the BDCP. These potential effects would be minimized or avoided through AMM1-AMM6, and  
34 AMM26, which would be in effect throughout the term of the Plan.

35 The use of mechanical equipment during the implementation of the conservation measures could  
36 cause the accidental release of petroleum or other contaminants that could affect salt marsh harvest  
37 mouse and its habitat. The inadvertent discharge of sediment could also have a negative effect on  
38 the species and its habitat. AMM1-AMM6 would minimize the likelihood of such spills and would  
39 ensure measures are in place to prevent runoff from the construction area and potential effects of  
40 sediment on salt marsh harvest mouse.

41 Tidal marsh restoration has the potential to increase salt marsh harvest mouse's exposure to  
42 mercury. Mercury is transformed into the more bioavailable form of methylmercury under

1 anaerobic conditions, which in the environment typically occurs in sediments subjected to regular  
 2 wetting and drying such as tidal marshes and flood plains. Thus, BDCP restoration activities that  
 3 create newly inundated areas could increase bioavailability of mercury. In general, the highest  
 4 methylation rates are associated with high tidal marshes that experience intermittent wetting and  
 5 drying and associated anoxic conditions (Alpers et al. 2008). High tidal marsh is considered to be  
 6 primary habitat for salt marsh harvest mouse and thus the species could be exposed to methyl  
 7 mercury in tidal restoration areas. Salt marsh harvest mouse may be exposed to elemental mercury  
 8 by feeding on pickleweed, which is found concentrated in the distal tips of pickleweed leaves (Yee et  
 9 al., 2008). Though elemental mercury is less bioavailable than methylmercury, studies have shown  
 10 that mercury can become methylated in the anaerobic portions of the intestinal tract (Rudd et al.  
 11 1980, Rieder et al. 2013) and could thus become a pathway for salt marsh harvest exposure to  
 12 methylmercury. A study of small mammals residing in pickleweed around the San Francisco Bay  
 13 showed an absence of salt marsh harvest mouse where mercury concentrations measured in house  
 14 mice (*Mus musculus*) livers were  $\geq 0.19$   $\mu\text{g/g}$  (dry weight) (Clark et al. 1992). Clark et al (1992) also  
 15 report that the lack of salt marsh harvest mouse at these locations are not the result of undetected  
 16 habitat differences or are by chance. Clarke et al (1992) suggest that the absence of salt marsh  
 17 harvest mouse at certain locations may be associated with higher amounts of mercury and  
 18 polychlorinated biphenyls (PCBs); however, because their study didn't analyze contaminants in salt  
 19 marsh harvest mouse and because (at that time) there was no data in the literature on contaminants  
 20 in harvest mice, they could not make conclusions on these associations. Currently, it is unknown  
 21 what the exact exposure pathways are or what tissue concentrations are harmful to the salt marsh  
 22 harvest mouse.

23 The Suisun Marsh Plan (Bureau of Reclamation et al. 2010) anticipates that tidal wetlands restored  
 24 under the plan would generate less methylmercury than the existing managed wetlands. The  
 25 potential for salt marsh harvest mouse exposure to methyl mercury in Suisun Marsh may decrease  
 26 in the long term because the creation of tidal brackish emergent wetland would predominantly  
 27 result from the conversion of managed wetlands. *CM12 Methylmercury Management* includes  
 28 provisions for project-specific Mercury Management Plans. Along with avoidance and minimization  
 29 measures and adaptive management and monitoring, CM12 could reduce the effects of  
 30 methylmercury on salt marsh harvest mouse resulting from BDCP tidal restoration.

31 **NEPA Effects:** Implementation of the AMMs listed above as part of implementing BDCP Alternative  
 32 1C would avoid and minimize indirect effects on salt marsh harvest mouse. These AMMs would also  
 33 avoid and minimize effects that could substantially reduce the number of salt marsh harvest mouse,  
 34 or restrict the species' range. Therefore, the indirect effects of Alternative 1C would not have an  
 35 adverse effect on salt marsh harvest mouse.

36 **CEQA Conclusion:** Indirect effects from construction-related noise and visual disturbances could  
 37 impact salt marsh harvest mouse within 100 feet of these disturbances. The use of mechanical  
 38 equipment during construction could cause the accidental release of petroleum or other  
 39 contaminants that could impact salt marsh harvest mouse and its habitat. The inadvertent discharge  
 40 of sediment adjacent to salt marsh harvest mouse habitat could also impact the species. With  
 41 implementation of AMM1-AMM5, and AMM26 as part of Alternative 1C construction, operation and  
 42 maintenance, the BDCP would avoid the potential for substantial adverse effects on salt marsh  
 43 harvest mouse, either indirectly or through habitat modifications, in that the BDCP would not result  
 44 in a substantial reduction in numbers or a restriction in the range of salt marsh harvest mouse. The  
 45 indirect effects of BDCP Alternative 1C would have a less-than-significant impact on salt marsh  
 46 harvest mouse.

1 Salt marsh harvest mouse could experience indirect effects from increased exposure to  
2 methylmercury as a result of tidal habitat restoration (CM4). With implementation of CM12, the  
3 potential indirect effects of methylmercury would not result in a substantial reduction in numbers  
4 or a restriction in the range of salt marsh harvest mouse, and, therefore, would have a less-than-  
5 significant impact on the species.

## 6 **Suisun Shrew**

7 Primary Suisun shrew habitat consists of all *Salicornia*-dominated natural seasonal wetlands and  
8 certain *Scirpus* and *Typha* communities found within Suisun Marsh only. Low marsh dominated by  
9 *Schoenoplectus acutus* and *S. californicus* and upland transitional zones within 150 feet of the tidal  
10 wetland edge were classified separately as secondary habitat because they are used seasonally  
11 (Hays and Lidicker 2000). All managed wetlands were excluded from the habitat model.  
12 Construction and restoration associated with Alternative 1C conservation measures would result in  
13 effects on modeled Suisun shrew habitat, which would include permanent losses and habitat  
14 conversions (i.e., existing habitat converted to greater or lesser valued habitat for the species post-  
15 restoration) as indicated in Table 12-1C-58. All of the effects on the species would take place over an  
16 extended period of time as tidal marsh is restored in the Plan Area. Full implementation of  
17 Alternative 1C would also include the following conservation actions over the term of the BDCP to  
18 benefit Suisun shrew (BDCP Chapter 3, *Conservation Strategy*).

- 19 ● Restore or create 6,000 acres of tidal brackish emergent wetland in CZ 11 to be consistent with  
20 the final Recovery Plan for Tidal Marsh Ecosystems of Northern and Central California  
21 (Objective TBEWNC1.1, associated with CM4)
- 22 ● Within the 6,000 acres of tidal brackish emergent wetland restored or created, distribute 1,500  
23 acres of middle and high marsh (primary Suisun shrew habitat) to contribute to total (existing  
24 and restored) acreage targets for each complex as specified in the final Recovery Plan for Tidal  
25 Marsh Ecosystems of Northern and Central California (Objective TBEWNC1.2, associated with  
26 CM4).
- 27 ● Limit perennial pepperweed to no more than 10% cover in the tidal brackish emergent wetland  
28 natural community within the reserve system (Objective TBEWNC2.1).

29 Protect or restore grasslands adjacent to restored tidal brackish emergent wetlands to provide at  
30 least 200 feet of adjacent grasslands beyond the sea level rise accommodation area, which provides  
31 refugia during high tides (Objective GNC1.4, associated with CM3 and CM8). As explained below,  
32 with the restoration and protection of these amounts of habitat, impacts on the Suisun shrew would  
33 not be adverse for NEPA purposes and would be less than significant for CEQA purposes.

1 **Table 12-1C-58. Changes in Suisun Shrew Modeled Habitat Associated with Alternative 1C (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	(CM1 Outside of species range)	0	0	0	0	NA	NA
<b>Total Impacts CM1</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>NA</b>	<b>NA</b>
CM2-CM18	Primary	58	60	0	0	0	0
	Secondary	47	342	0	0	0	0
<b>Total Impacts CM2-CM18</b>		<b>105</b>	<b>401</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>TOTAL IMPACTS</b>		<b>105</b>	<b>401</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

<sup>a</sup> See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only.

NT = near-term

LLT = late long-term

NA = not applicable

2

3 **Impact BIO-160: Loss or Conversion of Habitat for and Direct Mortality of Suisun Shrew**

4 BDCP tidal restoration (CM4) would be the only conservation measure resulting in loss of habitat to  
5 Suisun shrew. Habitat enhancement and management activities (CM11), which include ground  
6 disturbance or removal of nonnative vegetation, could result in local adverse habitat effects. Each of  
7 these activities is described in detail below. A summary statement of the combined impacts and  
8 NEPA and CEQA conclusions follows the individual conservation measure discussions.

9 • *CM4 Tidal Natural Communities Restoration* would result in effects on 401 acres of Suisun shrew  
10 modeled habitat, which would include 377 acres of permanent losses and 24 acres of habitat  
11 conversions. Suisun shrew may be displaced temporarily from areas of converted habitat but  
12 would ultimately provide suitable habitat for the species. However, all 24 acres would be  
13 converted from secondary to primary habitat and therefore over would be a net benefit to the  
14 species. The hypothetical restoration footprints overlap with two CNDDDB records for Suisun  
15 shrew (California Department of Fish and Wildlife 2013).

16 • *CM11 Natural Communities Enhancement and Management*: As described in the BDCP, the  
17 restoration of at least 6,000 acres of tidal brackish emergent wetland would be managed to  
18 provide habitat for covered species, including Suisun shrew. A variety of habitat management  
19 actions included in *CM11 Natural Communities Enhancement and Management* that are designed  
20 to enhance and manage these areas may result in localized ground disturbances that could  
21 temporarily remove small amounts of Suisun shrew habitat. The areas of grasslands that would  
22 be protected and/or restored within 200 feet of restored tidal marsh would also have  
23 enhancement and management actions that would include invasive species control, nonnative

1 wildlife control, and vegetation management. Ground-disturbing activities, such as removal of  
2 nonnative vegetation are expected to have minor effects on habitat and are expected to result in  
3 overall improvements to and maintenance of Suisun shrew habitat values over the term of the  
4 BDCP. These effects cannot be quantified, but are expected to be minimal and would be avoided  
5 and minimized by the AMMs listed below.

- 6 • Injury and Direct Mortality: The use of heavy equipment and handtools may result in injury or  
7 mortality to Suisun shrew during restoration, enhancement, and management activities.  
8 However, preconstruction surveys, construction monitoring, and other measures would be  
9 implemented to avoid and minimize injury or mortality of this species during these activities, as  
10 required by the AMM described below.

11 The following paragraphs summarize the combined effects discussed above and describe other  
12 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA impact conclusions are  
13 also included.

#### 14 ***Near-Term Timeframe***

15 The near-term BDCP conservation strategy has been evaluated to determine whether it would  
16 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
17 effects of near-term covered activities would not be adverse under NEPA. Alternative 1C would  
18 effect 105 acres of Suisun shrew modeled habitat in the study area in the near-term. These effects  
19 include 90 acres of permanent loss and 15 acres of converted habitat, which is all secondary habitat  
20 being converted to primary habitat.

21 The BDCP has committed to near-term goals of restoring 2,000 acres of tidal brackish emergent  
22 wetland and the protection and/or restoration of grasslands within 200 feet of restored tidal  
23 wetlands, of which approximately 150 feet of this area will benefit the species. These Plan goals  
24 represent performance standards for considering the effectiveness of restoration actions. The acres  
25 of tidal restoration and the commitment to protection of adjacent uplands contained in the near-  
26 term Plan goals would keep pace with the loss of habitat and effects on Suisun shrew.

27 Other factors relevant to effects on Suisun shrew are listed below.

- 28 • Restoration would be sequenced and oriented in a manner that minimizes any temporary, initial  
29 loss of habitat and habitat fragmentation
- 30 • The habitat that would be restored and protected would consist of large blocks of contiguous  
31 tidal brackish emergent wetland that has a large proportion of pickleweed-dominated  
32 vegetation suitable for the species. This would provide greater habitat connectivity and greater  
33 habitat value and quantity, with is expected to accommodate larger populations and to therefore  
34 increase population resilience to random environmental events and climate change.
- 35 • The amount of tidal habitat restored in the near term (2,000 acres) would greatly exceeds the  
36 amount permanently lost (105 acres).

37 Because there would be no project-level effects on Suisun shrew resulting from CM1, the analysis of  
38 the effects of conservation actions does not include a comparison with standard ratios used for  
39 project-level NEPA analyses.

40 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
41 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*

1 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment and*  
2 *Countermeasure Plan, and AMM26 Salt Marsh Harvest Mouse and Suisun Shrew. All of these AMMs*  
3 *include elements that avoid or minimize the risk of affecting habitats and species adjacent to work*  
4 *areas. The AMMs are described in detail in BDCP Appendix 3.C.*

#### 5 ***Late Long-Term Timeframe***

6 The study area supports approximately 7,515 acres of Suisun shrew modeled habitat. Alternative 1C  
7 as a whole would result in effects on 401 acres of Suisun shrew modeled habitat over the term of the  
8 Plan, which would include 377 acres of permanent losses and 24 acres of habitat conversions  
9 (roughly 5% of the habitat in the study area).

10 The Plan contains a commitment to restore or create 6,000 acres of tidal brackish emergent  
11 wetland, 1,500 acres of which would target middle and high marsh habitat (primary habitat for  
12 Suisun shrew) (Objectives TBEWNC1.1, TBEWNC1.2, and SMHM1.1, associated with CM4) and the  
13 protection and/or restoration of grassland adjacent to tidal restoration (areas within 200 feet of  
14 tidal restoration, of which approximately 150 feet would likely benefit the species) to provide  
15 upland refugia for Suisun shrew (Objective GNC1.4, associated with CM3 and CM8). Other factors  
16 relevant to effects on Suisun shrew are listed below.

- 17 ● Restoration would be sequenced and oriented in a manner that minimizes any temporary, initial  
18 loss of habitat and habitat fragmentation
- 19 ● The habitat that would be restored and protected would consist of large blocks of contiguous  
20 tidal brackish emergent wetland that has a large proportion of pickleweed-dominated  
21 vegetation suitable for the species. This would provide greater habitat connectivity and greater  
22 habitat value and quantity, with is expected to accommodate larger populations and to therefore  
23 increase population resilience to random environmental events and climate change.
- 24 ● The amount of tidal habitat restored (6,000 acres) greatly exceeds the amount permanently lost  
25 and converted (401 acres).

26 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6) estimates that the restoration  
27 and protection actions discussed above could result in the restoration of 6,006 acres and the  
28 protection of 232 acres of modeled habitat for Suisun shrew.

29 ***NEPA Effects:*** In the absence of other conservation actions, the effects on Suisun shrew habitat from  
30 Alternative 1C would represent an adverse effect as a result of habitat modification and potential  
31 direct mortality of a special-status species. However, the BDCP has committed to habitat protection,  
32 restoration, management, and enhancement with CM3, CM4, CM8, and CM11. This habitat  
33 protection, restoration, management, and enhancement would be guided by goals and objectives  
34 and by AMM1–AMM5 and AMM26, which would be in place throughout the construction period.  
35 Considering these commitments, the effects of losses and conversions of Suisun shrew habitat and  
36 potential mortality of individuals on Suisun shrew would not be adverse under Alternative 1C.

#### 37 ***CEQA Conclusion:***

#### 38 ***Near-Term Timeframe***

39 The near-term BDCP conservation strategy has been evaluated to determine whether it would  
40 provide sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that  
41 the effects of near-term covered activities would be less than significant. Alternative 1C would

1 impact 105 acres of Suisun shrew modeled habitat in the study area in the near-term. These impacts  
2 include 90 acres of permanent loss and 15 acres of converted habitat, which is all secondary habitat  
3 being converted to primary habitat.

4 The BDCP has committed to near-term goals of restoring 1,000 acres of tidal brackish emergent  
5 wetland and the protection and/or restoration of grasslands within 200 feet of restored tidal  
6 wetlands, of which approximately 150 feet of this area will benefit the species. These Plan goals  
7 represent performance standards for considering the effectiveness of restoration actions. The acres  
8 of tidal restoration and the commitment to protection of adjacent uplands contained in the near-  
9 term Plan goals would keep pace with the loss of habitat and impacts on Suisun shrew.

10 Other factors relevant to effects on Suisun shrew include:

- 11 ● Restoration would be sequenced and oriented in a manner that minimizes any temporary, initial  
12 loss of habitat and habitat fragmentation
- 13 ● The habitat that would be restored and protected would consist of large blocks of contiguous  
14 tidal brackish emergent wetland that has a large proportion of pickleweed-dominated  
15 vegetation suitable for the species. This would provide greater habitat connectivity and greater  
16 habitat value and quantity, with is expected to accommodate larger populations and to therefore  
17 increase population resilience to random environmental events and climate change.
- 18 ● The amount of tidal habitat restored in the near term (2,000 acres) greatly exceeds the amount  
19 permanently lost (105 acres).

20 Because there would be no project level impacts on Suisun shrew resulting from CM1, the analysis of  
21 the impacts of conservation actions does not include a comparison with standard ratios used for  
22 project-level CEQA analyses.

23 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
24 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
25 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment and*  
26 *Countermeasure Plan*, and *AMM26 Salt Marsh Harvest Mouse and Suisun Shrew*. All of these AMMs  
27 include elements that avoid or minimize the risk of affecting habitats and species adjacent to work  
28 areas. The AMMs are described in detail in BDCP Appendix 3.C.

29 These commitments are more than sufficient to support the conclusion that the near-term effects of  
30 Alternative 1C would be less than significant under CEQA.

### 31 **Late Long-Term Timeframe**

32 Based on modeled habitat, the study area supports approximately 7,515 acres of Suisun shrew  
33 modeled habitat. Alternative 1C as a whole would result in effects to 401 acres of Suisun shrew  
34 modeled habitat over the term of the Plan, which would include 377 acres of permanent losses and  
35 24 acres of habitat conversions (roughly 5% of the habitat in the study area). The Plan includes a  
36 commitment to restore or create 6,000 acres of tidal brackish emergent wetland, 1,500 acres of  
37 which would target middle and high marsh habitat (primary habitat for Suisun shrew) (Objectives  
38 TBEWNC1.1, TBEWNC1.2, and SMHM1.1, associated with CM4) and the protection and/or  
39 restoration of grassland adjacent to tidal restoration (areas within 200 feet of tidal restoration, of  
40 which approximately 150 feet would likely benefit the species) to provide upland refugia for Suisun  
41 shrew (Objective GNC1.4, associated with CM3 and CM8). Other factors relevant to effects on Suisun  
42 shrew are listed below.

- 1       ● Restoration would be sequenced and oriented in a manner that minimizes any temporary, initial  
2       loss of habitat and habitat fragmentation
- 3       ● The habitat that would be restored and protected would consist of large blocks of contiguous  
4       tidal brackish emergent wetland that has a large proportion of pickleweed-dominated  
5       vegetation suitable for the species. This would provide greater habitat connectivity and greater  
6       habitat value and quantity, with is expected to accommodate larger populations and to therefore  
7       increase population resilience to random environmental events and climate change.
- 8       ● The amount of tidal habitat restored (6,000 acres) greatly exceeds the amount permanently lost  
9       (401 acres).

10       The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*  
11       *Plant Species*) estimates that the restoration and protection actions discussed above could result in  
12       the restoration of 6,006 acres and the protection of 232 acres of modeled habitat for Suisun shrew.

13       Alternative 1C would result in substantial modifications to Suisun shrew habitat in the absence of  
14       other conservation actions. However, with habitat protection, restoration, management, and  
15       enhancement associated with CM3, CM4, CM8, and CM11, guided by species-specific goals and  
16       objectives and by AMM1–AMM5 and AMM26, which would be in place throughout the construction  
17       phase, Alternative 1C over the term of the BDCP would not result in a substantial adverse effect  
18       through habitat modifications and would not substantially reduce the number or restrict the range  
19       of the species. Therefore, the alternative would have a less-than-significant impact on Suisun shrew.

#### 20       **Impact BIO-161: Indirect Effects of Plan Implementation on Suisun Shrew**

21       Construction/disturbance activities associated tidal restoration (CM4), grassland restoration (CM8),  
22       and management and enhancement activities (CM11) could result in temporary noise and visual  
23       disturbances to Suisun shrew occurring within 100 feet of these areas over the term of the BDCP.  
24       These potential effects would be minimized or avoided through AMM1–AMM7, and AMM26, which  
25       would be in effect throughout the term of the Plan.

26       The use of mechanical equipment during the implementation of the conservation measures could  
27       cause the accidental release of petroleum or other contaminants that could affect Suisun shrew and  
28       its habitat. The inadvertent discharge of sediment could also have a negative effect on the species  
29       and its habitat. AMM1–AMM6 would minimize the likelihood of such spills and would ensure  
30       measures are in place to prevent runoff from the construction area and potential effects of sediment  
31       on Suisun shrew.

32       Tidal marsh restoration has the potential to increase Suisun shrew's exposure to mercury. Mercury  
33       is transformed into the more bioavailable form of methylmercury under anaerobic conditions,  
34       which in the environment typically occurs in sediments subjected to regular wetting and drying  
35       such as tidal marshes and flood plains. Thus, BDCP restoration activities that create newly  
36       inundated areas could increase bioavailability of mercury. In general, the highest methylation rates  
37       are associated with high tidal marshes that experience intermittent wetting and drying and  
38       associated anoxic conditions (Alpers et al. 2008). High and mid tidal marsh is considered to be  
39       primary habitat for Suisun shrew and thus the species could be exposed to methylmercury in tidal  
40       restoration areas. Suisun shrew could be exposed to methylmercury by feeding on marsh  
41       invertebrates that may bioaccumulate methylmercury from marsh sediments. Toxic concentrations  
42       of methylmercury have been found in the kidneys of shrews that inhabit contaminated sites and

1 forage on earthworms and other prey that live within contaminated sediments (Talmage and  
2 Walton 1993; Hinton and Veiga 2002).

3 The Suisun Marsh Plan (Bureau of Reclamation et al. 2010) anticipates that tidal wetlands restored  
4 under the plan would generate less methylmercury than the existing managed wetlands. The  
5 potential for Suisun shrew exposure to methylmercury in Suisun Marsh may decrease in the long  
6 term because the creation of tidal brackish emergent wetland would predominantly result from the  
7 conversion of managed wetlands. *CM12 Methylmercury Management* includes provisions for project-  
8 specific Mercury Management Plans. Along with avoidance and minimization measures and adaptive  
9 management and monitoring, CM12 could reduce the effects of methylmercury on Suisun shrew  
10 resulting from BDCP tidal restoration.

11 **NEPA Effects:** Implementation of the AMMs listed above as part of implementing BDCP Alternative  
12 1C would avoid and minimize the potential for substantial adverse effects on Suisun shrew, either  
13 indirectly or through habitat modifications. These AMMs would also avoid and minimize effects that  
14 could substantially reduce the number of Suisun shrew, or restrict the species' range. Therefore, the  
15 indirect effects of Alternative 1C would not have an adverse effect on Suisun shrew.

16 **CEQA Conclusion:** Indirect effects from construction-related noise and visual disturbances could  
17 impact Suisun shrew within 100 feet of these disturbances. The use of mechanical equipment during  
18 construction could cause the accidental release of petroleum or other contaminants that could  
19 impact Suisun shrew and its habitat. The inadvertent discharge of sediment adjacent to Suisun  
20 shrew habitat could also impact the species. With implementation of AMM1-AMM5, and AMM26 as  
21 part of Alternative 1C construction, operation, and maintenance, the BDCP would avoid the potential  
22 for substantial adverse effects on Suisun shrew, either indirectly or through habitat modifications, in  
23 that the BDCP would not result in a substantial reduction in numbers or a restriction in the range of  
24 Suisun shrew. The indirect effects of BDCP Alternative 1C would have a less-than-significant impact  
25 on Suisun shrew.

26 Suisun shrew could experience indirect effects from increased exposure to methylmercury as a  
27 result of tidal habitat restoration (CM4). With implementation of CM12, the potential indirect effects  
28 of methylmercury would not result in a substantial reduction in numbers or a restriction in the  
29 range of Suisun shrew, and, therefore, would have a less-than-significant impact on the species.

### 30 **San Joaquin Kit Fox and American Badger**

31 Within the study area, the modeled habitat for the San Joaquin kit fox and potential habitat for the  
32 American badger is restricted to 5,327 acres of grassland habitat west of Clifton Court Forebay along  
33 the study area's southwestern edge, in CZ 7-CZ 10.

34 The study area represents the extreme northeastern corner of the species' range in California, which  
35 extends westward and southward from the study area border. The northern range of the San  
36 Joaquin kit fox (including the study area) was most likely marginal habitat historically and has been  
37 further degraded due to development pressures, habitat loss, and fragmentation (Clark et al. 2007).  
38 CNDDDB (California Department of Fish and Wildlife 2013).) reports eight occurrences of San Joaquin  
39 kit foxes along the extreme western edge of the study area within CZ 8, south of Brentwood (Figure  
40 12-49). However, Clark et al. (2007) provide evidence that a number of CNDDDB occurrences in the  
41 northern portion of the species' range may be coyote pups misidentified as San Joaquin kit foxes.  
42 Smith et al. (2006) suggest that the northern range may possibly be a population sink for the San  
43 Joaquin kit fox.

1 Construction and restoration associated with Alternative 1C conservation measures would result in  
2 both temporary and permanent losses of San Joaquin kit and American badger habitat (Table 12-1C-  
3 59). Grassland restoration, and protection and management of natural communities could affect  
4 modeled San Joaquin kit fox habitat and potential American badger habitat. Full implementation of  
5 Alternative 1C would also include biological objectives over the term of the BDCP to benefit the San  
6 Joaquin kit fox which would also benefit American badger which uses similar habitat (BDCP Chapter  
7 3, *Conservation Strategy*). The conservation strategy for the San Joaquin kit fox involves protecting  
8 and enhancing habitat in the northern extent of the species' range to increase the likelihood that San  
9 Joaquin kit fox may reside and breed in the Plan Area; and providing connectivity to habitat outside  
10 the Plan Area. The conservation measures that will be implemented to achieve the biological goals  
11 and objectives are summarized below.

- 12 ● Protect and improve habitat linkages that allow terrestrial covered and other native species to  
13 move between protected habitats within and adjacent to the Plan Area (Objective L3.1,  
14 associated with CM3-CM8, and CM11).
- 15 ● Protect 150 acres of alkali seasonal wetland in CZ 1, CZ 8, and/or CZ 11 among a mosaic of  
16 protected grasslands and vernal pool complex (Objective ASWNC1.1, associated with CM3).
- 17 ● Restore or create alkali seasonal wetlands in CZs 1, CZ 8, and/or CZ 11 (up to 72 acres of alkali  
18 seasonal wetland complex restoration) (Objective ASWNC1.2, associated with CM3 and CM9).
- 19 ● Protect 600 acres of existing vernal pool complex in CZ 1, CZ 8, and CZ 11, primarily in core  
20 vernal pool recovery areas identified in the Recovery Plan for Vernal Pool Ecosystems of  
21 California and Southern Oregon (U.S. Fish and Wildlife Service 2005) (Objective VPNC1.1,  
22 associated with CM3).
- 23 ● Restore vernal pool complex in C Z 1, CZ 8, and/or CZ 11 to achieve no net loss of vernal pool  
24 acreage (up to 67 acres of vernal pool complex restoration) (Objective VPNC1.2, associated with  
25 CM3 and CM9).
- 26 ● Protect 8,000 acres of grassland (Objective GNC1.1, associated with CM3).
- 27 ● Restore 2,000 acres of grasslands to connect fragmented patches of protected grassland  
28 (Objective GNC1.2, associated with CM3 and CM8).
- 29 ● Increase burrow availability for burrow-dependent species in grasslands surrounding alkali  
30 seasonal wetlands within restored and protected alkali seasonal wetland complex (Objective  
31 ASWNC2.3, associated with CM11).
- 32 ● Increase prey, especially small mammals and insects, for grassland-foraging species in  
33 grasslands surrounding alkali seasonal wetlands within restored and protected alkali seasonal  
34 wetland complex (Objective ASWNC2.4, associated with CM11).
- 35 ● Increase burrow availability for burrow-dependent species in grasslands surrounding vernal  
36 pools within restored and protected vernal pool complex (Objective VPNC2.4, associated with  
37 CM11).
- 38 ● Increase prey, especially small mammals and insects, for grassland-foraging species in  
39 grasslands surrounding vernal pools within restored and protected vernal pool complex  
40 (Objective VPNC2.5, associated with CM11).
- 41 ● Increase burrow availability for burrow-dependent species (Objective GNC2.3, associated with  
42 CM11).

- Increase prey abundance and accessibility, especially small mammals and insects, for grassland-foraging species (Objective GNC2.4, associated with CM11).

As explained below, with the restoration and protection of these amounts of habitat, in addition to the AMMs to reduce potential effects, impacts on San Joaquin kit fox and American badger would not be adverse for NEPA purposes and would be less than significant for CEQA purposes.

**Table 12-1C-59. Changes in San Joaquin Kit Fox Modeled Habitat Associated with Alternative 1C (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	Grassland	193	193	160	160	NA	NA
<b>Total Impacts CM1</b>		<b>193</b>	<b>193</b>	<b>160</b>	<b>160</b>	<b>NA</b>	<b>NA</b>
CM2–CM18	Grassland	3	8	0	0	0	0
<b>Total Impacts CM2–CM18</b>		<b>3</b>	<b>8</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>TOTAL IMPACTS</b>		<b>196</b>	<b>201</b>	<b>160</b>	<b>160</b>	<b>0</b>	<b>0</b>

<sup>a</sup> See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only.

NT = near-term

LLT = late long-term

NA = not applicable

### Impact BIO-162: Loss or Conversion of Habitat for and Direct Mortality of San Joaquin Kit Fox and American Badger

Alternative 1C conservation measures would result in the permanent and temporary loss combined of up to 353 acres of modeled habitat for the San Joaquin kit fox (Table 12-1C-59). Because American badger uses grasslands for denning and foraging and shares the same geographic locations as the San Joaquin kit fox, effects on are anticipated to be the same as those described for San Joaquin kit fox. There are two San Joaquin kit fox and no American badger occurrences that overlap with the Plan footprint.

Habitat enhancement and management activities (CM11) could result in local adverse effects on species. In addition, construction vehicle activity could cause injury or mortality of San Joaquin kit foxes and badgers. Each of these individual activities is described below. A summary statement of the combined impacts and NEPA effects and a CEQA conclusion follow the individual conservation measure discussions.

- *CM1 Water Facilities and Operation*: Construction of the conveyance facilities would result in the permanent loss of approximately 193 acres and the temporary loss of 160 acres of modeled San Joaquin kit fox habitat and American badger habitat. This habitat is located in areas of

1 naturalized grassland in a highly disturbed or modified setting on lands immediately adjacent to  
2 Clifton Court Forebay, in CZ 8.

- 3 ● *CM11 Natural Communities Enhancement and Management*: The creation of recreational trails  
4 and recreational staging areas would result in the permanent removal of 8 acres of San Joaquin  
5 kit fox modeled habitat. *AMM24 San Joaquin Kit Fox* would be implemented to ensure that San  
6 Joaquin kit fox dens are avoided, as described in BDCP Appendix 3.C, *Avoidance and*  
7 *Minimization Measures*. Passive recreation in the reserve system could result in disturbance of  
8 San Joaquin kit foxes at their den site. Natal and pupping dens would be particularly vulnerable  
9 to human disturbance. Additionally, disease could be transmitted from domestic dogs that enter  
10 the reserve system with recreational users. However, *AMM37 Recreation* would prohibit  
11 construction of new trails within 250 feet of active San Joaquin kit fox dens. Existing trails would  
12 be closed within 250 feet of active natal/pupping dens until young have vacated, and within 50  
13 feet of other active dens. No dogs would be allowed on reserve units with active San Joaquin kit  
14 fox populations. Rodent control would be prohibited even on grazed or equestrian access areas  
15 with San Joaquin kit fox populations. With these restrictions, recreation-related effects on San  
16 Joaquin kit fox are expected to be minimal.

17 The BDCP would require the enhancement and management of these protected existing  
18 grasslands and restored grasslands to improve their function as a natural community of plants  
19 and wildlife and for associated covered species, including San Joaquin kit fox. The BDCP also  
20 includes actions to improve rodent prey availability.

21 However, management activities could result in injury or mortality of San Joaquin kit fox or  
22 American badger if individuals were present in work sites or if dens were located in the vicinity  
23 of habitat management work sites. A variety of habitat management actions included in *CM11*  
24 that are designed to enhance wildlife values on protected lands may result in localized ground  
25 disturbances that could temporarily remove small amounts of San Joaquin kit fox and American  
26 badger habitat near Clifton Court Forebay, in CZ 8. Ground-disturbing activities, such as removal  
27 of nonnative vegetation and road and other infrastructure maintenance activities, are expected  
28 to have minor effects on available habitat and are expected to result in overall improvements to  
29 and maintenance of San Joaquin kit fox and badger habitat values over the term of the BDCP.  
30 These effects cannot be quantified, but are expected to be minimal and would be avoided and  
31 minimized through the AMMs listed below. These AMMs would remain in effect throughout the  
32 BDCP's construction phase.

- 33 ● *Operations and maintenance*: Ongoing maintenance of BDCP facilities would be expected to have  
34 little if any adverse effect on San Joaquin kit fox or American badger. Postconstruction  
35 operations and maintenance of the above-ground water conveyance facilities and restoration  
36 infrastructure could result in ongoing but periodic disturbances that could affect either species'  
37 use of the surrounding habitat near Clifton Court Forebay, in CZ 8. Maintenance activities would  
38 include vegetation management, levee and structure repair, and regrading of roads and  
39 permanent work areas. These effects, however, would be minimized with implementation of  
40 *AMM1-AMM6, AMM10, and AMM24* and with preconstruction surveys for the American badger,  
41 as required by Mitigation Measure BIO-162, *Conduct Preconstruction Survey for American*  
42 *Badger*.
- 43 ● *Injury and direct mortality*: Construction vehicle activity may cause injury to or mortality of  
44 either species. If San Joaquin kit fox or American badger reside where activities take place (most  
45 likely in the vicinity of Clifton Court Forebay, in CZ 8), the operation of equipment for land

1 clearing, construction, operations and maintenance, and restoration, enhancement, and  
2 management activities could result in injury to or mortality of either species. Measures would be  
3 implemented to avoid and minimize injury to or mortality of these species as described in  
4 AMM1–AMM6, AMM10, and AMM24 (see BDCP Appendix 3.C) and Mitigation Measure BIO-162.

5 The following paragraphs summarize the combined effects discussed above and describe other  
6 BDCP conservation actions that offset or avoid these effects. NEPA effects and a CEQA conclusion are  
7 also included.

### 8 ***Near-Term Timeframe***

9 Because water conveyance facilities construction is being evaluated at the project level, the near-  
10 term BDCP strategy has been analyzed to determine whether it would provide sufficient habitat  
11 protection or restoration in an appropriate timeframe to ensure that the construction effects would  
12 not be adverse under NEPA.

13 Under Alternative 1C there would be a loss of 356 acres of San Joaquin kit fox modeled habitat and  
14 American badger habitat from CM1 (353 acres) and CM11 (3 acres).

15 Typical NEPA project-level mitigation ratio for the natural community that would be affected and  
16 that is identified in the biological goals and objectives for San Joaquin kit fox in Chapter 3 of the  
17 BDCP would be 2:1 for protection of grassland. Using this ratio would indicate that 712 acres of  
18 grassland should be protected for San Joaquin kit fox to mitigate near-term losses.

19 The BDCP has committed to near-term restoration of 58 acres of alkali seasonal wetland (Objective  
20 ASWNC1.2), 40 acres of vernal pool complex (Objective VPNC1.2), and 1,140 acres of grassland  
21 (Objective GNC1.2). In addition, there would be near-term protection of 120 acres of alkali seasonal  
22 wetland (Objective ASWNC1.1), 400 acres of vernal pool complex (Objective VPNC1.1), and 2,000  
23 acres of grassland (Objective GNC1.1). The natural community restoration and protection activities  
24 are expected to be concluded during the first 10 years of plan implementation, which is close enough  
25 in time to the occurrence of impacts to constitute adequate mitigation for NEPA purposes. These  
26 commitments are more than sufficient to support the conclusion that the near-term effects of  
27 Alternative 1C would be not be adverse under NEPA, because the number of acres required to meet  
28 the typical ratios described above would be only 712 acres of grassland protected.

29 The effects on San Joaquin kit fox and American badger habitat from Alternative 1C as a whole  
30 would represent an adverse effect as a result of habitat modification of a special-status species and  
31 potential for direct mortality in the absence of other conservation actions. However, the effects of  
32 Alternative 1C would be not be adverse with habitat protection, restoration, and management and  
33 enhancement in addition to implementation of *AMM1 Worker Training Awareness, AMM2*  
34 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*  
35 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
36 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
37 *Material, AMM10 Restoration of Temporarily Affected Natural Communities, AMM24 San Joaquin Kit*  
38 *Fox, and AMM37 Recreation. These AMMs include elements that avoid or minimize the risk of*  
39 *construction activity affecting habitat and species adjacent to work areas and storage sites.*  
40 Remaining effects would be addressed by implementation of Mitigation Measure BIO-162, *Conduct*  
41 *Preconstruction Survey for American Badger*. BDCP Appendix 3.C describes the AMMs in detail.

1 **Late Long-Term Timeframe**

2 There are 5,327 acres of modeled San Joaquin kit fox habitat in the study area. Alternative 1C as a  
3 whole would result in the permanent loss of and temporary effects on 361 acres of modeled habitat  
4 for San Joaquin kit fox and potential habitat for American badger representing 7% of the modeled  
5 habitat (Table 12-1C-59).

6 With full implementation of Alternative 1C, at least 1,000 acres of grassland would be protected in  
7 CZ 8, where the San Joaquin kit fox is most likely to occur if present in the Plan Area. Additionally, a  
8 portion of the 2,000 acres of grassland restoration will likely occur in CZ 8. Assuming the restored  
9 grasslands would provide suitable San Joaquin kit fox habitat proportional to the amount of  
10 modeled habitat in this natural community in the Plan Area (6.8% of the grasslands in the Plan Area  
11 consist of modeled San Joaquin kit fox habitat), an estimated 132 acres of restored grasslands would  
12 be suitable for the species (6.6% of 2,000 acres).

13 Because San Joaquin kit fox home ranges are large (ranging from around 1 to 12 square miles; see  
14 Appendix 2.A, *Covered Species Accounts*), habitat connectivity is key to the conservation of the  
15 species. Grasslands would be acquired for protection in locations that provide connectivity to  
16 existing protected breeding habitats in CZ 8 (Objective L3.1) and to other adjoining San Joaquin kit  
17 fox habitat within and adjacent to the Plan Area. Connectivity to occupied habitat adjacent to the  
18 Plan Area would help ensure the movement of San Joaquin kit foxes, if present, to larger habitat  
19 patches outside of the Plan Area in Contra Costa County. Grassland protection would focus in  
20 particular on acquiring the largest remaining contiguous patches of unprotected grassland habitat,  
21 which are located south of SR 4 in CZ 8 (Appendix 2.A, *Covered Species Accounts*). This area connects  
22 to more than 620 acres of existing habitat that was protected under the East Contra Costa County  
23 HCP/NCCP.

24 Grasslands in CZ 8 would also be managed and enhanced to increase prey availability and to  
25 increase mammal burrows, which could benefit the San Joaquin kit fox by increasing potential den  
26 sites, which are a limiting factor for the San Joaquin kit fox in the northern portion of its range  
27 (Objectives ASWNC2.3, ASWNC2.4, VPNC2.4, Objective VPNC2.5, Objective GNC2.3, and Objective  
28 GNC2.4). These management and enhancement actions are expected to benefit the San Joaquin kit  
29 fox as well as the American badger by increasing the habitat value of the protected and restoration  
30 grasslands.

31 CZ 8 supports 74% of the modeled San Joaquin kit fox grassland habitat in the study area, and the  
32 remainder of habitat consists of fragmented, isolated patches that are unlikely to support this  
33 species. The BDCP's commitment to protect the largest remaining contiguous habitat patches  
34 (including grasslands and the grassland component of alkali seasonal wetland and vernal pool  
35 complexes) in CZ 8 and to maintain connectivity with the remainder of the satellite population in  
36 Contra Costa County would sufficiently offset the impacts resulting from water conveyance facilities  
37 construction.

38 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*  
39 *Plant Species*) estimates that the restoration and protection actions discussed above, as well as the  
40 restoration of grassland and vernal pool that could overlap with the species model, would result in  
41 the restoration of 131 acres of modeled habitat for San Joaquin kit fox. In addition, protection of  
42 grassland and vernal pool complex could overlap with the species model and would result in the  
43 protection of 1,011 acres of modeled habitat for San Joaquin kit fox.

1 **NEPA Effects:** In the absence of other conservation actions, the effects on San Joaquin kit fox and  
2 American badger habitat from Alternative 1C would represent an adverse effect as a result of habitat  
3 modification and potential direct mortality of a special-status species. However, with habitat  
4 protection, restoration, management, and enhancement associated with CM3, CM8, and CM11, and  
5 guided by AMM1–AMM6, AMM10, AMM24, and AMM37, which would be in place throughout the  
6 time period of construction, and with implementation of Mitigation Measure BIO-162, the effects of  
7 Alternative 1C as a whole on San Joaquin kit fox and American badger would not be adverse.

8 **CEQA Conclusion:**

9 **Near-Term Timeframe**

10 Because water conveyance facilities construction (CM1) is being evaluated at the project level, the  
11 near-term BDCP strategy has been analyzed to determine whether it would provide sufficient  
12 habitat protection or restoration in an appropriate timeframe to ensure that the construction effects  
13 would be less than significant under CEQA.

14 Under Alternative 1C there would be a loss of 356 acres of San Joaquin kit fox modeled habitat and  
15 American badger habitat from CM1 (353 acres) and CM11 (3 acres).

16 Typical CEQA project-level mitigation ratio for the natural community that would be affected and  
17 that is identified in the biological goals and objectives for San Joaquin kit fox in Chapter 3 of the  
18 BDCP would be 2:1 for protection of grassland. Using this ratio would indicate that 712 acres of  
19 grassland should be protected for San Joaquin kit fox to mitigate near-term losses.

20 The BDCP has committed to near-term restoration of 58 acres of alkali seasonal wetland (Objective  
21 ASWNC1.2), 40 acres of vernal pool complex (Objective VPNC1.2), and 1,140 acres of grassland  
22 (Objective GNC1.2). In addition, there would be near-term protection of 120 acres of alkali seasonal  
23 wetland (Objective ASWNC1.1), 400 acres of vernal pool complex (Objective VPNC1.1), and 2,000  
24 acres of grassland (Objective GNC1.1). The natural community restoration and protection activities  
25 are expected to be concluded during the first 10 years of plan implementation, which is close enough  
26 in time to the occurrence of impacts to constitute adequate mitigation for CEQA purposes.

27 These commitments are more than sufficient to support the conclusion that the near-term effects of  
28 Alternative 1C would be less than significant under CEQA, because the number of acres required to  
29 meet the typical ratios described above would be only 712 acres of grassland protected.

30 The BDCP also contains commitments to implement AMM1–AMM6, AMM10, AMM24, and AMM37  
31 which include elements that avoid or minimize the risk of construction activity impacting habitat  
32 and species adjacent to work areas and storage sites. Remaining effects would be addressed by  
33 implementation of Mitigation Measure BIO-162. BDCP Appendix 3.C describes the AMMs in detail.

34 These commitments are more than sufficient to support the conclusion that the near-term impacts  
35 of Alternative 1C on San Joaquin kit fox and American badger would be less than significant under  
36 CEQA, because the number of acres required to meet the typical ratios described above would be  
37 only 712 acres of grassland protected.

38 **Late Long-Term Timeframe**

39 There are 5,327 acres of modeled San Joaquin kit fox habitat in the study area. Alternative 1C as a  
40 whole would result in the permanent loss of and temporary effects on 361 acres of modeled habitat

1 for San Joaquin kit fox and potential habitat for American badger representing 7% of the modeled  
2 habitat (Table 12-1C-59).

3 With full implementation of Alternative 1C, at least 1,000 acres of grassland would be protected in  
4 CZ 8, where the San Joaquin kit fox is most likely to occur if present in the Plan Area. Additionally, a  
5 portion of the 2,000 acres of grassland restoration will likely occur in CZ 8. Assuming the restored  
6 grasslands would provide suitable San Joaquin kit fox habitat proportional to the amount of  
7 modeled habitat in this natural community in the Plan Area (6.8% of the grasslands in the Plan Area  
8 consist of modeled San Joaquin kit fox habitat), an estimated 132 acres of restored grasslands would  
9 be suitable for the species (6.6% of 2,000 acres).

10 Because San Joaquin kit fox home ranges are large (ranging from around 1 to 12 square miles; see  
11 Appendix 2.A, *Covered Species Accounts*), habitat connectivity is key to the conservation of the  
12 species. Grasslands would be acquired for protection in locations that provide connectivity to  
13 existing protected breeding habitats in CZ 8 (Objective L3.1) and to other adjoining San Joaquin kit  
14 fox habitat within and adjacent to the Plan Area. Connectivity to occupied habitat adjacent to the  
15 Plan Area would help ensure the movement of San Joaquin kit foxes, if present, to larger habitat  
16 patches outside of the Plan Area in Contra Costa County. Grassland protection would focus in  
17 particular on acquiring the largest remaining contiguous patches of unprotected grassland habitat,  
18 which are located south of SR 4 in CZ 8 (Appendix 2.A, *Covered Species Accounts*). This area connects  
19 to more than 620 acres of existing habitat that was protected under the East Contra Costa County  
20 HCP/NCCP.

21 Grasslands in CZ 8 would also be managed and enhanced to increase prey availability and to  
22 increase mammal burrows, which could benefit the San Joaquin kit fox by increasing potential den  
23 sites, which are a limiting factor for the San Joaquin kit fox in the northern portion of its range  
24 (Objectives ASWNC2.3, ASWNC2.4, VPNC2.4, Objective VPNC2.5, Objective GNC2.3, and Objective  
25 GNC2.4). These management and enhancement actions are expected to benefit the San Joaquin kit  
26 fox as well as the American badger by increasing the habitat value of the protected and restoration  
27 grasslands.

28 CZ 8 supports 74% of the modeled San Joaquin kit fox grassland habitat in the study area, and the  
29 remainder of habitat consists of fragmented, isolated patches that are unlikely to support this  
30 species. The BDCP's commitment to protect the largest remaining contiguous habitat patches  
31 (including grasslands and the grassland component of alkali seasonal wetland and vernal pool  
32 complexes) in CZ 8 and to maintain connectivity with the remainder of the satellite population in  
33 Contra Costa County would sufficiently offset the impacts resulting from water conveyance facilities  
34 construction.

35 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*  
36 *Plant Species*) estimates that the restoration and protection actions discussed above, as well as the  
37 restoration of grassland and vernal pool that could overlap with the species model, would result in  
38 the restoration of 131 acres of modeled habitat for San Joaquin kit fox. In addition, protection of  
39 grassland and vernal pool complex could overlap with the species model and would result in the  
40 protection of 1,011 acres of modeled habitat for San Joaquin kit fox.

41 In the absence of other conservation actions, the effects on San Joaquin kit fox and American badger  
42 habitat from Alternative 1C would represent a significant impact as a result of habitat modification  
43 and potential direct mortality of a special-status species. However, with habitat protection,  
44 restoration, management, and enhancement associated with CM3, CM8, and CM11, and guided by

1 AMM1–AMM6, AMM10, AMM24, and AMM37, which would be in place throughout the time period  
2 of construction, and with implementation of Mitigation Measure BIO-162, the impact of Alternative  
3 1C as a whole on San Joaquin kit fox and American badger would be less than significant.

4 **Mitigation Measure BIO-162: Conduct Preconstruction Survey for American Badger**

5 A qualified biologist provided by DWR will survey for American badger concurrent with the  
6 preconstruction survey for San Joaquin kit fox and burrowing owl. If badgers are detected, the  
7 biologist will passively relocate badgers out of the work area prior to construction if feasible. If  
8 an active den is detected within the work area, DWR will avoid the den until the qualified  
9 biologist determines the den is no longer active. Dens that are determined to be inactive by the  
10 qualified biologist will be collapsed by hand to prevent occupation of the den between the time  
11 of the survey and construction activities.

12 **Impact BIO-163: Indirect Effects of Plan Implementation on San Joaquin Kit Fox and**  
13 **American Badger**

14 Noise and visual disturbances outside the project footprint but within 250 feet of construction  
15 activities could temporarily affect modeled San Joaquin kit fox habitat and potential American  
16 badger. Water conveyance facilities operations and maintenance activities would include vegetation  
17 and weed control, ground squirrel control, canal maintenance, infrastructure and road maintenance,  
18 levee maintenance, and maintenance and upgrade of electrical systems. While maintenance  
19 activities are not expected to remove San Joaquin kit fox and badger habitat, operation of equipment  
20 could disturb small areas of vegetation around maintained structures and could result in injury or  
21 mortality of individual foxes and badgers, if present. Given the remote likelihood of active San  
22 Joaquin kit fox or badger dens in the vicinity of the conveyance facility, the potential for this effect is  
23 small and would further be minimized with the implementation of seasonal no-disturbance buffers  
24 around occupied dens, if any, and other measures as described in AMM24 and MM BIO-62.

25 **NEPA Effects:** Implementation of the AMMs listed above and Mitigation Measure BIO-162, *Conduct*  
26 *Preconstruction Survey for American Badger*, would avoid the potential for substantial adverse  
27 effects on San Joaquin kit fox or American badger, either indirectly or through habitat modifications.  
28 These measures would also avoid and minimize effects that could substantially reduce the number  
29 of San Joaquin kit fox or American badger, or restrict either species' range. Therefore, the indirect  
30 effects of Alternative 1C would not have an adverse effect on San Joaquin kit fox or American badger.

31 **CEQA Conclusion:** Indirect effects from conservation measure operations and maintenance as well  
32 as construction-related noise and visual disturbances could impact San Joaquin kit fox and American  
33 badger. With implementation of AMM1–AMM6, AMM10, AMM24, and AMM37 as part of Alternative  
34 1C construction, operation, and maintenance, the BDCP would avoid the potential for significant  
35 adverse effects on either species, either indirectly or through habitat modifications, and would not  
36 result in a substantial reduction in numbers or a restriction in the range of either species. In  
37 addition, Mitigation Measure BIO-162 would reduce the impact of indirect effects of Alternative 1C  
38 on American badger to a less-than-significant level.

39 **Mitigation Measure BIO-162: Conduct Preconstruction Survey for American Badger**

40 Please see Mitigation Measure BIO-162 under Impact BIO-162.

**San Joaquin Pocket Mouse**

Habitat for San Joaquin pocket mouse consists of the grassland natural community throughout the Plan Area. The species requires friable soils for burrowing. Construction and restoration associated with Alternative 1C conservation measures would result in both temporary and permanent losses of San Joaquin pocket mouse habitat as indicated in Table 12-1C-60. Full implementation of Alternative 1C would also include the following conservation actions over the term of the BDCP that would likely benefit San Joaquin pocket mouse.

- Protect 8,000 acres of grasslands (Objective GNC1.1, associated with CM3).
- Restore 2,000 acres of grasslands to connect fragmented patches of protected grasslands (Objective GNC1.2, associated with CM8).
- Restore and sustain a mosaic of grassland vegetation alliances, reflecting localized water availability, soil chemistry, soil texture, topography, and disturbance regimes, with consideration of historical states (Objective GNC2.1).

As explained below, with the restoration or protection of these amounts of habitat, impacts on San Joaquin pocket mouse would not be adverse for NEPA purposes and would be less than significant for CEQA purposes.

**Table 12-1C-60. Changes in San Joaquin Pocket Mouse Habitat Associated with Alternative 1C (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	Grassland	358	358	320	320	NA	NA
<b>Total Impacts CM1</b>		<b>358</b>	<b>358</b>	<b>320</b>	<b>320</b>	<b>NA</b>	<b>NA</b>
CM2–CM18	Grassland	889	2,056	239	274	385–1277	514
<b>Total Impacts CM2–CM18</b>		<b>889</b>	<b>2,056</b>	<b>239</b>	<b>274</b>	<b>385–1277</b>	<b>514</b>
<b>TOTAL IMPACTS</b>		<b>1,247</b>	<b>2,414</b>	<b>559</b>	<b>594</b>	<b>385–1277</b>	<b>514</b>

<sup>a</sup> See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

**Impact BIO-164: Loss or Conversion of Habitat for and Direct Mortality of San Joaquin Pocket Mouse**

Alternative 1C conservation measures would result in the combined permanent and temporary loss of up to 3,008 acres of habitat for San Joaquin pocket mouse (of which 2,414 acres would be a

1 permanent loss and 594 acres would be a temporary loss of habitat, Table 12-1C-60). Conservation  
 2 measures that would result in these losses are conveyance facilities and transmission line  
 3 construction, and establishment and use of borrow and spoil areas (CM1), *CM2 Yolo Bypass Fisheries*  
 4 *Enhancement*, *CM4 Tidal Natural Communities Restoration*, *CM5 Seasonally Inundated Floodplain*  
 5 *Restoration*, *CM7 Riparian Natural Community Restoration*, *CM9 Vernal Pool Natural Community and*  
 6 *Alkali Seasonal Wetland Complex Restoration*, *CM10 Nontidal Marsh Restoration*, *CM11 Natural*  
 7 *Community Enhancement and Management*, and *CM18 Conservation Hatcheries*. The majority of  
 8 habitat loss would result from CM4. Habitat enhancement and management activities (CM11), which  
 9 include ground disturbance or removal of nonnative vegetation, could result in local adverse habitat  
 10 effects. In addition, maintenance activities associated with the long-term operation of the water  
 11 conveyance facilities and other BDCP physical facilities could degrade or eliminate San Joaquin  
 12 pocket mouse habitat. Each of these individual activities is described below. A summary statement  
 13 of the combined impacts and NEPA and CEQA conclusions follows the individual conservation  
 14 measure discussions.

- 15 • *CM1 Water Facilities and Operation*: Construction of Alternative 1C conveyance facilities would  
 16 result in the combined permanent and temporary loss of up to 678 acres of potential San  
 17 Joaquin pocket mouse habitat (358 acres of permanent loss, 320 acres of temporary loss) in CZ  
 18 3-CZ 6, CZ 8, and CZ 9. The majority of grassland that would be removed would be in CZ 8 and CZ  
 19 9, from the construction of the new canals. Refer to the Terrestrial Biology Map Book for a  
 20 detailed view of Alternative 1C construction locations. Construction of the canal south of Clifton  
 21 Court Forebay would affect the area where there is a record of San Joaquin pocket mouse  
 22 (California Department of Fish and Game 2012).
- 23 • *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo bypass fisheries enhancement  
 24 would permanently remove 388 acres of potential San Joaquin pocket mouse habitat in the Yolo  
 25 Bypass in CZ 2. In addition, 239 acres would be temporarily removed. Most of the grassland  
 26 losses would occur at the north end of the bypass below Fremont Weir, along the Toe  
 27 Drain/Tule Canal, and along the west side channels.
- 28 • *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and  
 29 inundation would permanently remove an estimated 1,122 acres of potential San Joaquin pocket  
 30 mouse habitat. The majority of the losses would likely occur in the vicinity of Cache Slough, on  
 31 Decker Island in the West Delta ROA, on the upslope fringes of Suisun Marsh, and along narrow  
 32 bands adjacent to waterways in the South Delta ROA. Tidal restoration would directly impact  
 33 and fragment remaining grassland just north of Rio Vista in and around French and Prospect  
 34 Islands, and in an area south of Rio Vista around Threemile Slough.
- 35 • *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore  
 36 seasonally inundated floodplain would permanently and temporarily remove approximately 85  
 37 acres of San Joaquin pocket mouse habitat (51 permanent, 34 temporary). These losses would  
 38 be expected to occur along the San Joaquin River and other major waterways in CZ 7.
- 39 • *CM7 Riparian Natural Community Restoration*: Riparian restoration will impact 410 acres of  
 40 grasslands, primarily in CZ 7, as part of tidal natural communities restoration (11 acres) and  
 41 seasonal floodplain restoration (399 acres).
- 42 • *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*: Up to 10 acres of grassland  
 43 will be permanently converted to vernal pool complex. The vernal pool and alkali seasonal  
 44 wetland restoration will leave intact the grasslands surrounding the vernal pools. Temporary  
 45 construction-related disturbance of grassland habitat would result from implementation of *CM9*

1 in CZ 1, CZ 8, and CZ 11. However, all areas would be restored to their original or higher value  
2 habitat after the construction periods.

- 3 ● *CM11 Natural Communities Enhancement and Management*: The creation of recreational trails  
4 and recreational staging areas will result in the permanent removal of 50 acres of grassland. The  
5 protection of 8,000 acres of grassland for covered species is also expected to benefit San Joaquin  
6 pocket mouse by protecting existing habitats from potential loss or degradation that otherwise  
7 could occur with future changes in existing land use. Habitat management and enhancement-  
8 related activities could cause disturbance or direct mortality to San Joaquin pocket mouse if they  
9 are present near work areas.

10 A variety of habitat management actions included in *CM11 Natural Communities Enhancement*  
11 *and Management* that are designed to enhance wildlife values in restored or protected habitats  
12 could result in localized ground disturbances that could temporarily remove small amounts of  
13 San Joaquin pocket mouse habitat. Ground-disturbing activities, such as removal of nonnative  
14 vegetation and road and other infrastructure maintenance activities, would be expected to have  
15 minor adverse effects on habitat and would be expected to result in overall improvements to  
16 and maintenance of habitat values over the term of the BDCP. Noise and visual disturbance from  
17 management-related equipment operation could temporarily displace individuals or alter the  
18 behavior of the species if adjacent to work areas. With full implementation of the BDCP,  
19 enhancement and management actions designed for western burrowing owl would also be  
20 expected to benefit these species. San Joaquin pocket mouse would benefit particularly from  
21 protection of grassland habitat against potential loss or degradation that otherwise could occur  
22 with future changes in existing land use.

- 23 ● *CM18 Conservation Hatcheries*: Implementation of CM18 would remove up to 35 acres of San  
24 Joaquin pocket mouse habitat.
- 25 ● *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground  
26 water conveyance facilities and restoration infrastructure could result in ongoing but periodic  
27 disturbances that could affect San Joaquin pocket mouse use of the surrounding habitat.  
28 Maintenance activities would include vegetation management, levee and structure repair, and  
29 re-grading of roads and permanent work areas. These effects, however, would be reduced by  
30 AMMs and conservation actions as described below.
- 31 ● *Injury and Direct Mortality*: Construction could result in direct mortality of San Joaquin pocket  
32 mouse if present in construction areas.

33 The following paragraphs summarize the combined effects discussed above and describe other  
34 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA impact conclusions are  
35 also included.

### 36 ***Near-Term Timeframe***

37 Because the water conveyance facilities construction is being evaluated at the project level, the near-  
38 term BDCP conservation strategy has been evaluated to determine whether it would provide  
39 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the effects of  
40 construction would not be adverse under NEPA. Alternative 1C would remove 1,806 acres of San  
41 Joaquin pocket mouse habitat (1,247 permanent, 559 temporary) in the study area in the near-term.  
42 One record of San Joaquin pocket mouse near Clifton Court forebay could be affected by the  
43 construction of the new canal south of the forebay. These effects would result from the construction

1 of the water conveyance facilities (CM1, 678 acres), and implementing other conservation measures  
2 (Yolo Bypass Fisheries Enhancement [CM2] Tidal Natural Communities Restoration [CM4],  
3 Seasonally Inundated Floodplain Restoration [CM5], Grassland Natural Community Restoration  
4 [CM8], Vernal Pool and Alkali Seasonal Wetland Complex Restoration [CM9], and Conservation  
5 Hatcheries [CM18] 1,128 acres).

6 The typical NEPA project-level mitigation ratio for those natural communities affected by CM1  
7 would be 2:1 protection of grassland habitat. Using this ratio would indicate that 1,356 acres of  
8 grassland natural communities should be protected to mitigate the CM1 losses of 678 acres of San  
9 Joaquin pocket mouse habitat. The near-term effects of other conservation actions would remove  
10 1,128 acres of modeled habitat, and therefore require 2,256 acres of protection of golden eagle and  
11 ferruginous hawk habitat using the same typical NEPA ratio (2:1 for protection).

12 The BDCP has committed to near-term goals of protecting 2,000 acres and restoring 1,140 acres of  
13 grassland natural community in CZ 1, CZ 2, CZ 4, CZ 5, CZ 7, CZ 8, and CZ 11. The protection and  
14 restoration of grasslands, would result in a contiguous matrix of grassland, alkali seasonal wetland,  
15 and vernal pool natural communities which would expand habitat for San Joaquin pocket mouse and  
16 reduce the effects of current levels of habitat fragmentation. Under *CM11 Natural Communities*  
17 *Enhancement and Management*, San Joaquin pocket mouse would likely benefit from the  
18 management of the grasslands for general wildlife benefit.

19 These natural community biological goals and objectives would inform the near-term protection and  
20 restoration efforts and represent performance standards for considering the effectiveness of  
21 restoration actions for the species. The acres of protection and restoration contained in the near-  
22 term Plan goals would satisfy the typical mitigation ratios that would be applied to the project-level  
23 effects of CM1, especially considering that a large portion of the affected grasslands consists of thin  
24 strips of grassland along levees and that areas of grassland protection and restoration would be in  
25 large contiguous blocks.

26 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
27 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
28 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment and*  
29 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
30 *Material*, and *AMM10 Restoration of Temporarily Affected Natural Communities*. All of these AMMs  
31 include elements that avoid or minimize the risk of affecting habitats and species adjacent to work  
32 areas and RTM storage sites. The AMMs are described in detail in BDCP Appendix 3.C.

### 33 **Late Long-Term Timeframe**

34 Based on the habitat model, the study area supports approximately 78,047 acres of potential habitat  
35 for San Joaquin pocket mouse. Alternative 1C as a whole would result in the permanent loss of and  
36 temporary effects on 3,008 acres of grasslands that could be suitable for San Joaquin pocket mouse  
37 (4% of the habitat in the study area). The locations of these losses are described above in the  
38 analyses of individual conservation measures. The Plan includes a commitment to restore or create  
39 at least 2,000 acres of grassland in CZ 1, CZ 8 and CZ 11 (GNC1.2) and to protect 8,000 acres of  
40 grassland (with at least 2,000 acres protected in CZ 1, at least 1,000 acres in CZ 8, at least 2,000  
41 acres protected in CZ 11, and the remainder distributed throughout CZ 1, CZ 2, CZ 4, CZ 5, CZ 7, CZ 8,  
42 and CZ 11 in the study area)(GNC1.1). The Plan's commitment to restore grasslands such that they  
43 connect fragmented patches of already protected grasslands (GNC1.2) will improve habitat  
44 connectivity and dispersal abilities of San Joaquin pocket mouse within and outside of the plan area.

1 All protected habitat would be managed under *CM11 Natural Communities Enhancement and*  
2 *Management*.

3 **NEPA Effects:** In the near-term, the loss of San Joaquin pocket mouse habitat and potential direct  
4 mortality would not be an adverse effect because the BDCP has committed to protecting and  
5 restoring an acreage that would meet the typical mitigation ratios described above. In the absence of  
6 other conservation actions, the effects on San Joaquin pocket mouse habitat and potential mortality  
7 of a special-status species resulting from Alternative 1C would represent an adverse effect.  
8 However, the BDCP has committed to habitat protection and restoration associated with CM3, CM8,  
9 and CM11. This habitat protection and restoration would be guided by biological goals and  
10 objectives and by AMM1–AMM6, and AMM10, which would be in place throughout the construction  
11 period. Considering these commitments, losses of San Joaquin pocket mouse habitat and potential  
12 mortality under Alternative 1C would not be an adverse effect.

13 **CEQA Conclusion:**

14 **Near-Term Timeframe**

15 Because the water conveyance facilities construction is being evaluated at the project level, the near-  
16 term BDCP conservation strategy has been evaluated to determine whether it would provide  
17 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the impacts of  
18 construction would be less than significant. Alternative 1C would remove 1,806 acres of modeled  
19 (1,247 permanent, 559 temporary) habitat for San Joaquin pocket mouse in the study area in the  
20 near-term. One record of San Joaquin pocket mouse near Clifton Court forebay could be affected by  
21 the construction of the new canal south of the forebay. These impacts would result from the  
22 construction of the water conveyance facilities (CM1, 678 acres), and implementing other  
23 conservation measures (Yolo Bypass Fisheries Enhancement [CM2] Tidal Natural Communities  
24 Restoration [CM4], Seasonally Inundated Floodplain Restoration [CM5], Grassland Natural  
25 Community Restoration [CM8], Vernal Pool and Alkali Seasonal Wetland Complex Restoration  
26 [CM9], and Conservation Hatcheries [CM18] 1,128 acres).

27 Typical CEQA project-level mitigation ratios for those natural communities affected by CM1 would  
28 be 2:1 protection of grassland habitat. Using these typical ratios would indicate that 1,356 acres of  
29 grassland natural communities should be protected to mitigate the CM1 losses of 678 acres of San  
30 Joaquin pocket mouse habitat. The near-term impacts of other conservation actions would remove  
31 1,128 acres of modeled habitat, and therefore require 2,256 acres of protection of golden eagle and  
32 ferruginous hawk habitat using the same typical NEPA and CEQA ratios (2:1 for protection).

33 The BDCP has committed to near-term goals of protecting 2,000 acres and restoring 1,140 acres of  
34 grassland natural community in CZ 1, CZ 2, CZ 4, CZ 5, CZ 7, CZ 8, and CZ 11. The protection and  
35 restoration of grasslands, would result in a contiguous matrix of grassland, alkali seasonal wetland,  
36 and vernal pool natural communities which would expand habitat for San Joaquin pocket mouse and  
37 reduce the effects of current levels of habitat fragmentation. Under CM11 Natural Communities  
38 Enhancement and Management, San Joaquin pocket mouse would likely benefit from the  
39 management of the grasslands for general wildlife benefit.

40 These natural community biological goals and objectives would inform the near-term protection and  
41 restoration efforts and represent performance standards for considering the effectiveness of  
42 restoration actions for the species. The acres of protection and restoration contained in the near-  
43 term Plan goals would satisfy the typical mitigation ratios that would be applied to the project-level

1 effects of CM1, especially considering that a large portion of the impacted grasslands consists of thin  
2 strips of grassland along levees and that areas of grassland protection and restoration would be in  
3 large contiguous blocks.

4 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*  
5 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*  
6 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment and*  
7 *Countermeasure Plan, and AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
8 *Material, and AMM10 Restoration of Temporarily Affected Natural Communities. All of these AMMs*  
9 *include elements that avoid or minimize the risk of affecting habitats and species adjacent to work*  
10 *areas and RTM storage sites. The AMMs are described in detail in BDCP Appendix 3.C.*

11 These commitments are more than sufficient to support the conclusion that the near-term effects of  
12 Alternative 1C would be less than significant under CEQA.

### 13 **Late Long-Term Timeframe**

14 Based on the habitat model, the study area supports approximately 78,047 acres of potential habitat  
15 for San Joaquin pocket mouse. Alternative 1C as a whole would result in the permanent loss of and  
16 temporary impacts on 3,008 acres of grasslands that could be suitable for San Joaquin pocket mouse  
17 (4% of the habitat in the study area). The locations of these losses are described above in the  
18 analyses of individual conservation measures. The Plan includes a commitment to restore or create  
19 at least 2,000 acres of grassland in CZ 1, CZ 8 and CZ 11(GNC1.2) and to protect 8,000 acres of  
20 grassland (with at least 2,000 acres protected in CZ 1, at least 1,000 acres in CZ 8, at least 2,000  
21 acres protected in CZ 11, and the remainder distributed throughout CZ 1, CZ 2, CZ 4, CZ 5, CZ 7, CZ 8,  
22 and CZ 11 in the study area)(GNC1.1). The Plan's commitment to restore grasslands such that they  
23 connect fragmented patches of already protected grasslands (GNC1.2) will improve habitat  
24 connectivity and dispersal abilities of San Joaquin pocket mouse within and outside of the plan area.  
25 All protected habitat would be managed under CM11.

26 Considering these protection and restoration provisions, which would provide acreages of new  
27 high-value or enhanced habitat in amounts suitable to compensate for habitats lost to construction  
28 and restoration activities, and with implementation of AMM1-AMM6, and AMM10, the loss of  
29 habitat and direct mortality through implementation of Alternative 1C would not result in a  
30 substantial adverse effect through habitat modifications and would not substantially reduce the  
31 number or restrict the range of either species. Therefore, the loss of habitat and potential mortality  
32 under this alternative would have a less-than-significant impact on San Joaquin pocket mouse.

### 33 **Impact BIO-165: Indirect Effects of Plan Implementation on San Joaquin Pocket Mouse**

34 Construction activities associated with water conveyance facilities, conservation components and  
35 ongoing habitat enhancement, as well as operations and maintenance of above-ground water  
36 conveyance facilities, including the transmission facilities, could result in ongoing periodic  
37 postconstruction disturbances and noise with localized effects on San Joaquin kit pocket mouse and  
38 its habitat over the term of the BDCP. These potential effects would be minimized and avoided  
39 through AMM1-AMM6, and AMM10, which would be in effect throughout the plan's construction  
40 phase.

41 Water conveyance facilities operations and maintenance activities would include vegetation and  
42 weed control, ground squirrel control, canal maintenance, infrastructure and road maintenance,

1 levee maintenance, and maintenance and upgrade of electrical systems. While maintenance  
2 activities are not expected to remove pocket mouse habitat, operation of equipment could disturb  
3 small areas of vegetation around maintained structures and could result in injury or mortality of  
4 individual pocket mice, if present.

5 **NEPA Effects:** Implementation of the AMMs listed above would avoid the potential for substantial  
6 adverse effects on San Joaquin pocket mouse, either indirectly or through habitat modifications.  
7 These measures would also avoid and minimize effects that could substantially reduce the number  
8 of San Joaquin pocket mouse, or restrict the species' range. Therefore, the indirect effects of  
9 Alternative 1C would not have an adverse effect on San Joaquin pocket mouse.

10 **CEQA Conclusion:** Indirect effects from conservation measure operations and maintenance as well  
11 as construction-related noise and visual disturbances could impact San Joaquin pocket mouse. With  
12 implementation of AMM1-AMM6 and AMM10 as part of Alternative 1C construction, operation, and  
13 maintenance, the BDCP would avoid the potential for significant adverse effects on either species,  
14 either indirectly or through habitat modifications, and would not result in a substantial reduction in  
15 numbers or a restriction in the range of the species. Therefore, the indirect effects under this  
16 alternative would have a less-than-significant impact on San Joaquin pocket mouse.

### 17 **Special-Status Bat Species**

18 Special-status bat species with potential to occur in the study area employ varied roost strategies,  
19 from solitary roosting in foliage of trees to colonial roosting in trees and artificial structures, such as  
20 tunnels, buildings, and bridges. Various roost strategies could include night roosts, maternity roosts,  
21 migration stopover, or hibernation. The habitat types used to assess effects for special-status bats  
22 roosting habitat includes valley/foothill riparian natural community, developed lands and  
23 landscaped trees, including eucalyptus, palms and orchards. Potential foraging habitat includes all  
24 riparian habitat types, cultivated lands, developed lands, grasslands, and wetlands.

25 There is potential for at least thirteen different bat species to be present in the study area (Figure  
26 12-51), including four California species of special concern and nine species ranked from low to  
27 moderate priority by the Western Bat Working Group (Table 12A-2 in Appendix 12A, *Special-Status  
28 Species with Potential to Occur in the Study Area*). In 2009, DHCCP conducted a large-scale effort that  
29 involved habitat assessments, bridge surveys, and passive acoustic monitoring surveys for bats (see  
30 Appendix 12C, *2009 to 2011 Bay Delta Conservation Plan EIR/EIS Environmental Data Report* for  
31 details on methods and results).

32 There is potential for at least thirteen different bat species to be present in the study area (Figure  
33 12-51), including four California species of special concern and nine species ranked from low to  
34 moderate priority by the Western Bat Working Group (Table 12A-2 in Appendix 12A). In 2009,  
35 DHCCP conducted a large-scale effort that involved habitat assessments, bridge surveys, and passive  
36 acoustic monitoring surveys for bats(see Appendix 12C, *2009 to 2011 Bay Delta Conservation Plan  
37 EIR/EIS Environmental Data Report* for details on methods and results).

38 The majority of the parcels assessed during field surveys contained bat foraging and roosting  
39 features and were considered highly suitable habitat, At the time of the 2009 field surveys, DWR  
40 biologists initially identified 145 bridges in their survey area. Eleven of the 145 bridges were not  
41 accessible and thirteen were determined to not be suitable for bats. Evidence of bat presence was  
42 observed at six of the bridges and bat sign (guano, urine staining, odor, or vocalizations) was  
43 observed at 26 of the bridges. biologists observed Mexican free-tailed bats at four of the bridges and

1 unidentified species at the remaining two bridges. One of these bridges, over the Yolo Causeway,  
2 was used by approximately 10,000 Mexican free-tailed bats, indicating a maternity roost. A second  
3 roost site of about 50 individuals was observed under a bridge in eastern Solano County.

4 The remaining 89 bridges contained structural features that were considered conducive to  
5 maternity, solitary, day and/or night roosting. Night roosts may have crevices and cracks but more  
6 often have box beams or other less protected roosting spots where bats rest temporarily while  
7 feeding. Day roosts are commonly found in bridges with expansion joints, crevices, or cracks where  
8 bats are protected from predators and weather. Seventeen bridges in the survey area had no  
9 potential for roosting because they lacked surface features from which bats could hang and offered  
10 no protection from weather or predators.

11 Construction and restoration associated with Alternative 1C conservation measures would result in  
12 both temporary and permanent losses of foraging and roosting habitat for special-status bats as  
13 indicated in Table 12-4-61. Protection and restoration for special-status bat species focuses on  
14 habitats and does not include manmade structures such as bridges. The conservation measures that  
15 would be implemented to achieve the biological goals and objectives that would also benefit special-  
16 status bats are summarized below.

- 17 ● Protect or restore 142,200 acres of high-value natural communities (Objective L1.1, associated  
18 with CM3). This objective includes restoring and protecting a variety of habitat types described  
19 below (BDCP Chapter 3, Table 3.3-4).
  - 20 ○ Protect 150 acres of alkali seasonal wetland in CZ 1, CZ 8, and/or CZ 11 among a mosaic of  
21 protected grasslands and vernal pool complex (Objective ASWNC1.1, associated with CM3).
  - 22 ○ Protect 600 acres of existing vernal pool complex (Objective VPNC1.1, associated with  
23 CM3).
  - 24 ○ Protect 8,000 acres of grassland (Objective GNC1.1, associated with CM3).
  - 25 ○ Protect 8,100 acres of managed wetland (Objective MWNC1.1, associated with CM3 and  
26 CM11).
  - 27 ○ Protect 48,625 acres of cultivated lands (Objective CLNC1.1, associated with CM3 and  
28 CM11).
  - 29 ○ Protect, restore, or create 2,740 acres of rice land or equivalent habitat type for the giant  
30 garter snake (Objective GGS3.1, associated with CM3, CM4, and CM10).
  - 31 ○ Restore 2,000 acres of grasslands to connect fragmented patches of protected (Objective  
32 GNC1.2, associated with CM3 and 8).
  - 33 ○ Restore 67 acres of vernal pool complex (Objective VPNC1.2, associated with CM3 and 9).
  - 34 ○ Restore and protect 65,000 acres of tidal natural communities (Objective L1.2, associated  
35 with CM2, 3, and 4).
  - 36 ○ Restore or create 5,000 acres of valley/foothill riparian natural community (Objective  
37 VFRNC1.1, associated with CM3 and CM7).
  - 38 ○ Protect 750 acres of existing valley/foothill riparian natural community in CZ 7 by year 10  
39 (Objective VFRNC1.2, associated with CM3).

1 As explained below, with the restoration and protection of these amounts of habitat, in addition to  
 2 mitigation measures to reduce potential effects, impacts on special-status bats would not be adverse  
 3 for NEPA purposes and would be less than significant for CEQA purposes.

4 **Table 12-1C-61. Changes in Special-Status Bat Roosting and Foraging Habitat Associated with**  
 5 **Alternative 1C<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type <sup>c</sup>	Permanent		Temporary		Periodic <sup>e</sup>	
		NT	LLT <sup>d</sup>	NT	LLT <sup>d</sup>	CM2	CM5
CM1	Roosting	135	135	333	333	NA	NA
	Foraging	6,832	6,832	10,451	10,451	NA	NA
<b>Total Impacts CM1</b>		<b>6,967</b>	<b>6,967</b>	<b>10,784</b>	<b>10,784</b>	<b>NA</b>	<b>NA</b>
CM2-CM18	Roosting	524	1,570	167	212	324	411
	Foraging	14,497	60,399	773	2,126	21,265	10,137
<b>Total Impacts CM2-CM18</b>		<b>15,021</b>	<b>61,969</b>	<b>940</b>	<b>2,338</b>	<b>21,589</b>	<b>10,548</b>
<b>TOTAL IMPACTS</b>		<b>21,988</b>	<b>68,937</b>	<b>11,724</b>	<b>13,122</b>	<b>21,589</b>	<b>10,548</b>

<sup>a</sup> See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> Affected roosting habitat acreages include valley/foothill riparian habitat and orchards. An unknown number of buildings, bridges, tunnels, and individual trees could also be affected but were not included in this analysis. Foraging habitat includes all natural communities, cultivated lands, and developed lands in the study area. Foraging habitat effects for CM2-CM18 were not considered adverse as they reflect a conversion from one foraging habitat type (mostly cultivated lands) to another foraging habitat (wetlands).

<sup>d</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>e</sup> Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as the maximum possible based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

6

7 **Impact BIO-166: Loss or Conversion of Habitat for and Direct Mortality of Special-Status Bats**

8 Alternative 1C conservation measure CM1 would result in the permanent and temporary loss  
 9 combined of up to 468 acres of roosting habitat and 16,833 acres of foraging habitat for special-  
 10 status bats in the study area. DWR identified two bridges, one with positive bat sign that provided  
 11 both day and night roosting habitat and the other a potential night roost, that could be affected by  
 12 construction in CM1. Conservation measures Fremont Weir/Yolo Bypass improvements (CM2), tidal  
 13 habitat restoration (CM4), and floodplain restoration (CM5) and would result in the permanent and  
 14 temporary loss of 1,782 acres of roosting habitat and the conversion of approximately 65,525 acres  
 15 of foraging habitat from mostly cultivated lands and managed wetlands to tidal and nontidal  
 16 wetlands. Foraging habitat effects that would result from CM2-CM18 were not considered adverse  
 17 because they reflect a conversion from one foraging habitat type (mostly cultivated lands) to  
 18 another foraging habitat (wetlands). Habitat enhancement and management activities (CM11) could

1 result in local adverse effects. In addition, maintenance activities associated with the long-term  
2 operation of the water conveyance facilities and other BDCP physical facilities could affect special-  
3 status bat habitat. A summary of combined impacts and NEPA effects and a CEQA conclusion follows  
4 the individual conservation measure discussions.

- 5 ● *CM1 Water Facilities and Operation*: Construction of Alternative 1C conveyance facilities would  
6 result in the permanent loss of approximately 135 acres of roosting habitat and 6,832 acres of  
7 foraging habitat in the study area. Development of the water conveyance facilities would also  
8 result in the temporary removal of up to 333 acres of roosting habitat and up to 10,451 acres of  
9 foraging habitat for special-status bats in the study area (Table 12-1C-61). DWR identified two  
10 bridges within the CM1 footprint. One bridge had positive bat sign and provided both day and  
11 night roosting habitat and was located in a new bridge construction area. The second bridge  
12 provided potential night roosting habitat and is located in a borrow area.
- 13 ● *CM2 Yolo Bypass Fisheries Enhancement*: Improvements in the Yolo Bypass would result in the  
14 conversion of approximately 2,025 acres of foraging habitat into wetlands that could still be  
15 used by bats for foraging. CM2 would also result in the permanent removal of 89 acres and  
16 temporary removal of 167 acres of roosting habitat for special-status bats. The maternity colony  
17 of Mexican free-tailed bats located at both ends of the Yolo Causeway bridge could also be  
18 affected during construction for CM2. Implementation of Mitigation Measure BIO-166 *Conduct*  
19 *Preconstruction Surveys for Roosting Bats and Implement Protective Measures*, would ensure that  
20 improvements in the Yolo Bypass avoid effects on roosting special-status bats.
- 21 ● *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and  
22 inundation would result in the conversion of approximately 56,810 acres of foraging habitat into  
23 wetlands that could still be used by bats for foraging. Approximately 1,425 acres of roosting  
24 habitat for special-status bats would permanently affected. This habitat is of low value,  
25 consisting of a small, isolated patch surrounded by cultivated lands, and the species have a  
26 relatively low likelihood of being present in these areas. The roosting habitat that would be  
27 removed consists of relatively small and isolated patches along canals and irrigation ditches  
28 surrounded by cultivated lands in the Union Island and Roberts Island areas, and several small  
29 patches along the San Joaquin River. Mitigation Measure BIO-166, *Conduct Preconstruction*  
30 *Surveys for Roosting Bats and Implement Protective Measures*, requires that tidal natural  
31 communities restoration avoid effects on roosting special-status bats.
- 32 ● *CM5 Seasonally Inundated Floodplain Restoration*: Levee construction associated with floodplain  
33 restoration would result in the conversion of an estimated 3,690 acres of foraging habitat into  
34 wetlands that could still be used by bats for foraging. CM5 would also result in the permanent  
35 removal of 57 acres and temporary removal of 45 acres of roosting habitat for special-status  
36 bats in the study area.
- 37 ● *CM11 Natural Communities Enhancement and Management*: Implementation of Alternative 1C  
38 would result in an overall benefit to special-status bats within the study area through protection  
39 and restoration of their foraging and roosting habitats. The majority of affected acres would  
40 convert agricultural land to natural communities with higher potential foraging and roosting  
41 value, such as riparian, tidal and nontidal wetlands, and periodically inundated lands. Restored  
42 foraging habitats primarily would replace agricultural lands. Restored habitats are expected to  
43 be of higher function because the production of flying insect prey species is expected to be  
44 greater in restored wetlands and uplands on which application of pesticides would be reduced  
45 relative to affected agricultural habitats. Noise and visual disturbances during implementation

1 of riparian habitat management actions could result in temporary disturbances that, if bat roost  
2 sites are present, could cause temporary abandonment of roosts. This effect would be  
3 minimized with implementation of Mitigation Measure BIO-166, *Conduct Preconstruction*  
4 *Surveys for Roosting Bats and Implement Protective Measures*.

- 5 • Operations and maintenance: Ongoing facilities operation and maintenance is expected to have  
6 little if any adverse effect on special-status bats. Postconstruction operation and maintenance of  
7 the above-ground water conveyance facilities and restoration infrastructure could result in  
8 ongoing but periodic disturbances that could affect special-status bat use of the surrounding  
9 habitat in the Yolo Bypass, the Cache Slough area, and the north and south Delta (CZ 1, CZ 2, CZ  
10 4, CZ 5, CZ 6, CZ 7, and CZ 8). Maintenance activities would include vegetation management,  
11 levee and structure repair, and regrading of roads and permanent work areas. These effects,  
12 however, would be minimized with implementation of the mitigation measures described  
13 below.
- 14 • Injury and direct mortality: In addition, to habitat loss and conversion, construction activities,  
15 such as grading, the movement of construction vehicles or heavy equipment, and the installation  
16 of water conveyance facilities components and new transmission lines, may result in the direct  
17 mortality, injury, or harassment of roosting special-status bats. Construction activities related to  
18 conservation components could have similar affects. Preconstruction surveys would be  
19 conducted and if roosting or maternity sites are detected, seasonal restrictions would be placed  
20 while bats are present, as described below in the mitigation measures.

21 The following paragraphs summarize the combined effects discussed above and describe other  
22 BDCP conservation actions that offset or avoid these effects. NEPA effects and CEQA conclusions are  
23 also included.

#### 24 ***Near-Term Timeframe***

25 Because water conveyance facilities construction is being evaluated at the project level, the near-  
26 term BDCP strategy has been analyzed to determine whether it would provide sufficient habitat  
27 protection or restoration in an appropriate timeframe to ensure that the construction effects would  
28 not be adverse under NEPA. Because the majority of affected acres would convert agricultural land  
29 to natural communities with higher potential foraging and roosting value, such as riparian, tidal and  
30 nontidal wetlands, and periodically inundated lands this analysis focuses only on losses to roosting  
31 habitat for CM1, CM2, and CM4 in the near-term.

32 Alternative 1C would permanently or temporarily affect 1,159 acres of roosting for special-status  
33 bats in the near-term as a result of implementing (468 acres roosting habitat), CM2 (256 acres  
34 roosting habitat), and CM4 (435 acres roosting habitat). Effects from CM5 would all occur in the late  
35 long-term. Most of the roosting habitat losses would occur in an valley/foothill riparian.

36 Typical NEPA project-level mitigation ratios for those natural communities that would be affected  
37 for roosting habitat would be 1:1 for restoration and protection of the valley/foothill riparian  
38 natural community. Using these ratios would indicate that 1,159 acres of riparian habitat should be  
39 restored and 1,159 acres of riparian habitat should be protected.

40 Implementation of BDCP actions in the near-term would result in an overall benefit to special-status  
41 bats within the study area through protection and restoration of their foraging and roosting habitats  
42 (Objective L1.1). BDCP actions in the near-term would restore 800 acres of riparian roosting and  
43 foraging habitat (Objective VFRNC1.1) and 21,288 acres of foraging habitat in natural communities

1 and developed lands (Objective L1.1, Objective GNC1.2, Objective VPNC1.2, Objective L1.2, and  
2 Objective L2.11). In addition, the BDCP would protect 750 acres of riparian roosting and foraging  
3 habitat (Objective VFRNC1.2) and 41,445 acres of foraging habitat (Objective L1.1, Objective  
4 ASWNC1.1, Objective VPNC1.1, Objective MWNC1.1, Objective CLNC1.1, Objective GGS3.1, and  
5 Objective GNC1.1). Restored foraging habitats would replace primarily cultivated lands. Restored  
6 habitats are expected to be of higher function because the production of flying insect prey species is  
7 expected to be greater in restored wetlands and uplands on which application of pesticides would  
8 be reduced relative to affected agricultural habitats. Conservation components in the near-term  
9 would sufficiently offset the adverse effects resulting from near-term effects from Alternative 1C.

10 In addition, activities associated with natural communities enhancement and protection and with  
11 ongoing facilities operations and maintenance could affect special-status bat use of surrounding  
12 habitat and could result in harassment, injury or mortality of bats. Mitigation Measure BIO-166,  
13 described below, requires preconstruction surveys to reduce these effects.

14 The BDCP also contains commitments to implement *AMM1 Worker Awareness Training, AMM2*  
15 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*  
16 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
17 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
18 *Material, and AMM10 Restoration of Temporarily Affected Natural Communities. These AMMs include*  
19 *elements that avoid or minimize the risk of construction activity affecting habitat and species*  
20 *adjacent to work areas and storage sites. The AMMs are described in detail in BDCP Appendix 3.C,*  
21 *Avoidance and Minimization Measures.*

### 22 **Late Long-Term Timeframe**

23 Alternative 1C as a whole would affect 2,250 acres of roosting habitat (Table 12-1C-61). Because the  
24 majority of affected acres would convert agricultural land to natural communities with higher  
25 potential foraging and roosting value, such as riparian, tidal and nontidal wetlands, and periodically  
26 inundated lands this analysis focuses only on losses to roosting habitat for CM1, CM2, CM4, and CM5  
27 in the late long-term.

28 Implementation of BDCP actions in the late long-term would result in an overall benefit to special-  
29 status bats within the study area through protection and restoration of approximately 142,200 acres  
30 of their foraging and roosting habitats (Objective L1.1). Achieving this objective is intended to  
31 protect the highest quality natural communities and covered species habitat in the Plan Area to  
32 optimize the ecological value of the reserve system for conserving covered species and native  
33 biodiversity. The target for total protected and restored acreage is based on the sum of all natural  
34 community acreage targets. Achieving this objective is intended to protect and restore natural  
35 communities, species-specific habitat elements, and species diversity on a landscape-scale.,  
36 Achieving this objective is also intended to conserve representative natural and seminatural  
37 landscapes in order to maintain the ecological integrity of large habitat blocks, including desired  
38 ecosystem function, and biological diversity.

39 BDCP actions in the late long-term would restore and protect 5,750 acres of riparian roosting and  
40 foraging habitat (Objective VFRNC1.1 and Objective VFRNC1.2), and 136,450 acres of foraging  
41 habitat (Objective L1.1, Objective GNC1.2, Objective VPNC1.2, Objective L1.2, Objective L2.11,  
42 Objective L1.1, Objective ASWNC1.1, Objective VPNC1.1, Objective MWNC1.1, Objective CLNC1.1,  
43 Objective GGS3.1, and Objective GNC1.1) in natural communities and developed lands. Restored  
44 foraging habitats would replace primarily cultivated lands. Restored habitats are expected to be of

1 higher function because the production of flying insect prey species is expected to be greater in  
2 restored wetlands and uplands on which application of pesticides would be reduced relative to  
3 affected agricultural habitats.

4 Should any of the special-status bat species be detected roosting in the study area, construction of  
5 water conveyance facilities and restoration activities would have an adverse effect on roosting  
6 special-status bats. Noise and visual disturbances and the potential for injury or mortality of  
7 individuals associated within implementation of the restoration activities on active roosts would be  
8 minimized with implementation of Mitigation Measure BIO-166, *Conduct Preconstruction Surveys for*  
9 *Roosting Bats and Implement Protective Measures*. Conservation components would sufficiently  
10 offset the adverse effects resulting from late long-term effects from CM1, CM2, CM4, and CM5.

11 **NEPA Effects:** In the near-term, the losses of roosting and foraging habitat for special-status bats  
12 associated with implementing Alternative 1C are not expected to result in substantial adverse  
13 effects on special-status bats, either directly or through habitat modifications and would not result  
14 in a substantial reduction in numbers or a restriction in the range of special-status bats because the  
15 BDCP has committed to protecting the acreage required to meet the typical mitigation ratios  
16 described above. In the late long-term, the losses of foraging and roosting habitat for special-status  
17 bats associated with Alternative 1C, in the absence of other conservation actions, would represent  
18 an adverse effect as a result of habitat modification and potential direct mortality of a special-status  
19 species. However, with habitat protection and restoration associated with the conservation  
20 components, guided by landscape-scale goals and objectives and by AMM1–AMM6, and AMM10, and  
21 with implementation of Mitigation Measure BIO-166, the effects of Alternative 1C as a whole on  
22 special-status bats would not be adverse.

23 **CEQA Conclusion:**

24 **Near-Term Timeframe**

25 Because water conveyance facilities construction is being evaluated at the project level, the near-  
26 term BDCP strategy has been analyzed to determine whether it would provide sufficient habitat  
27 protection or restoration in an appropriate timeframe to ensure that the construction effects would  
28 be less than significant for CEQA purposes. Because the majority of affected acres would convert  
29 agricultural land to natural communities with higher potential foraging and roosting value, such as  
30 riparian, tidal and nontidal wetlands, and periodically inundated lands this analysis focuses only on  
31 losses to roosting habitat for CM1, CM2, and CM4 in the near-term.

32 Alternative 1C would permanently or temporarily affect 1,159 acres of roosting for special-status  
33 bats in the near-term as a result of implementing (468 acres roosting habitat), CM2 (256 acres  
34 roosting habitat), and CM4 (435 acres roosting habitat). Effects from CM5 would all occur in the late  
35 long-term. Most of the roosting habitat losses would occur in an valley/foothill riparian.

36 Typical CEQA project-level mitigation ratios for those natural communities that would be affected  
37 for roosting habitat would be 1:1 for restoration and protection of the valley/foothill riparian  
38 natural community. Using these ratios would indicate that 1,159 acres of riparian habitat should be  
39 restored and 1,159 acres of riparian habitat should be protected.

40 Implementation of BDCP actions in the near-term would result in an overall benefit to special-status  
41 bats within the study area through protection and restoration of their foraging and roosting habitats  
42 (Objective L1.1). BDCP actions in the near-term would restore 800 acres of riparian roosting and  
43 foraging habitat (Objective VFRNC1.1) and 21,288 acres of foraging habitat in natural communities

1 and developed lands (Objective L1.1, Objective GNC1.2, Objective VPNC1.2, Objective L1.2, and  
2 Objective L2.11). In addition, the BDCP would protect 750 acres of riparian roosting and foraging  
3 habitat (Objective VFRNC1.2) and 41,445 acres of foraging habitat (Objective L1.1, Objective  
4 ASWNC1.1, Objective VPNC1.1, Objective MWNC1.1, Objective CLNC1.1, Objective GGS3.1, and  
5 Objective GNC1.1). Restored foraging habitats would replace primarily cultivated lands. Restored  
6 habitats are expected to be of higher function because the production of flying insect prey species is  
7 expected to be greater in restored wetlands and uplands on which application of pesticides would  
8 be reduced relative to affected agricultural habitats. Conservation components in the near-term  
9 would sufficiently offset the adverse effects resulting from near-term effects from Alternative 1C.

10 In addition, activities associated with natural communities enhancement and protection and with  
11 ongoing facilities operations and maintenance could affect special-status bat use of surrounding  
12 habitat and could result in harassment, injury or mortality of bats. Mitigation Measure BIO-166,  
13 described below, requires preconstruction surveys to reduce these impacts to a less-than-significant  
14 level.

15 The permanent loss of roosting habitat from Alternative 1C would be mitigated through  
16 implementation of Mitigation Measure BIO-166, which would ensure there is no significant impact  
17 under CEQA on roosting special-status bats, either directly or through habitat modifications and no  
18 substantial reduction in numbers or a restriction in the range of special-status bats. The BDCP also  
19 contains commitments to implement AMM1–AMM6 and AMM10. These AMMs include elements that  
20 avoid or minimize the risk of construction activity affecting habitat and species adjacent to work  
21 areas and storage sites. The AMMs are described in detail in BDCP Appendix 3.C, *Avoidance and*  
22 *Minimization Measures*.

### 23 ***Late Long-Term Timeframe***

24 Alternative 1C as a whole would affect 2,250 acres of roosting habitat (Table 12-1C-61). Because the  
25 majority of affected acres would convert agricultural land to natural communities with higher  
26 potential foraging and roosting value, such as riparian, tidal and nontidal wetlands, and periodically  
27 inundated lands this analysis focuses only on losses to roosting habitat for CM1, CM2, CM4, and CM5  
28 in the late long-term.

29 Implementation of BDCP actions in the late long-term would result in an overall benefit to special-  
30 status bats within the study area through protection and restoration of approximately 142,200 acres  
31 of their foraging and roosting habitats (Objective L1.1). Achieving this objective is intended to  
32 protect the highest quality natural communities and covered species habitat in the Plan Area to  
33 optimize the ecological value of the reserve system for conserving covered species and native  
34 biodiversity. The target for total protected and restored acreage is based on the sum of all natural  
35 community acreage targets. Achieving this objective is intended to protect and restore natural  
36 communities, species-specific habitat elements, and species diversity on a landscape-scale.,  
37 Achieving this objective is also intended to conserve representative natural and seminatural  
38 landscapes in order to maintain the ecological integrity of large habitat blocks, including desired  
39 ecosystem function, and biological diversity.

40 BDCP actions in the late long-term would restore and protect 5,750 acres of riparian roosting and  
41 foraging habitat (Objective VFRNC1.1 and Objective VFRNC1.2), and 136,450 acres of foraging  
42 habitat (Objective L1.1, Objective GNC1.2, Objective VPNC1.2, Objective L1.2, Objective L2.11,  
43 Objective L1.1, Objective ASWNC1.1, Objective VPNC1.1, Objective MWNC1.1, Objective CLNC1.1,  
44 Objective GGS3.1, and Objective GNC1.1) in natural communities and developed lands. Restored

1 foraging habitats would replace primarily cultivated lands. Restored habitats are expected to be of  
2 higher function because the production of flying insect prey species is expected to be greater in  
3 restored wetlands and uplands on which application of pesticides would be reduced relative to  
4 affected agricultural habitats.

5 Should any of the special-status bat species roost in the study area, construction of water  
6 conveyance facilities and restoration activities would have an adverse effect on roosting special-  
7 status bats. Noise and visual disturbances and the potential for injury or mortality of individuals  
8 associated within implementation of the restoration activities on active roosts would be minimized  
9 with implementation of Mitigation Measure BIO-166, *Conduct Preconstruction Surveys for Roosting*  
10 *Bats and Implement Protective Measures*. Conservation components would sufficiently offset late  
11 long-term effects resulting from CM1, CM2, CM4, and CM5.

12 The permanent loss of roosting habitat from Alternative 1C would be mitigated through  
13 implementation of Mitigation Measure BIO-166, which would ensure there is no significant impact  
14 under CEQA on roosting special-status bats, either directly or through habitat modifications and no  
15 substantial reduction in numbers or a restriction in the range of special-status bats. Therefore,  
16 Alternative 1C would not result in a significant impact on special-status bats under CEQA.

17 **Mitigation Measure BIO-166: Conduct Preconstruction Surveys for Roosting Bats and**  
18 **Implement Protective Measures**

19 The following measure was designed to avoid and minimize adverse effects on special-status  
20 bats. However, baseline data are not available or are limited on how bats use the study area, and  
21 on individual numbers of bats and how they vary seasonally. Therefore, it is difficult to  
22 determine if there would be a substantial reduction in species numbers. Bat species with  
23 potential to occur in the study area employ varied roost strategies, from solitary roosting in  
24 foliage of trees to colonial roosting in trees and artificial structures, such as buildings and  
25 bridges. Daily and seasonal variations in habitat use are common. To obtain the highest  
26 likelihood of detection, preconstruction bat surveys will be conducted by DWR and will include  
27 these components.

- 28 ● Identification of potential roosting habitat within project area.
- 29 ● Daytime search for bats and bat sign in and around identified habitat.
- 30 ● Evening emergence surveys at potential day-roost sites, using night-vision goggles and/or  
31 active full-spectrum acoustic monitoring where species identification is sought.
- 32 ● Passive full-spectrum acoustic monitoring and analysis to detect bat use of the area from  
33 dusk to dawn over multiple nights.
- 34 ● Additional on-site night surveys as needed following passive acoustic detection of special  
35 status bats to determine nature of bat use of the structure in question (e.g., use of structure  
36 as night roost between foraging bouts).
- 37 ● Qualified biologists would have knowledge of the natural history of the species that could  
38 occur in the study area and experience using full-spectrum acoustic equipment. During  
39 surveys, biologists would avoid unnecessary disturbance of occupied roosts.

1           ***Preconstruction Bridges and Other Structure Surveys***

2           Before work begins on the bridge/structure, qualified biologists would conduct a daytime  
3           search for bat sign and evening emergence surveys to determine if the bridge/structure is being  
4           used as a roost. Biologists conducting daytime surveys would listen for audible bat calls and  
5           would use naked eye, binoculars, and a high-powered spotlight to inspect expansion joints,  
6           weep holes, and other bridge features that could house bats. Bridge surfaces and the ground  
7           around the bridge/structure would be surveyed for bat sign, such as guano, staining, and prey  
8           remains.

9           Evening emergence surveys would consist of at least one biologist stationed on each side of the  
10          bridge/structure watching for emerging bats from a half hour before sunset to 1–2 hours after  
11          sunset for a minimum of two nights within the season that construction would be taking place.  
12          Night-vision goggles and/or full-spectrum acoustic detectors shall be used during emergence  
13          surveys to assist in species identification. All emergence surveys would be conducted during  
14          favorable weather conditions (calm nights with temperatures conducive to bat activity and no  
15          precipitation predicted).

16          Additionally, passive monitoring with full-spectrum bat detectors would be used to assist in  
17          determining species present. A minimum of four nights of acoustic monitoring surveys would be  
18          conducted within the season that the construction would be taking place. If site security allows,  
19          detectors should be set to record bat calls for the duration of each night. To the extent possible,  
20          all monitoring would be conducted during favorable weather conditions (calm nights with  
21          temperatures conducive to bat activity and no precipitation predicted). The biologists would  
22          analyze the bat call data using appropriate software and prepare a report with the results of the  
23          surveys. If acoustic data suggest that bats may be using the bridge/structure as a night roost,  
24          biologists would conduct a night survey from 1–2 hours past sunset up to 6 hours past sunset to  
25          determine if the bridge is serving as a colonial night roost.

26          If suitable roost structures would be removed, additional surveys may be required to determine  
27          how the structure is used by bats, whether it is as a night roost, maternity roosts, migration  
28          stopover, or for hibernation.

29           ***Preconstruction Tree Surveys***

30          If tree removal or trimming is necessary, qualified biologists would examine trees to be  
31          removed or trimmed for suitable bat roosting habitat. High-value habitat features (large tree  
32          cavities, basal hollows, loose or peeling bark, larger snags, palm trees with intact thatch, etc.)  
33          would be identified and the area around these features searched for bats and bat sign (guano,  
34          culled insect parts, staining, etc.). Riparian woodland, orchards, and stands of mature broadleaf  
35          trees should be considered potential habitat for solitary foliage roosting bat species.

36          If bat sign is detected, biologists would conduct evening visual emergence survey of the source  
37          habitat feature, from a half hour before sunset to 1–2 hours after sunset for a minimum of two  
38          nights within the season that construction would be taking place. Methodology should follow  
39          that described above for the bridge emergence survey.

40          Additionally, if suitable tree roosting habitat is present, acoustic monitoring with a bat detector  
41          would be used to assist in determining species present. These surveys would be conducted in  
42          coordination with the acoustic monitoring conducted for the bridge/structure.

1           ***Protective Measures for Bats using Bridges/Structures and Trees***

2           Avoidance and minimization measures may be necessary if it is determined that bats are using  
3           the bridge/structure or trees as roost sites and/or sensitive bats species are detected during  
4           acoustic monitoring. Appropriate measures would be determined in coordination with CDFW  
5           and may include measures listed below.

- 6           ● Disturbance of the bridge would be avoided between April 15 and September 15 (the  
7           maternity period) to avoid impacts on reproductively active females and dependent young.
  - 8           ● Installation of exclusion devices from March 1 through April 14 or September 15 through  
9           October 30 to preclude bats from occupying the bridge during construction. Exclusionary  
10          devices would only be installed by or under the supervision of an experienced bat biologist.
  - 11          ● Tree removal would be avoided between April 15 and September 15 (the maternity period)  
12          to avoid impacts on pregnant females and active maternity roosts (whether colonial or  
13          solitary).
  - 14          ● All tree removal would be conducted between September 15 and October 30, which  
15          corresponds to a time period when bats would not likely have entered winter hibernation  
16          and would not be caring for flightless young. If weather conditions remain conducive to  
17          regular bat activity beyond October 30<sup>th</sup>, later tree removal may be considered in  
18          consultation with CDFW.
  - 19          ● Trees would be removed in pieces, rather than felling the entire tree.
  - 20          ● If a maternity roost is located, whether solitary or colonial, that roost would remain  
21          undisturbed with a buffer as determined in consultation with CDFW until September 15 or  
22          until a qualified biologist has determined the roost is no longer active.
  - 23          ● If a non-maternity roost is found, that roost would be avoided and an appropriate buffer  
24          established in consultation with CDFW. Every effort should be made to avoid the roost, as  
25          methods to evict bats from trees are largely untested. However, if the roost cannot be  
26          avoided, eviction would be attempted and procedures designed in consultation with CDFW  
27          to reduce the likelihood of mortality of evicted bats. In all cases:
    - 28          ○ Eviction would not occur before September 15<sup>th</sup> and would match the timeframe for tree  
29          removal approved by CDFW.
    - 30          ○ Qualified biologists would carry out or oversee the eviction tasks and would monitor the  
31          tree trimming/removal.
    - 32          ○ Eviction would take place late in the day or in the evening to reduce the likelihood of  
33          evicted bats falling prey to diurnal predators.
    - 34          ○ Eviction would take place during weather and temperature conditions conducive to bat  
35          activity.
    - 36          ○ Special-status bat roosts would not be disturbed.
- 37          Eviction procedures may include but are not limited to:
- 38          ○ Pre-eviction surveys to obtain data to inform the eviction approach and subsequent  
39          mitigation requirements. Relevant data may include the species, sex, reproductive status  
40          and/or number of bats using the roost, and roost conditions themselves such as

1 temperature and dimensions. Surveys may include visual emergence, night vision,  
2 acoustic, and/or capture.

- 3 ○ Structural changes may be made to the roost, performed without harming bats, such  
4 that the conditions in the roost are undesirable to roosting bats and the bats leave on  
5 their own (e.g., open additional portals so that temperature, wind, light and  
6 precipitation regime in the roost change).
- 7 ○ Noninjurious harassment at the roost site to encourage bats to leave on their own, such  
8 as ultrasound deterrents or other sensory irritants.
- 9 ● Prior to removal/trimming, after other eviction efforts have been attempted, any confirmed  
10 roost tree would be shaken, repeatedly struck with a heavy implement such as an axe and  
11 several minutes should pass before felling trees or trimming limbs to allow bats time to  
12 arouse and leave the tree. The biologists should search downed vegetation for dead and  
13 injured bats. The presence of dead or injured bats would be reported to CDFW.

14 Compensatory mitigation for the loss of roosting habitat would also be determined through  
15 consultation with CDFW and may include the construction and installation of suitable replacement  
16 habitat onsite. Depending on the species and type of roost lost, various roost replacement habitats  
17 have met with some success (e.g., bat houses, “bat bark,” planting cottonwood trees, leaving palm  
18 thatch in place rather than trimming). The creation of natural habitat onsite is generally preferable  
19 to artificial.

20 Artificial roosts are often unsuccessful, and care must be taken to determine as closely as possible  
21 the conditions in the natural roost to be replaced. Even with such care, artificial habitat may fail.  
22 Several artificial roosts have been highly successful in replacing bridge roost habitat when  
23 incorporated into new bridge designs. “Bat bark” has been successfully used by Arizona Department  
24 of Game and Fish to create artificial crevice-roosting bat habitat mounted on pine trees (Mering and  
25 Chambers 2012: 765). Bat houses have at best an inconsistent track record but information is  
26 mounting on how to create successful houses. There is no single protocol or recipe for bat-house  
27 success. Careful study of the roost requirements of the species in question; the particular conditions  
28 at the lost roost site including temperature, orientation of the openings, airflow, internal dimensions  
29 and structures (cavity vs. crevice, etc.) should increase the chances of designing a successful  
30 replacement.

31 Restoring riparian woodland with plantings shows signs of success in Colorado. Western red bat  
32 activity has been positively correlated with increased vegetation and tree growth, canopy  
33 complexity and restoration acreage at cottonwood-willow restoration sites along the Lower  
34 Colorado River (Broderick 2012: 39). These complex woodland areas would ultimately provide a  
35 wider range of bat species with preferred roost types, including both foliage-roosting and crevice-  
36 /cavity-roosting bats.

### 37 **Impact BIO-167: Indirect Effects of Plan Implementation on Special-Status Bats**

38 Construction activities associated with water conveyance facilities, conservation components and  
39 ongoing habitat enhancement, as well as operations and maintenance of above-ground water  
40 conveyance facilities, including the transmission facilities, could result in ongoing periodic  
41 postconstruction disturbances and noise with localized effects on special-status bats and their  
42 roosting habitat over the term of the BDCP.

1 Water conveyance facilities operations and maintenance activities would include vegetation and  
2 weed control, ground squirrel control, canal maintenance, infrastructure and road maintenance,  
3 levee maintenance, and maintenance and upgrade of electrical systems. While maintenance  
4 activities are not expected to remove special-status bat habitat, operation of equipment could  
5 disturb small areas of vegetation around maintained structures and could result in disturbances to  
6 roosting bats, if present. Mitigation Measure BIO-166, *Conduct Preconstruction Surveys for Roosting*  
7 *Bats and Implement Protective Measures*, is available to address these adverse effects.

8 Increased exposure to methylmercury associated with tidal natural communities restoration would  
9 potentially indirectly affect special-status bat species. *CM12 Methylmercury Management* describes  
10 the process by which tidal natural communities restoration may increase methyl mercury levels in  
11 wetlands in the study area. Mercury has been found in high concentrations in some bat species, such  
12 as the Indiana bat. Many bat species forage heavily on aquatic insects, which might result in rapid  
13 bioaccumulation (Evers et al. 2012). Measures described in *CM12 Methylmercury Management* are  
14 expected to reduce the effects of methylmercury on special-status bat species resulting from BDCP  
15 tidal natural communities restoration.

16 **NEPA Effects:** Implementation of the Mitigation Measure BIO-166 for special-status bats would  
17 avoid the potential for substantial adverse effects on roosting special-status bats, either indirectly or  
18 through habitat modifications. This mitigation measure would also avoid and minimize effects that  
19 could substantially reduce the number of special-status bats, or restrict species' range. Therefore,  
20 the indirect effects of Alternative 1C would not have an adverse effect on special-status bats.

21 **CEQA Conclusion:** Indirect effects from conservation components operations and maintenance as  
22 well as construction-related noise and visual disturbances could have a significant impact on  
23 special-status bat species, either indirectly or through habitat modifications. Mitigation Measure  
24 BIO-166, *Conduct Preconstruction Surveys for Roosting Bats and Implement Protective Measures*,  
25 would reduce these potential impacts to a less-than-significant level and ensure that Alternative 1C  
26 would not result in a substantial reduction in numbers or a restriction in the range of species.

27 **Mitigation Measure BIO-166: Conduct Preconstruction Surveys for Roosting Bats and**  
28 **Implement Protective Measures**

29 See Mitigation Measure BIO-166 under Impact BIO-166.

30 **Impact BIO-168: Periodic Effects of Inundation of Special-Status Bat Habitat as a Result of**  
31 **Implementation of Conservation Components**

32 Flooding of the Yolo Bypass from *CM2 Yolo Bypass Fisheries Enhancement* would periodically affect  
33 324 acres of roosting habitat and 21,265 acres of foraging habitat for special-status bats in the study  
34 area (Table 12-1C-61).

35 *CM5 Seasonally Inundated Floodplain Restoration* would periodically inundate up to 411 acres of  
36 roosting habitat and 10,137 acres of foraging habitat for special-status bats (Table 12-1C-61).  
37 Potential roosting trees are likely to be retained within seasonally flooded areas, although high  
38 velocity flooding could uproot some trees. Seasonal flooding would not adversely affect foraging  
39 habitat for the species. The overall effect of seasonal inundation in existing riparian natural  
40 communities may instead be beneficial. Historically, flooding was the main natural disturbance  
41 regulating ecological processes in riparian areas, and flooding promotes the germination and  
42 establishment of many native riparian plants. In the late long-term, seasonal inundation in areas

1 currently occupied by riparian vegetation may contribute to the establishment of high-value habitat  
2 for special-status bats that use riparian habitats.

3 **NEPA Effects:** Periodic effects on roosting and foraging habitat for special-status bats associated  
4 with implementing Alternative 1C are not expected to result in substantial adverse effects on  
5 special-status bats, either directly or through habitat modifications and would not result in a  
6 substantial reduction in numbers or a restriction in the range of special-status bats. Mitigation  
7 Measure BIO-166, *Conduct Preconstruction Surveys for Roosting Bats and Implement Protective*  
8 *Measures*, is available to address any effects of periodic inundation on special-status bats and  
9 roosting habitat. Therefore, Alternative 1C would not adversely affect the species.

10 **CEQA Conclusion:** Periodic inundation under CM2 and floodplain restoration under CM5 would  
11 periodically affect foraging and roosting habitat for special-status bats in the study area. Any impact  
12 of periodic inundation on special-status bats would be mitigated through implementation of  
13 Mitigation Measure BIO-166, which would ensure there is no significant impact on roosting special-  
14 status bats, either directly or through habitat modifications and no substantial reduction in numbers  
15 or a restriction in the range of special-status bats.

16 **Mitigation Measure BIO-166: Conduct Preconstruction Surveys for Roosting Bats and**  
17 **Implement Protective Measures**

18 See discussion of Mitigation Measure BIO-166 under Impact BIO-166.

19 **Plant Species**

20 **Vernal Pool Plants**

21 Five covered plant species and 12 noncovered special-status plant species occur in vernal pools in  
22 the study area (Tables 12-2, 12-3, summarized in Table 12-1C-62). The vernal pool habitat model  
23 used for the impact analysis was based on vegetation types and associations from various data sets  
24 which were used to create maps showing the distribution of vernal pool habitat in the study area  
25 according to three habitat types in which the species are known to occur, including vernal pool  
26 complex and degraded vernal pool complex, and alkali seasonal wetland habitat. Vernal pool  
27 complex habitat consists of vernal pools and uplands that display characteristic vernal pool and  
28 swale visual signatures that have not been significantly impacted by agricultural or development  
29 practices. Degraded vernal pool complex habitat consists of habitat that ranges from areas with  
30 vernal pool and swale visual signatures that display clear evidence of significant disturbance due to  
31 plowing, discing, or leveling to areas with clearly artificial basins such as shallow agricultural  
32 ditches, depressions in fallow fields, and areas of compacted soils in pastures. Because wetlands in  
33 the degraded vernal pool complex are inundated during the wet season and may have historically  
34 been located in or near areas with natural vernal pool complex, they may support individuals or  
35 small populations of species that are found in vernal pools and swales. However, they do not possess  
36 the full complement of ecosystem and community characteristics of natural vernal pools, swales and  
37 their associated uplands and they are generally ephemeral features that are eliminated during the  
38 course of normal agricultural practices. A small amount of alkali seasonal wetland habitat was  
39 included in the model because alkaline vernal pools are also present in some areas mapped as alkali  
40 seasonal wetland.

41 Because each of the vernal pool species addressed in this EIR/EIS have specific microhabitat  
42 affinities, and because vernal pool habitat within the study area is highly heterogeneous with

respect to habitat parameters such as soil type and pool depth, the vernal pool habitat model greatly overestimates the extent of habitat in the study area occupied by each species. However, the vernal pool habitat model is likely to encompass all or most of the potential area within which special-status vernal pool plant species would occur. Therefore, it is not likely to underestimate the extent of occupied habitat or to underestimate the effects of Alternative 1C.

Full implementation of Alternative 1C would include the following conservation actions over the term of the BDCP to benefit covered vernal pool plants (BDCP Chapter 3, Section 3.3, *Biological Goals and Objectives*).

- Protect two currently unprotected occurrences of alkali milk-vetch in the Altamont Hills or Jepson Prairie core recovery areas (Objective VPP1.1, associated with CM3).
- Maintain no net loss of Heckard’s peppergrass in Conservation Zones 1, 8, or 11 within restoration sites or within the area of affected tidal range of restoration projects (Objective VPP1.2, associated with CM3 and CM9).

The construction and restoration activities covered under Alternative 1C could have impacts on special-status vernal pool plants. Modeled habitat is within the proposed footprint for the Alternative 1C water conveyance facilities and within the hypothetical footprints for restoration activities. In addition, three known occurrence of a covered plant species and two known occurrences of a noncovered plant species are within the proposed footprint for the Alternative 1C water conveyance facilities. Table 12-1C-62 summarizes the acreage of modeled vernal pool habitat in the study area, the number of occurrences of each special-status vernal pool plant in the study area, and potential effects.

**Table 12-1C-62. Summary of Impacts on Vernal Pool Plants under Alternative 1C**

	Acres in Study Area	Acres Affected	Occurrences in Study Area	Occurrences Affected	Impacts
<b>Modeled Habitat</b>					
Vernal pool complex	9,557	61	0	0	Habitat loss from construction of water conveyance facilities and tidal restoration
Degraded vernal pool complex	2,493	376	0	0	Habitat loss from construction of water conveyance facilities and tidal restoration
Alkali Seasonal Wetland	188	15	0	0	Habitat loss from construction of water conveyance facilities
<b>Total</b>	<b>12,238</b>	<b>452</b>	<b>0</b>	<b>0</b>	
<b>Covered Species</b>					
Alkali milk-vetch	0	0	16	1	Occurrences affected by construction of water conveyance facilities
Dwarf downingia	0	0	12	0	None
Boggs Lake hedge-	0	0	1	0	None

	Acres in Study Area	Acres Affected	Occurrences in Study Area	Occurrences Affected	Impacts
hyssop					
Legenere	0	0	8	0	None
Heckard's peppergrass	0	0	4 <sup>a</sup>	0	None
<b>Noncovered Species</b>					
Ferris' milk-vetch	0	0	6	2	Occurrences affected by construction of water conveyance facilities
Vernal pool smallscale	0	0	2	0	None
Hogwallow starfish	0	0	0	0	None
Ferris' goldfields	0	0	4	2	Occurrences affected by construction of water conveyance facilities
Contra Costa goldfields	0	0	7	0	None
Cotula-leaf navarretia	0	0	5	0	None
Baker's navarretia	0	0	3	0	None
Colusa grass	0	0	1	0	None
Bearded popcorn-flower	0	0	4	0	None
Delta woolly marbles	0	0	3	0	None
Saline clover	0	0	9	0	None
Solano grass	0	0	1	0	None

<sup>a</sup> One additional occurrence is in alkali seasonal wetlands.

1

2 **Impact BIO-169: Effects on Habitat and Populations of Vernal Pool Plants**

3 Alternative 1C could affect habitat for special-status vernal pool plants and occurrences of two  
4 vernal pool plant species. The individual effects of each relevant conservation measure are  
5 addressed below. A summary statement of the combined impacts and NEPA and CEQA conclusions  
6 follows the individual conservation measure discussions.

- 7
- 8 • *CM1 Water Facilities and Operations*: Eighty acres of modeled habitat in CZ 8 are within the  
9 proposed footprint for the Alternative 1C water conveyance facilities, including 5.5 acres of  
10 critical habitat for Contra Costa goldfields, one known occurrence of alkali milk-vetch, two  
11 known occurrences of Ferris' milk-vetch, and two known occurrences of Ferris' goldfields.  
12 Construction and operation of the water conveyance facilities would not affect known  
13 occurrences of the other four covered vernal pool plants or the other 11 noncovered special-  
14 status plants. Under Alternative 1C, construction and operation of the water conveyance  
15 facilities could affect undiscovered occurrences of the five covered vernal pool plants or the 12  
16 noncovered special-status plants. In addition, construction of the west transmission line option  
17 could affect potential habitat and undocumented occurrences of special-status vernal pool  
18 plants, including Ferris' milkvetch, Baker's meadowfoam, bearded popcornflower, Delta woolly  
19 marbles, and saline clover.
  - 20 • *CM2 Yolo Bypass Fisheries Enhancement*: No modeled vernal pool habitat and no known  
occurrences of special-status vernal pool plant species are within the hypothetical footprint for

1 construction or operation of the Yolo Bypass fisheries enhancements. Construction and  
2 operation of the Yolo Bypass fisheries enhancements would not affect the 17 covered or  
3 noncovered vernal pool plants.

- 4 ● *CM3 Natural Communities Protection and Restoration*: The BDCP proposes to benefit covered  
5 vernal pool plants by protecting 600 acres of vernal pool complex in CZs 1, 8, and 11 (Objective  
6 VPNC1.1). The protected vernal pool habitat would be managed and enhanced to sustain  
7 populations of native vernal pool species. These benefits also would accrue to any noncovered  
8 vernal pool plants occurring in the protected vernal pool complex.
- 9 ● *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration would result in the  
10 inundation of an estimated acres of vernal pool complex and would, therefore, potentially affect  
11 special-status vernal pool plants. However, most of this habitat (370acres) consists of degraded  
12 vernal pool habitat that is unlikely to contain special-status plants. In addition, 257.8 acres of  
13 critical habitat for Contra Costa goldfields could be affected. No known occurrences of covered  
14 and noncovered vernal pool plants would be affected by tidal restoration.
- 15 ● *CM5 Seasonally Inundated Floodplain Restoration*: No vernal pool habitat or occurrences of  
16 special-status vernal pool plants are present within areas proposed for floodplain restoration.  
17 Therefore, floodplain restoration and construction of new floodplain levees would have no  
18 impacts on covered and noncovered vernal pool plants.
- 19 ● *CM6 Channel Margin Enhancement*: No vernal pool habitat or occurrences of special-status  
20 vernal pool plants are present within areas proposed for channel margin habitat enhancement.  
21 Therefore, channel margin habitat enhancement would have no impacts on covered and  
22 noncovered vernal pool plants.
- 23 ● *CM7 Riparian Natural Community Restoration*: No vernal pool habitat or occurrences of special-  
24 status vernal pool plants are present within areas proposed for riparian habitat enhancement.  
25 Therefore, riparian habitat enhancement would have no impacts on covered and noncovered  
26 vernal pool plants.
- 27 ● *CM8 Grassland Natural Community Restoration*: Although the vernal pool complex habitat  
28 includes grassland matrix within which the vernal pools occur, grassland restoration activities  
29 would take place in non-grasslands (ruderal habitat, cultivated land) or degraded grasslands  
30 that are not included within vernal pool complex habitat. Therefore, grassland communities  
31 restoration would have no impacts on covered and noncovered vernal pool plants.
- 32 ● *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*: If, through unforeseen  
33 circumstances, BDCP activities result in the net loss of vernal pool habitat, CM9 would be  
34 implemented to compensate for that loss. Because vernal pool complex restoration would focus  
35 on habitat that had been cleared and leveled but maintained an intact duripan or claypan, the  
36 likelihood of affecting any special-status vernal pool plants would be low. However, vernal pool  
37 restoration could adversely affect remnant populations of special-status vernal pool plants or  
38 potentially affect vernal pool habitat adjacent to the restoration areas.
- 39 ● *CM10 Nontidal Marsh Restoration*: Nontidal marsh restoration would take place through  
40 conversion of cultivated lands. Therefore, nontidal marsh restoration would avoid vernal pool  
41 habitat and would have no impacts on covered and noncovered vernal pool plants.
- 42 ● *CM22 Avoidance and Minimization Measures*: Effects on covered vernal pool plants potentially  
43 resulting from implementation of CM4 would be avoided or minimized though *AMM11 Covered*

1 *Plant Species, AMM12 Vernal Pool Crustaceans, AMM30 Transmission Line Design and Alignment*  
2 *Guidelines, and AMM37 Recreation. AMM2 Construction Best Management Practices and*  
3 *Monitoring.* AMM11 prohibits ground disturbance or hydrologic disturbance within 250 feet of  
4 existing vernal pools. In addition, AMM11 specifies that individual projects be designed to avoid  
5 critical habitat for listed plant and wildlife vernal pool species. *AMM12 Vernal Pool Crustaceans*  
6 also requires that that tidal natural communities restoration or other ground-disturbing  
7 covered activities in Conservation Zones 1 and 11 will not result in the adverse modification of  
8 primary constituent elements of critical habitat for vernal pool fairy shrimp, conservancy fairy  
9 shrimp, and vernal pool tadpole shrimp. These protections would also apply to critical habitat  
10 for Contra Costa goldfields, where it overlaps with critical habitat for these vernal pool  
11 crustaceans. AMM12 limits the direct removal of vernal pool crustacean habitat to no more than  
12 10 wetted acres and the indirect effect to no more than 20 wetted acres through the life of the  
13 Plan. AMM30 specifies that the alignment of proposed transmission lines will be designed to  
14 avoid sensitive terrestrial and aquatic habitats when siting poles and towers, to the maximum  
15 extent feasible. Effects on alkali milk-vetch would be avoided or minimized though  
16 implementation of AMM11 and AMM30. AMM37 requires that new recreation trails avoid  
17 populations of covered vernal pool plants.

18 In addition, the BDCP includes species-specific goals to benefit covered vernal pool plants. This  
19 includes protecting two occurrences of alkali milkvetch (Objective VPP1.1) and requiring no net loss  
20 of Heckard's peppergrass (Objective VPP1.2).

21 In summary, adverse effects on covered vernal pool plants could occur from implementing  
22 Alternative 1C. One known occurrence of alkali milk-vetch that could be affected under the current  
23 project design would be surveyed to establish the occurrence limits and to redesign the project to  
24 avoid affecting the occurrences, but only to the extent feasible. Beneficial effects on special-status  
25 vernal pool plants could occur by protecting 600 acres of vernal pool complex in CZs 1, 8, and 11 and  
26 by protecting occurrences of alkali milk-vetch. However, conservation measures that benefit or  
27 protect covered species do not apply to noncovered species, and two occurrences of Ferris' milk-  
28 vetch and two occurrences of Ferris' goldfields at Byron Tract Forebay would be adversely affected.

29 The GIS analysis estimated that up to 437 acres of vernal pool complex could be adversely affected  
30 by covered activities under Alternative 1C. However, the actual effect on habitat for special-status  
31 vernal pool plants is expected to be much less than the estimated impact because the BDCP limits  
32 the total loss of wetted vernal pool habitat resulting from specific projects to 10 acres  
33 (approximately 67 acres of vernal pool complex) over the permit term (AMM12). At the proposed  
34 restoration ratios of 1:1 (prior to impact) and 1.5:1 (concurrent with impact), between 67 and 100.5  
35 acres of vernal pool complex restoration would be required to compensate for the loss of modeled  
36 habitat for special-status vernal pool plants (Objective VPNC1.2, associated with CM9). This would  
37 be consistent with typical NEPA and CEQA project-level mitigation ratios for vernal pool impacts.  
38 Because most of the vernal pool habitat restoration would be applied to compensating for impacts of  
39 CM1, the limitation on the loss of wetted vernal pool habitat would prevent implementation of tidal  
40 restoration projects that are adjacent to vernal pool complex, which could affect the feasibility of  
41 restoring 65,000 acres of tidal habitat (Objective TPANC1.1, associated with CM4).

42 **NEPA Effects:** The loss of modeled habitat for vernal pool plant species would be minimized by  
43 AMM12 and offset through CM9. Impacts on one occurrence of a covered vernal pool plant, alkali  
44 milk-vetch, could be avoided by project design. The loss of two occurrences of Ferris' milk-vetch and  
45 two occurrences of Ferris' goldfields, both noncovered species, would result in a reduction in the

1 range and numbers of this species and would be an adverse effect. Implementation of Mitigation  
2 Measure BIO-170 for Ferris' milk-vetch and Ferris' goldfields could offset or avoid this effect. With  
3 avoidance and minimization, Alternative 1C would not result in adverse effects on covered and  
4 noncovered vernal pool plant species. If the impacts could only be mitigated through project design,  
5 and project design changes are infeasible, then the effects would be adverse.

6 **CEQA Conclusion:** Because loss of modeled habitat for vernal pool plant species would be offset  
7 through restoration, and because impacts on occurrences of covered vernal pool plants would be  
8 avoided, the impacts of Alternative 1C on 15 covered and noncovered special-status vernal pool  
9 plants in the study area would be less than significant. However, construction of the water  
10 conveyance facilities could result in the reduction in numbers and range of Ferris' milk-vetch and  
11 Ferris' goldfields, which would be significant impacts. Mitigation Measure BIO-32, *Restore and*  
12 *Protect Vernal Pool Crustacean Habitat*, and Mitigation Measure BIO-170, *Avoid, Minimize, or*  
13 *Compensate for Impacts on Noncovered Special-Status Plant Species*, would reduce these impacts to a  
14 less-than-significant level. If the impacts could only be mitigated through project design, and project  
15 design changes are infeasible, then the impacts would be significant.

#### 16 **Mitigation Measure BIO-32: Restore and Protect Vernal Pool Crustacean Habitat**

17 See discussion of Mitigation Measure BIO-32 under Impact BIO-32.

#### 18 **Mitigation Measure BIO-170: Avoid, Minimize, or Compensate for Impacts on Noncovered** 19 **Special-Status Plant Species**

20 DWR will evaluate all projects for their impacts on special-status plants, avoid or minimize  
21 impacts on species that occur on project sites, and compensate for impacts on species. All  
22 impacts on federally listed noncovered species, diamond-petaled California poppy, or caper-  
23 fruited tropidocarpum shall be avoided. Impacts on other special-status plant species shall be  
24 avoided to the extent feasible, and any unavoidable impacts shall be compensated for.

- 25 ● DWR shall conduct surveys for the special-status plant species within and adjacent to all  
26 project sites. Special-status plant surveys required for project-specific permit compliance  
27 will be conducted during the planning phase to allow design of the individual restoration  
28 projects to avoid adverse modification of habitat for specified covered plants. The purpose  
29 of these surveys will be to verify that the locations of special-status plants identified in  
30 previous record searches or surveys are extant, identify any new special-status plant  
31 occurrences, and cover any portions of the project area not previously surveyed. The extent  
32 of mitigation of direct loss of or indirect effects on special-status plants will be based on  
33 these survey results.
- 34 ● All surveys shall be conducted by qualified biologists using the using *Guidelines for*  
35 *Conducting and Reporting Botanical Inventories for Federally Listed, Proposed and Candidate*  
36 *Plants* (U.S. Fish and Wildlife Service 1996) and *Protocols for Surveying and Evaluating*  
37 *Impacts to Special Status Native Plant Populations and Natural Communities* (California  
38 Department of Fish and Game 2009) during the season that special-status plant species  
39 would be evident and identifiable, i.e., during their blooming season. Locations of special-  
40 status plants in proposed construction areas will be recorded using a GPS unit and flagged.
- 41 ● The construction monitoring plan for the protection of covered fish, wildlife, and plant  
42 species, prepared by DWR before implementing an approved project, will provide for

1 construction activity monitoring in areas identified during the planning stages and  
2 species/habitat surveys as having noncovered special-status plant species.

- 3 ● Where surveys determine that a special-status plant species is present in or adjacent to a  
4 project site, direct and indirect impacts of the project on the species shall be avoided  
5 through the establishment of activity exclusion zones, within which no ground-disturbing  
6 activities shall take place, including construction of new facilities, construction staging, or  
7 other temporary work areas. Activity exclusion zones for special-status plant species shall  
8 be established around each occupied habitat site, the boundaries of which shall be clearly  
9 marked with standard orange plastic construction exclusion fencing or its equivalent. The  
10 establishment of activity exclusion zones shall not be required if no construction-related  
11 disturbances will occur within 250 feet of the occupied habitat site. The size of activity  
12 exclusion zones may be reduced through consultation with a qualified biologist and with  
13 concurrence from USFWS or CDFW based on project site-specific conditions.
- 14 ● Where avoidance of impacts on a special-status plant species is infeasible, DWR will  
15 compensate for loss of individuals or occupied habitat of a special-status plant species  
16 through the acquisition, protection, and subsequent management in perpetuity of other  
17 existing occurrences at a 2:1 ratio (occurrences affected:occurrences preserved). DWR will  
18 provide detailed information to USFWS and CDFW on the location of the preserved  
19 occurrences, quality of the preserved habitat, feasibility of protecting and managing the  
20 areas in-perpetuity, responsible parties, and other pertinent information. If suitable  
21 occurrences of a special-status plant species are not available for preservation, then the  
22 project shall be redesigned to remove features that would result in impacts on that species.

### 23 **Alkali Seasonal Wetland Plants**

24 Five covered species and three noncovered plants occur in alkali seasonal wetlands in the study area  
25 (Tables 12-2, 12-3, summarized in Table 12-1C-63). Alkali seasonal wetland habitat was modeled  
26 separately for four covered plant species occurring in seasonal alkali wetlands.

27 The San Joaquin spearscale habitat model approximated the distribution of suitable San Joaquin  
28 spearscale habitat in the study area according to the species' preferred habitat types, intersected  
29 with soil series and slope position. Historical and current records of San Joaquin spearscale in the  
30 study area indicate that its current distribution is limited to alkaline soil areas with shallow basin or  
31 swale microtopography along the western border. The vegetation cover of the alkaline soils is  
32 typically a combination of alkaline soil-adapted species and annual grasses, including annual  
33 ryegrass and Mediterranean barley. Habitat types used for the model included alkali seasonal  
34 wetlands, vernal pool complex, and grasslands. Soil series used in the model consisted of either clays  
35 or clay loams with alkaline horizons. San Joaquin spearscale typically occurs in swales or in level  
36 terrain but occasionally occurs on the lower slopes adjacent to streams or swales or where seeps are  
37 present. Because some of the soil series with which San Joaquin spearscale is associated can occur  
38 on hillsides, slope was used to limit the extent of the model to the toe of the slope where these soils  
39 occur by excluding areas with slope greater than 1%. Land uses that are incompatible with the  
40 species' habitat requirements, such as modeled habitat polygons falling on leveled or developed  
41 lands, were removed from the model.

42 Modeled habitat for brittlescale was mapped as hydrologic features such as stream corridors and  
43 playa pools located on alluvium associated with the Montezuma Block along the western boundary  
44 of the study area or on alluvium associated with tertiary formations located along the southwest

1 boundary of the study area. Stream corridors (intermittent and perennial) that intersected these  
2 geologic units were selected and truncated at the point at which they encountered the upper  
3 elevation of intertidal marsh. The corridors were buffered 50 feet (15.2 meters) on either side of  
4 their centerlines to capture the estimated maximum extent of alluvium deposits in proximity to the  
5 streams. Mapped habitat that was occupied by urban or intensive agricultural uses was removed  
6 from the model.

7 The habitat model for heartscale was based on the species distribution in the study area (Solano and  
8 Yolo Counties) and on the soil types and plant communities within which it occurs. Potential habitat  
9 was determined by intersecting the GIS coverage for three parameters: 1) Yolo and Solano County  
10 boundaries; 2) Solano, Pescadero, and Willows soils; and 3) grassland, alkali seasonal wetland, and  
11 vernal pool complex natural communities. The model excluded areas that have been developed or  
12 cultivated, i.e., where the topography, soils, and hydrology have been substantially altered.

13 Delta button-celery habitat was modeled as alkali seasonal wetland complex, vernal pool complex,  
14 other natural seasonal wetland, and grassland occurring on Brentwood, Grangerville, Marcuse,  
15 Solano, and Vernalis soil map units within the San Joaquin Basin (i.e., south of the mainstem San  
16 Joaquin River). For this species, land cover north of the Discovery Bay area where intensive  
17 agriculture was classified as annual grassland were manually deleted from the area of predicted  
18 habitat. Additionally, other areas of potential habitat that have been developed were also manually  
19 deleted.

20 Full implementation of Alternative 1C would include the following conservation actions over the  
21 term of the BDCP to benefit covered alkali seasonal wetland plants (BDCP Chapter 3, Section 3.3,  
22 *Biological Goals and Objectives*).

- 23 ● Of the 150 acres of alkali seasonal wetland complex protected under Objective ASWNC1.1, 600  
24 acres of vernal pool complex protected under Objective VPNC1.1, and 8,000 acres of grassland  
25 natural community protected under Objective GNC1.1, protect 75 acres of suitable brittlescale  
26 habitat and 75 acres of suitable heartscale habitat in Conservation Zones 1, 8, or 11 (Objective  
27 BRIT/HART/SJSC1.1, associated with CM3).
- 28 ● Protect two currently unprotected occurrences of San Joaquin spearscale in Conservation Zones  
29 1, 8, or 11 (Objective BRIT/HART/SJSC1.2, associated with CM3).

30 Alternative 1C would have adverse effects on modeled habitat for San Joaquin spearscale,  
31 brittlescale, heartscale, and Delta button-celery. It would also have adverse effects on occurrences of  
32 heartscale, Heckard's peppergrass, crownscale and recurved larkspur. Table 12-1C-63 summarizes  
33 the acreage of modeled alkali seasonal wetland habitat in the study area, the number of occurrences  
34 of each special-status alkali seasonal wetland plant in the study area, and potential impacts.

1 **Table 12-1C-63. Summary of Impacts on Seasonal Alkali Wetland Plants under Alternative 1C**

	Acres in Study Area	Acres Affected	Occurrences in Study Area	Occurrences Affected	Impacts
<b>Habitat</b>					
San Joaquin spearscale	14,933	823	0	0	Habitat loss from construction of water conveyance facilities, construction of Yolo Bypass fisheries enhancements, tidal habitat restoration, and floodplain restoration levee construction
Brittlescale modeled habitat	451	5	0	0	Habitat loss from construction of water conveyance facilities and tidal habitat restoration
Heartscale modeled habitat	6,528	307	0	0	Habitat loss from tidal habitat restoration
Delta button celery modeled habitat	3,361 <sup>a</sup>	130	0	0	Habitat loss from construction of water conveyance facilities
Alkali seasonal wetlands	3,723	94	0	0	Habitat loss from construction of water conveyance facilities, tidal restoration and Yolo Bypass fisheries enhancements
<b>Covered Species</b>					
San Joaquin spearscale	0	0	19	3	Occurrences affected by construction of water conveyance facilities and tidal habitat restoration
Brittlescale	0	0	8	0	None
Heartscale	0	0	3	1	Population loss from transmission line construction
Delta button celery	0	0	1 <sup>b</sup>	0	None
Heckard's peppergrass	0	0	1 <sup>c</sup>	1	Occurrence affected by tidal habitat restoration
<b>Noncovered Species</b>					
Crownscale	0	0	17	2	Occurrences affected by construction of water conveyance facilities
Palmate-bracted bird's-beak	0	0	1	0	None
Recurved larkspur	0	0	4	1	Occurrence affected by construction of water conveyance facilities

<sup>a</sup> A portion of this acreage consists of riparian habitat.

<sup>b</sup> A second occurrence in study area is in riparian habitat.

<sup>c</sup> Four additional occurrences of Heckard's peppergrass are associated with vernal pools.

2

## 1 **Impact BIO-170: Effects on Habitat and Populations of Alkali Seasonal Wetland Plants**

2 Modeled habitat for San Joaquin spearscale, Delta button-celery and brittlescale would be adversely  
3 affected by construction of the Alternative 1C water conveyance facilities. Two populations of San  
4 Joaquin spearscale, one population of crownscale, and one population of recurved larkspur also  
5 would be adversely affected by construction of the water conveyance facilities. Modeled habitat for  
6 brittlescale and heartscale could be adversely affected by tidal habitat restoration. One occurrence  
7 each of heartscale and Heckard's peppergrass could be affected by tidal habitat restoration. No  
8 adverse effects on palmate-bracted bird's-beak would be expected.

9 The individual effects of each relevant conservation measure are addressed below. A summary  
10 statement of the combined impacts and NEPA and CEQA conclusions follows the individual  
11 conservation measure discussions.

- 12 • *CM1 Water Facilities and Operations:* Under Alternative 1C, construction of the canal and  
13 associated facilities would permanently remove 144 acres of modeled habitat for San Joaquin  
14 spearscale, 130 acres of modeled habitat for Delta button-celery, and 1 acre of modeled habitat  
15 for brittlescale. This could be an adverse effect, depending on whether the affected modeled  
16 habitat is actually occupied by the species. Modeled habitat is assumed to encompass all  
17 potential habitat for a species and may therefore overestimate the area actually occupied. Two  
18 occurrences of San Joaquin spearscale, two occurrences of crownscale, and one occurrence of  
19 recurved larkspur would be affected near the Clifton Court Forebay by construction of the canal.  
20 Delta button-celery is not known to occur in CZ 8; the nearest known occurrence, in CZ 9, would  
21 not be affected.

22 Construction of the water conveyance facilities would permanently remove 0.2 acre of habitat  
23 occupied by crownscale at the Byron Tract Forebay. Part of the occurrence would be removed,  
24 but most of the occurrence would not be directly affected. However, a reduction of the  
25 population size, both in area and number of individuals present, would be an adverse impact.

26 Construction of the west transmission line option could affect one occurrence of heartscale  
27 along Goose Haven Road.

28 Construction of the water conveyance facilities would not affect Heckard's peppergrass, or  
29 palmate-bracted bird's-beak.

- 30 • *CM2 Yolo Bypass Fisheries Enhancement:* Construction of the Yolo Bypass improvements would  
31 permanently remove 56 acres of modeled habitat for San Joaquin spearscale. No known  
32 occurrences of San Joaquin spearscale would be affected. No modeled habitat and no known  
33 occurrences of the seven other alkali seasonal wetland plants are within the hypothetical  
34 footprint for construction or operation of the Yolo Bypass fisheries enhancements.
- 35 • *CM3 Natural Communities Protection and Restoration:* The BDCP proposes to benefit alkali  
36 seasonal wetland plants by protecting 150 acres of alkali seasonal wetland in Conservation  
37 Zones 1, 8, and/or 11. The protected alkali seasonal wetland habitat would be managed and  
38 enhanced to sustain populations of native plant species.
- 39 • *CM4 Tidal Natural Communities Restoration:* Tidal habitat restoration is expected to convert  
40 alkali seasonal wetlands on the margins of tidal wetlands to freshwater or brackish tidal marsh.  
41 Tidal habitat restoration would convert 622 acres of modeled habitat for San Joaquin spearscale  
42 to tidal marsh. Tidal habitat restoration would permanently remove 4 acres of modeled habitat  
43 for brittlescale in CZ 1 near Lindsey Slough and in CZ 11 near Nurse Slough; however, the BDCP

1 would allow up to 50 acres of modeled habitat to be converted to tidal wetlands. Tidal habitat  
2 restoration would remove 306 acres of modeled habitat for heartscale in CZ 1 in the vicinity of  
3 Jepson Prairie and in CZ 11 adjacent to Suisun Marsh. The extent to which the modeled habitat is  
4 actually occupied by these species is not known; modeled habitat is assumed to encompass all  
5 potential habitat for a species and may therefore overestimate the area actually occupied. Tidal  
6 habitat restoration could adversely affect one occurrence of Heckard's peppergrass at Hass  
7 Slough and one occurrence of San Joaquin spearscale at Main Prairie, both in CZ 1. These  
8 occurrences are based on historic records, and the whether the populations still exist is not  
9 known. In each case, the loss of modeled habitat and occurrences for covered species would be  
10 adverse effects. Delta button celery, crownscale, palmate-bracted bird's-beak, and recurved  
11 larkspur would not be affected by tidal habitat restoration.

- 12 ● *CM5 Seasonally Inundated Floodplain Restoration*: Floodplain restoration levee construction  
13 would result in the removal of 2 acres of modeled habitat for San Joaquin spearscale. No known  
14 occurrences of San Joaquin spearscale would be affected. No other alkali seasonal wetland  
15 habitat or occurrences of special-status alkali seasonal wetland plants are present within areas  
16 proposed for floodplain restoration. Therefore, floodplain restoration and construction of new  
17 floodplain levees would have no impacts on covered and noncovered alkali seasonal wetland  
18 plants.
- 19 ● *CM6 Channel Margin Enhancement*: No alkali seasonal wetland habitat or occurrences of special-  
20 status alkali seasonal wetland plants are present within areas proposed for channel margin  
21 habitat enhancement. Therefore, channel margin habitat enhancement would have no impacts  
22 on covered and noncovered alkali seasonal wetland plants.
- 23 ● *CM7 Riparian Natural Community Restoration*: No alkali seasonal wetland habitat or occurrences  
24 of special-status alkali seasonal wetland plants are present within areas proposed for riparian  
25 habitat enhancement. Therefore, riparian habitat enhancement would have no impacts on  
26 covered and noncovered alkali seasonal wetland plants.
- 27 ● *CM8 Grassland Natural Community Restoration*: Although the alkali seasonal wetland habitat  
28 includes the grassland matrix within which the wetlands occur, grassland restoration activities  
29 would take place in non-grasslands (ruderal habitat, cultivated land) or degraded grasslands  
30 that are not included within alkali seasonal wetland habitat. Therefore, grassland communities  
31 restoration would have no impacts on covered and noncovered alkali seasonal wetland plants.
- 32 ● *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*: Although some vernal pools  
33 are alkaline, alkali seasonal wetlands in the study area consist of alkali grassland, alkali meadow,  
34 or iodine bush scrub. Therefore, vernal pool restoration would avoid alkali seasonal wetland  
35 habitat and would have no impacts on covered and noncovered alkali seasonal wetland plants.  
36 In addition, the BDCP would compensate for the loss of alkali seasonal wetlands from other  
37 conservation measures by restoring or creating 72 acres of alkali seasonal wetlands in  
38 Conservation Zones 1, 8, or 11 to achieve no net loss of this habitat.
- 39 ● *CM10 Nontidal Marsh Restoration*: Nontidal marsh restoration would take place through  
40 conversion of cultivated lands. Therefore, nontidal marsh restoration would avoid alkali  
41 seasonal wetland habitat and would have no impacts on covered and noncovered alkali seasonal  
42 wetland plants.
- 43 ● *CM22 Avoidance and Minimization Measures*: Effects on special-status alkali seasonal wetland  
44 plants potentially resulting from implementation of CM1 and CM4 would be avoided or

1 minimized though *AMM11 Covered Plant Species*, *AMM2 Construction Best Management Practices*  
2 *and Monitoring*, *AMM12 Vernal Pool Crustaceans*, *AMM30 Transmission Line Design and*  
3 *Alignment Guidelines*, and *AMM37 Recreation*. Under AMM11, surveys for covered plant species  
4 would be performed during the planning phase of projects, and any impacts on populations of  
5 covered species would be avoided through project design or subsequently minimized through  
6 AMM2. In addition, AMM11 prohibits ground disturbance or hydrologic disturbance within 250  
7 feet of existing vernal pools, which would protect those species with modeled habitat that  
8 includes vernal pool complex. Occurrences of covered species in vernal pools near tidal  
9 wetlands would not be affected by tidal habitat restoration where critical habitat for vernal pool  
10 species is present and would be avoided under AMM11. AMM30, which specifies that the  
11 alignment of proposed transmission lines will be designed to avoid sensitive terrestrial and  
12 aquatic habitats when siting poles and towers, to the maximum extent feasible, would avoid  
13 some impacts on San Joaquin spearscale. AMM37 requires that new recreation trails avoid  
14 populations of covered alkali seasonal wetland plants.

15 In summary, two known occurrences of a special-status alkali seasonal wetland species  
16 (crownscale) would be affected under Alternative 1C, although one historic occurrence of Heckard's  
17 peppergrass and one historic occurrence of San Joaquin spearscale could be affected by tidal  
18 restoration activities, if those occurrences still exist. AMM11 would be implemented to avoid an  
19 adverse effect on the Heckard's peppergrass and San Joaquin spearscale occurrences.

20 The primary effect of Alternative 1C on special-status alkali seasonal wetland plants would be the  
21 loss of potential (i.e., modeled) habitat for San Joaquin spearscale, brittlescale, heartscale, and Delta  
22 button-celery. Approximately 72 acres of this habitat loss would be alkali seasonal wetlands. The  
23 actual effect on modeled habitat for alkali seasonal wetland plants is expected to be somewhat less  
24 than the estimated impact because some of this habitat is composed of vernal pool complex, and the  
25 BDCP limits the total loss of wetted vernal pool habitat to 10 acres (approximately 67 acres of vernal  
26 pool complex) over the permit term (AMM12). Loss of modeled habitat would be compensated for  
27 by restoring or creating vernal pool complex, alkali seasonal wetlands, and grasslands, in proportion  
28 to the amount of each habitat removed. At the proposed restoration ratios of 1:1 (prior to impact)  
29 and 1.5:1 (concurrent with impact), between 67 and 100.5 acres of vernal pool complex restoration  
30 would be required to compensate for the loss of modeled habitat composed of vernal pool complex  
31 (Objective VPNC1.2, associated with CM9). Approximately 72 acres of alkali seasonal wetlands  
32 would be restored (Objective ASWC1.2, associated with CM9). Loss of modeled habitat composed of  
33 grasslands would be compensated for by restoring grassland habitat on a 1:1 basis (Objective  
34 GNC1.1, associated with CM8). These compensation levels would be consistent with typical NEPA  
35 and CEQA project-level mitigation ratios for impacts on vernal pools, alkali seasonal wetlands, and  
36 grasslands.

37 The BDCP would have a small beneficial effect on special-status alkali seasonal wetland plants by  
38 protecting 150 acres of alkali seasonal wetland habitat. The BDCP also includes the species-specific  
39 goal that 75 acres would be modeled habitat for brittlescale and heartscale (Objective  
40 BRIT/HART/SJSC1.1) and another goal that would protect 2 occurrences of San Joaquin spearscale  
41 (Objective BRIT/HART/SJSC1.2). The benefits of habitat protection and management also would  
42 accrue to any noncovered alkali seasonal wetland plants occurring in the protected habitat. Because  
43 conservation measures that protect covered species do not apply to noncovered species, the loss of  
44 portions of the crownscale and recurved larkspur populations at Byron Tract Forebay would be an  
45 adverse effect.

1 **NEPA Effects:** Under Alternative 1C, loss of modeled habitat for alkali seasonal wetland plant species  
2 would be offset through restoration of grassland, vernal pool, and alkali seasonal wetland habitat  
3 (CM8, CM9). Impacts on one occurrence of San Joaquin spearscale and one occurrence of Heckard's  
4 peppergrass would be avoided through AMM11, and one occurrence of heartscale would be avoided  
5 through AMM30. Impacts on two occurrences of San Joaquin spearscale could be avoided by project  
6 design. With avoidance and habitat restoration, these effects would not be adverse. The loss of two  
7 occurrences of crownscale and one occurrence of recurved larkspur, both noncovered species,  
8 would result in a reduction in the range and numbers of these species and would be an adverse  
9 effect. Adverse effects on crownscale and recurved larkspur could be avoided or offset through  
10 implementation of Mitigation Measure BIO-170. Because avoidance of these occurrences would  
11 require redesign of the main conveyance canal, project design changes to avoid this impact may be  
12 infeasible. Under those circumstances, the impacts would be adverse.

13 **CEQA Conclusion:** Because loss of modeled habitat for alkali seasonal wetland plant species would  
14 be offset through restoration, and because impacts on occurrences of covered alkali seasonal  
15 wetland plants would be avoided, impacts on covered and one noncovered alkali seasonal wetland  
16 plants as a result of implementing Alternative 1C would be less than significant. However, the loss of  
17 all or portions of two crownscale populations and a recurved larkspur population at Byron Tract  
18 Forebay would be a significant impact. Mitigation Measure BIO-170 would reduce this impact to a  
19 less-than-significant level. Because avoidance of these occurrences would require redesign of the  
20 main conveyance canal, project design changes to avoid this impact may be infeasible. Under those  
21 circumstances, the impacts would be significant and unavoidable.

22 **Mitigation Measure BIO-170: Avoid, Minimize, or Compensate for Impacts on Noncovered**  
23 **Special-Status Plant Species.**

24 See discussion of Mitigation Measure BIO-170 under Impact BIO-169.

25 **Grassland Plants**

26 One covered plant and 11 noncovered special-status plants occur in grasslands in the study area  
27 (Tables 12-2, 12-3, summarized in Table 12-1C-64). The only covered plant species occurring in  
28 grassland is Carquinez goldenbush. Carquinez goldenbush modeled habitat included hydrological  
29 features such as stream corridors on alluvium derived from the Montezuma Formation. Stream  
30 corridors (intermittent and perennial) that intersected these geologic units were selected and  
31 truncated at the point at which they encountered the upper elevation of intertidal marsh. The  
32 corridors were buffered 50 feet (15 meters) on either side in an effort to capture the estimated  
33 maximum extent of alluvium deposits in close proximity to the actual rivers/streams.

34 Full implementation of Alternative 1C would include the following conservation actions over the  
35 term of the BDCP to benefit covered grassland plants (BDCP Chapter 3, Section 3.3, *Biological Goals*  
36 *and Objectives*).

- 37 ● Protect three unprotected occurrences of the Carquinez goldenbush in Conservation Zones 1  
38 and/or 11 (Objective CGB1.1, associated with CM3).
- 39 ● Maintain and enhance occupied Carquinez goldenbush habitat to slow erosion and reverse  
40 degradation from livestock grazing (Objective CGB1.2, associated with CM11).

41 Of 78,047 acres of grasslands in the study area, Alternative 1C would adversely affect 2,957 acres  
42 under Alternative 1C, including 4 acres that are modeled habitat for Carquinez goldenbush. For 10 of

1 the plants, no known occurrences would be affected. One of eight Carquinez goldenbush occurrences  
 2 and one of five Parry's rough tarplant occurrences in the study area could be adversely affected by  
 3 Alternative 1C. Table 12-1C-64 summarizes the acreage of grassland habitat in the study area, the  
 4 number of occurrences of each special-status grassland plant in the study area, and potential effects.

5 **Table 12-1C-64. Summary of Impacts on Grassland Plants under Alternative 1C**

	Acres in Study Area	Acres Affected	Occurrences in Study Area	Occurrences Affected	Impacts
<b>Habitat</b>					
Carquinez goldenbush modeled habitat	1,346	4	0	0	Habitat loss from tidal habitat restoration
Grassland	78,047	2,957	0	0	Habitat loss from construction of water conveyance facilities, tidal restoration, Yolo Bypass fisheries enhancements, floodplain restoration, and construction of conservation hatcheries
<b>Covered Species</b>					
Carquinez goldenbush	0	0	10	1	Occurrence affected by tidal restoration
<b>Noncovered Species</b>					
Big tarplant	0	0	5	0	None
Round-leaved filaree	0	0	2	0	None
Pappose tarplant	0	0	7	0	None
Parry's rough tarplant	0	0	5	1	Periodic inundation of one occurrence as a result of Yolo Bypass operations
Small-flowered morning-glory	0	0	0	0	None
Diamond-petaled poppy	0	0	1	0	None
Stinkbells	0	0	1	0	None
Fragrant fritillary	0	0	4	0	None
Keck's checkerbloom	0	0	2	1	Population loss from transmission line construction
Gairdner's yampah	0	0	0	0	None
Streamside daisy <sup>a</sup>	0	0	1	0	None
Caper-fruited tropicocarpum	0	0	8	0	None
<sup>a</sup> This species actually occurs in upland woodland, a habitat that has not been mapped or quantified in the BDCP.					

6

## 1 **Impact BIO-171: Effects on Habitat and Populations of Grassland Plant Species**

2 Alternative 1C could have adverse effects on modeled habitat for Carquinez goldenbush. It could  
3 also affect one occurrence of Carquinez goldenbush, one occurrence of Parry's rough tarplant, and  
4 one occurrence of Keck's checkerbloom. Although Alternative 1C would have no expected effects on  
5 known occurrences of the other special-status plant species that occur in grasslands, the loss of  
6 2,957 acres of grassland would have the potential to adversely affected undocumented populations  
7 of special-status grassland species.

8 The individual effects of each relevant conservation measure are addressed below. A summary  
9 statement of the combined impacts and NEPA and CEQA conclusions follows the individual  
10 conservation measure discussions.

- 11 • *CM1 Water Facilities and Operations*: No modeled habitat for Carquinez goldenbush and no  
12 known occurrences of 12 of the 13 special-status grassland plants are within the proposed  
13 footprint for the Alternative 1C water conveyance facilities. The west transmission line  
14 alternative would cross one historic occurrence of Keck's checkerbloom, which could have an  
15 adverse effect on the population, if it is still present. About 664 acres of grassland habitat would  
16 be affected by construction of the water conveyance facilities. However, this grassland habitat  
17 primarily consists of small patches of herbaceous ruderal vegetation along levees that do not  
18 provide habitat for special-status grassland species.
- 19 • *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo Bypass fisheries  
20 enhancements would remove 627 acres of grassland habitat. Yolo Bypass operations would  
21 result in more frequent and longer inundation of 1,597 acres of grasslands in the Yolo Causeway  
22 (CZ 2) that include habitat for one occurrence of Parry's rough tarplant. Parry's rough tarplant is  
23 a summer-blooming plant that occurs in areas subject to occasional inundation during the wet  
24 season, such as swales and seasonal wetlands. Increasing the frequency or duration of  
25 inundation may decrease the distribution in some areas by making some conditions too wet but  
26 would also expand the distribution into areas that may currently be too dry. Overall, changing  
27 the frequency and duration of inundation in the area of this occurrence should not result in a  
28 substantial change in the range of numbers of Parry's rough tarplant. Construction and  
29 operation of the Yolo Bypass fisheries enhancements would not affect modeled habitat for  
30 Carquinez goldenbush or known occurrences of other special-status grassland plants.
- 31 • *CM3 Natural Communities Protection and Restoration*: Alternative 1C would preserve 8,000 acres  
32 of grassland habitat, some of which may contain modeled habitat for Carquinez goldenbush.  
33 Protection of grassland habitat may also protect undiscovered occurrences of special-status  
34 plant species.
- 35 • *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration would permanently  
36 remove 1,122 acres of grassland habitat, including 4 acres of modeled habitat for Carquinez  
37 goldenbush along the eastern side of Suisun Marsh. Part of one Carquinez goldenbush  
38 occurrence within the hypothetical footprint of tidal restoration could be affected. Tidal  
39 restoration would have no impacts on other known occurrences of special-status grassland  
40 plants.
- 41 • *CM5 Seasonally Inundated Floodplain Restoration*: Construction of new floodplain levees would  
42 result in the loss of 85 acres of grassland habitat, periodic inundation of the floodplain would  
43 affect 513 acres of grassland habitat, and another 399 acres of grassland habitat would be  
44 converted to riparian habitat. However, no modeled habitat for Carquinez goldenbush or known

1 occurrences of special-status grassland plants are present within areas proposed for floodplain  
2 restoration, and the affected grassland habitat consists of herbaceous ruderal vegetation that  
3 does not support special-status grassland plants. Therefore, floodplain restoration and  
4 construction of new floodplain levees would have no impacts on covered and noncovered  
5 grassland plants.

- 6 ● *CM6 Channel Margin Enhancement*: No known occurrences of special-status grassland plants are  
7 present within areas proposed for channel margin habitat enhancement. Areas mapped as  
8 grassland along levees that would be affected by channel margin habitat enhancement are small  
9 patches of ruderal vegetation along levees that do not provide habitat for special-status  
10 grassland species and are not modeled habitat for Carquinez goldenbush. Therefore, channel  
11 margin habitat enhancement would have no impacts on covered and noncovered grassland  
12 plants.
- 13 ● *CM7 Riparian Natural Community Restoration*: No modeled habitat for Carquinez goldenbush or  
14 known occurrences of special-status grassland plants are present within areas proposed for  
15 riparian habitat enhancement. Therefore, riparian habitat enhancement would have no impacts  
16 on covered and noncovered grassland plants.
- 17 ● *CM8 Grassland Natural Community Restoration*: Grassland restoration would restore 2,000 acres  
18 of grassland habitat. Restoration activities would take place in non-grasslands (ruderal habitat,  
19 cultivated land) or degraded grasslands. These areas do not currently provide habitat for  
20 special-status grassland plants. Therefore, grassland communities restoration would have no  
21 impacts on covered and noncovered grassland plants.
- 22 ● *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*: Vernal pool complex includes  
23 vernal pools as well as the surrounding grassland matrix. Because the habitat to be restored  
24 would consist of areas of former vernal pool complex that have been leveled for cultivation,  
25 special-status grassland plants would not be present. Therefore, vernal pool complex  
26 restoration would not affect special-status grassland plants.
- 27 ● *CM10 Nontidal Marsh Restoration*: Nontidal marsh restoration would take place through  
28 conversion of cultivated lands. Therefore, nontidal marsh restoration would avoid grassland  
29 habitat and would have no impacts on covered and noncovered grassland plants.
- 30 ● *CM18 Conservation Hatcheries*: Construction of the conservation hatcheries would remove 35  
31 acres of grassland habitat. The removed habitat would consist of ruderal herbaceous vegetation  
32 that would not be likely to provide habitat for special-status grassland plants. Therefore,  
33 construction of the conservation hatcheries would not be expected to affect special-status  
34 grassland plants.
- 35 ● *CM22 Avoidance and Minimization Measures*: Effects on Carquinez goldenbush potentially  
36 resulting from implementation of CM4 and potential effects on undiscovered populations of  
37 special-status grassland plants would be avoided or minimized though *AMM11 Covered Plant*  
38 *Species*, *AMM2 Construction Best Management Practices and Monitoring*, and *AMM37 Recreation*.  
39 Under AMM11, surveys for covered plant species would be performed during the planning  
40 phase of projects, and any impacts on populations of covered species would be avoided through  
41 project design or subsequently minimized though AMM2. AMM37 requires that new recreation  
42 trails would avoid populations of Carquinez goldenbush.

43 The primary effect of Alternative 1C on special-status grassland plants is the loss of potential (i.e.,  
44 modeled) habitat for Carquinez goldenbush, including part of one known occurrence. Adverse

1 effects on Carquinez goldenbush would be avoided through implementation of CM22, which  
2 includes surveys to establish the population limits and redesigning the project to avoid affecting the  
3 population, to the extent feasible. Protecting three unprotected occurrences of Carquinez  
4 goldenbush (Objective CGB1.1, associated with CM3) and maintaining and enhancing occupied  
5 Carquinez goldenbush (Objective CGB1.2, associated with CM11) would compensate for any residual  
6 effects. One occurrence of Parry's rough tarplant would be affected by CM2, but the effect is not  
7 expected to be adverse. One occurrence of Keck's checkerbloom could be adversely affected, but no  
8 other special-status grassland plants would be affected.

9 The BDCP would have a potential beneficial effect on special-status grassland plants by protecting  
10 8,000 acres of grassland habitat. To ensure that this habitat preservation would specifically benefit  
11 Carquinez goldenbush, the plan proposes to protect at least three Carquinez goldenbush  
12 occurrences in CZs 1 and 11 that are currently not protected and to maintain and enhance occupied  
13 Carquinez goldenbush habitat. The preservation of modeled or potential habitat, together with  
14 avoidance and minimization of impacts on species occurrences, would reduce any effects of  
15 Alternative 1C implementation on covered grassland plants to a level that is no longer adverse.

16 **NEPA Effects:** The loss of modeled and occupied habitat for Carquinez goldenbush would be offset  
17 through CM3, CM8, and CM11. Adverse effects on Keck's checkerbloom could be avoided or offset  
18 through implementation of Mitigation Measure BIO-170. With avoidance and habitat enhancement,  
19 these effects would not be adverse.

20 **CEQA Conclusion:** Because adverse effects on special-status grassland plant species would be  
21 avoided or compensated for, Alternative 1C would not result in substantially reducing the numbers  
22 or restricting the range of one covered or 11 noncovered special-status grassland plants. However,  
23 conservation measures that benefit or protect covered species do not apply to noncovered species,  
24 and portions of one Keck's checkerbloom population could be adversely affected, which would be a  
25 significant impact. Implementation of Mitigation Measure BIO-170 would reduce this impact to a  
26 less-than-significant level.

27 **Mitigation Measure BIO-170: Avoid, Minimize, or Compensate for Impacts on Noncovered**  
28 **Special-Status Plant Species**

29 See discussion of Mitigation Measure BIO-170 under Impact BIO-169.

30 **Valley/Foothill Riparian Plants**

31 Two covered plants and two noncovered special-status plants occur in valley/foothill riparian  
32 habitat in the study area (Tables 12-2, 12-3, summarized in Table 12-1C-65). The valley/foothill  
33 riparian habitat model for Delta button-celery and slough thistle was mapped as all of the study area  
34 along the flood plain of the San Joaquin River between the levees from the Mossdale Bridge to  
35 Vernalis. Whether or not this modeled habitat is actually occupied by Delta button-celery and slough  
36 thistle is unknown; all known occurrences of these species within the area of modeled habitat are  
37 believed to be extirpated.

38 Full implementation of Alternative 1C would include the following conservation actions over the  
39 term of the BDCP to benefit covered valley/foothill riparian plants (BDCP Chapter 3, Section 3.3,  
40 *Biological Goals and Objectives*).

- 41 • Protect and enhance two occurrences of delta button celery. If occurrences are not found in the  
42 Plan Area, establish self-sustaining occurrences of delta button celery for a total of two

occurrences within the restored floodplain habitat on the mainstem of the San Joaquin River in Conservation Zone 7 between Mossdale and Vernalis. (Objective DBC1.1, associated with CM3 and CM11).

- Protect and enhance two occurrences of slough thistle. If occurrences are not found in the Plan Area, establish self-sustaining occurrences of slough thistle for a total of two occurrences within the 10,000 acres of restored floodplain on the mainstem of the San Joaquin River in Conservation Zone 7 between Mossdale and Vernalis (Objective ST1.1: associated with CM3 and CM11).

Of 17,966 acres of valley/foothill riparian habitat in the study area, Alternative 1C would adversely affect 932 acres, including 15 acres that are modeled habitat for Delta button-celery and 11 acres that are modeled habitat for slough thistle. Table 12-1C-65 summarizes the acreage of modeled habitat for Delta button-celery and slough thistle and the number of occurrences of each special-status grassland plant in the study area.

**Table 12-1C-65. Summary of Impacts on Valley/Foothill Riparian Plants under Alternative 1C**

	Acres in Study Area	Acres Affected	Occurrences in Study Area	Occurrences Affected	Impacts
<b>Habitat</b>					
Delta button celery modeled habitat	3,361 <sup>a</sup>	15	0	0	Habitat loss from floodplain restoration
Slough thistle modeled habitat	1,834	11	0	0	Habitat loss from floodplain restoration
Valley/foothill riparian habitat	17,966	932	0	0	Habitat loss from construction of water conveyance facilities, tidal restoration, Yolo Bypass fisheries enhancements, and floodplain restoration
<b>Covered Species</b>					
Delta button celery	0	0	1 <sup>b</sup>	1	Occurrence potentially affected by floodplain restoration
Slough thistle	0	0	2	2	Occurrences potentially affected by floodplain restoration
<b>Noncovered Species</b>					
Northern California black walnut	0	0	1	0	None
Wright's trichocoronis	0	0	1	0	None

<sup>a</sup> A portion of this acreage consists of alkali seasonal wetland  
<sup>b</sup> A second occurrence is in alkali seasonal wetland

1 **Impact BIO-172: Effects on Habitat and Populations of Valley/Foothill Riparian Plants**

2 No extant occurrences of Delta button-celery, slough thistle, Northern California black walnut, or  
3 Wright's trichocoronis are present in the study area. Therefore, no impacts on special-status  
4 valley/foothill riparian plants are expected. Modeled habitat for Delta button-celery and slough  
5 thistle, which may support undocumented occurrences of these species, would be affected by  
6 restoration of seasonally inundated floodplain.

7 The individual effects of each relevant conservation measure are addressed below. A summary  
8 statement of the combined impacts and NEPA and CEQA conclusions follows the individual  
9 conservation measure discussions.

- 10 • *CM1 Water Facilities and Operations*: Construction of the water conveyance facilities would  
11 remove 126 acres of valley-foothill riparian habitat under Alternative 1C. However, no modeled  
12 habitat and no known occurrences of the four special-status valley/foothill riparian plants are  
13 within the proposed footprint for the Alternative 1C water conveyance facilities. Therefore,  
14 under Alternative 1C, construction and operation of the water conveyance facilities would not  
15 affect covered or noncovered special-status valley/foothill riparian plants.
- 16 • *CM2 Yolo Bypass Fisheries Enhancement*: Construction and operation of the Yolo Bypass fisheries  
17 enhancements would adversely affect 378 acres of valley/foothill riparian habitat. However, no  
18 modeled habitat and no known occurrences of the four special-status valley/foothill riparian  
19 plants are within the hypothetical footprint for construction or operation of the Yolo Bypass  
20 fisheries enhancements. Therefore, construction and operation of the Yolo Bypass Fisheries  
21 enhancements would not affect the covered or noncovered valley/foothill riparian plants.
- 22 • *CM3 Natural Communities Protection*: Alternative 1C would protect 552 acres of existing  
23 valley/foothill riparian forest in CZ 7. This action would have no substantial effects on special-  
24 status valley/foothill plants because no extant occurrences of special-status valley/foothill  
25 plants are present in the study area.
- 26 • *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration would inundate 552 acres  
27 of valley/foothill riparian habitat. However, no modeled habitat and no known occurrences of  
28 the four special-status valley/foothill riparian plants are within the hypothetical footprint for  
29 tidal restoration. Therefore, tidal restoration would not affect the covered or noncovered  
30 valley/foothill riparian plants.
- 31 • *CM5 Seasonally Inundated Floodplain Restoration*: Floodplain restoration levee construction  
32 would remove 15 acres of modeled habitat for Delta button-celery along the San Joaquin River  
33 in CZ 7. In addition, floodplain restoration would result in more frequent and longer inundation  
34 of 18 acres of modeled habitat for Delta button-celery in this area. The area affected contains  
35 one historic occurrence of Delta button celery. This occurrence is considered to be extirpated,  
36 because all habitat for Delta button-celery at his location has been converted to agriculture  
37 (California Department of Fish and Wildlife 2013). Therefore, Alternative 1C would not have an  
38 adverse effect on Delta button celery in CZ 7.

39 The BDCP proposes to benefit Delta button-celery at this location by restoring 5,000 acres of  
40 valley/foothill riparian habitat and re-introducing two occurrences of Delta button-celery.  
41 Although Delta button celery occurs in riparian habitat, it is not associated with woodland or  
42 scrub habitats; rather, it occurs in alkali seasonal wetlands in floodplains, which may or may not  
43 also contain adjacent woody riparian habitat. Restoring habitat for Delta button-celery may not  
44 be compatible with restoring woody riparian habitat. In addition, establishing new populations

1 of Delta button-celery is an untried, unproven procedure and may not be feasible. Therefore, any  
2 beneficial effects on Delta button-celery would be speculative.

3 Floodplain restoration levee construction would remove 11 acres of modeled habitat for slough  
4 thistle and would result in more frequent and longer inundation of 6 acres of modeled habitat  
5 for slough thistle along the San Joaquin River in CZ 7. However, the BDCP would allow up to 50  
6 acres of modeled habitat to be converted to riparian habitat. Whether the affected modeled  
7 habitat is actually occupied by slough thistle is not known; however, of two historic occurrences  
8 of slough thistle present in the study area, only one is considered to be extirpated (California  
9 Department of Fish and Wildlife 2013). The BDCP would protect and enhance two occurrences  
10 of slough thistle. If occurrences are not found in the study area, then two self-sustaining  
11 occurrences of slough thistle would be established using locally-sourced genetic material for a  
12 total of two occurrences within the restored floodplain habitat on the main stem of the San  
13 Joaquin River in Conservation Zone 7 between Mossdale and Vernalis. Establishing new  
14 populations of slough thistle is an untried, unproven procedure and may not be feasible.  
15 Therefore, any beneficial effects on slough thistle would be speculative.

16 One historic occurrence of Wright's trichocoronis in the study area near Lathrop (CZ 7) could  
17 also be affected by floodplain restoration. The occurrence is presumed to be extant because the  
18 presence or absence of suitable habitat has not been verified by field surveys (California  
19 Department of Fish and Wildlife 2013). However, the species has not been observed at this  
20 location for nearly a century, and habitat for Wright's trichocoronis, which would have been  
21 similar to that for Delta button celery and slough thistle, no longer appears to be present in  
22 aerial photographs of the area. Therefore, Alternative 1C would not be expected to have an  
23 adverse effect on Wright's trichocoronis.

- 24 ● *CM6 Channel Margin Enhancement*: No modeled habitat or occurrences of special-status  
25 valley/foothill riparian plants are present within areas proposed for channel margin habitat  
26 enhancement. Therefore, channel margin habitat enhancement would have no impacts on  
27 covered and noncovered valley/foothill riparian plants.
- 28 ● *CM7 Riparian Natural Community Restoration*: No extant occurrences of special-status  
29 valley/foothill riparian plants are present within areas proposed for riparian habitat  
30 restoration. Therefore, riparian habitat restoration would have no impacts on covered and  
31 noncovered valley/foothill riparian plants.
- 32 ● *CM8 Grassland Natural Community Restoration*: No occurrences of special-status valley/foothill  
33 riparian plants are present within areas proposed for grassland communities restoration.  
34 Therefore, grassland communities restoration would have no impacts on covered and  
35 noncovered valley/foothill riparian plants.
- 36 ● *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*: No occurrences of special-  
37 status valley/foothill riparian plants are present within areas proposed for vernal pool and  
38 alkali seasonal wetland complex restoration. Therefore, vernal pool and alkali seasonal wetland  
39 complex restoration would have no impacts on covered and noncovered valley/foothill riparian  
40 plants.
- 41 ● *CM10 Nontidal Marsh Restoration*: Nontidal marsh restoration would take place through  
42 conversion of cultivated lands. Therefore, nontidal marsh restoration would avoid  
43 valley/foothill riparian habitat and would have no impacts on covered and noncovered  
44 valley/foothill riparian plants.

- *CM22 Avoidance and Minimization Measures*: Effects on Delta button-celery and slough thistle potentially resulting from implementation of CM5 would be avoided or minimized through *AMM11 Covered Plant Species* and *AMM2 Construction Best Management Practices and Monitoring*. Under AMM11, surveys for covered plant species would be performed during the planning phase of projects, and any impacts on populations of covered species would be avoided through project design or subsequently minimized through AMM2.

Because no extant occurrences of special-status valley/foothill riparian plants are known to occur in the study area, Alternative 1C is not expected to adversely affect any special-status valley/foothill riparian plants. Modeled habitat for both Delta button-celery and slough thistle would be affected. Under AMM11, surveys for covered plants would be performed during the planning phase for floodplain restoration. If Delta button-celery or slough thistle were found to be present in the floodplain restoration area, then the project would be designed to avoid impacts on the populations. Therefore, Alternative 1C would not have an adverse effect on these species.

The BDCP proposes to benefit Delta button-celery and slough thistle by restoring 5,000 acres of valley/foothill riparian habitat and re-introducing two occurrences of both species. Establishing new populations of Delta-button-celery or slough thistle would be a beneficial effect. However, establishing new populations is an untried, unproven procedure and may not be feasible.

**NEPA Effects:** Implementing the BDCP under Alternative 1C would not have an adverse effect on special-status valley/foothill riparian plant species.

**CEQA Conclusion:** Because Alternative 1C would not result in a reduction in the range and numbers of covered and noncovered valley/foothill riparian plants, this impact would be less than significant. No mitigation is required.

### **Tidal Wetland Plants**

Seven covered plants and one noncovered special-status plant occur in tidal wetlands in the study area (Tables 12-2, 12-3, summarized in Table 12-1C-66). Five tidal wetland habitat models were developed for the seven covered plant species occurring in tidal wetland habitat.

Modeled habitat for Mason's lilaepsis and Delta mudwort was mapped as areas within 10 feet (3 meters) on either side of the landward boundary of tidal perennial aquatic land cover type, which was obtained from the BDCP GIS vegetation data layer.

The side-flowering skullcap model mapped the distribution of suitable habitat in the study area according to the species' habitat association with woody riparian habitat. The model selected Delta riparian vegetation types providing the habitat characteristics that side-flowering skullcap seems to require, namely, woody substrate in freshwater tidal areas. The model included vegetation subunits of the BDCP Valley Riparian natural community characterized by California dogwood, white alder, and arroyo willow.

The modeled habitat for soft bird's-beak consisted of pickleweed- and saltgrass-dominated vegetation units located west of the Antioch Bridge. Modeled habitat for these two plant species was mapped as areas within 10 feet (3 meters) on either side of the landward boundary of tidal perennial aquatic land cover types. The model used all Tidal Brackish Emergent Wetland polygons that were limited by specific vegetation units that are known to be closely associated with soft bird's-beak habitat.

1 Habitat for Delta tule pea and Suisun Marsh aster was modeled separately based on the salinity of  
2 the water. For the tidal freshwater emergent wetland BDCP land cover type, modeled habitat was  
3 mapped as the area within 10 feet (3 meters) of the landward side of the landward boundary,  
4 exclusively where this land cover type is adjacent to grassland, vernal pool complex, valley/foothill  
5 riparian, or cultivated land habitat cover types. For brackish water areas in and near Suisun Marsh,  
6 the model used all tidal brackish emergent wetland polygons within an elevation range of 7 to 10  
7 feet (2 to 3 meters) to capture elevations 1 foot (30 centimeters) below intertidal to 2 feet (60  
8 centimeters) above intertidal.

9 The modeled habitat for Suisun thistle in and near Suisun Marsh consists of all tidal brackish  
10 emergent wetland polygons with the appropriate vegetation. This included vegetation units  
11 dominated by saltscare, saltgrass, pickleweed, and broad-leaved peppergrass.

12 Full implementation of Alternative 1C would include the following conservation actions over the  
13 term of the BDCP to benefit covered tidal wetland plants (BDCP Chapter 3, Section 3.3, *Biological*  
14 *Goals and Objectives*).

- 15 ● No net loss of Mason's lilaopsis and delta mudwort occurrences within restoration sites, or  
16 within the area of affected tidal range of restoration projects (Objective DMW/ML1.1, associated  
17 with CM4 and CM11).
- 18 ● No net loss of Delta tule pea and Suisun Marsh aster occurrences within restoration sites  
19 (Objective DTP/SMA1.1, associated with CM4 and CM11).
- 20 ● Restore tidal inundation to wetlands in the Hill Slough Ecological Reserve and to the ponded  
21 area at Rush Ranch (Objective SBB/SuT1.1, associated with CM4).
- 22 ● Complete seed banking of all existing Suisun Marsh populations and the representative genetic  
23 diversity using accepted seed banking protocols (Objective SBB/SuT1.2, associated with CM11).
- 24 ● Establish a cultivated population of Suisun thistle from wild seed using accepted seed collection  
25 protocols (Objective SBB/SuT1.3, associated with CM11).
- 26 ● Establish two occurrences of Suisun thistle in Conservation Zone 11 (Objective SBB/SuT1.4,  
27 associated with CM11).

28 Of 17,357 acres of tidal wetlands in the study area, Alternative 1C would affect 10 acres, including  
29 areas that are modeled habitat for Mason's lilaopsis, Delta mudwort, side-flowering skullcap, Delta  
30 tule pea, Suisun Marsh aster, soft bird's-beak, and Suisun thistle. Known occurrences of these  
31 species would be affected. In addition, three occurrences of Bolander's water-hemlock, a noncovered  
32 special-status plant, could be affected by tidal habitat restoration. Table 12-1C-66 summarizes the  
33 acreage of modeled habitat for covered tidal wetland species and the number of occurrences of each  
34 special-status tidal wetland plants in the study area.

1 **Table 12-1C-66. Summary of Impacts on Tidal Wetland Plants under Alternative 1C**

	Acres in Study Area	Acres Affected	Occurrences in Study Area	Occurrences Affected	Impacts
<b>Habitat</b>					
Delta mudwort/Mason's lilaepsis modeled habitat	6,081	41	0	0	Habitat loss from construction of water conveyance facilities, tidal habitat restoration, Yolo Bypass fisheries enhancements, and floodplain restoration
Side-flowering skullcap modeled habitat	2,497	22	0	0	Habitat loss from construction of water conveyance facilities, tidal habitat restoration, Yolo Bypass fisheries enhancements, and floodplain restoration
Soft bird's-beak modeled habitat	1,228	73	0	0	Habitat loss from tidal habitat restoration
Delta tule pea/Suisun Marsh aster modeled habitat	5,853	1	0	0	Habitat loss from tidal habitat restoration, Yolo Bypass fisheries enhancements, and floodplain restoration
Suisun thistle modeled habitat	1,281	73	0	0	Habitat loss from tidal habitat restoration
Tidal brackish emergent wetland	8,501	0	0	0	Habitat loss from tidal habitat restoration
Tidal freshwater emergent wetland	8,856	10	0	0	Habitat loss from construction of water conveyance facilities, tidal habitat restoration, Yolo Bypass fisheries enhancements, and floodplain restoration
<b>Covered Species</b>					
Delta mudwort	0	0	58	3	Occurrences affected by tidal habitat restoration
Delta tule pea	0	0	106	26	Occurrences affected by tidal habitat restoration
Mason's lilaepsis	0	0	181	17	Occurrences affected by construction of water conveyance facilities and tidal habitat restoration
Side-flowering skullcap	0	0	12	0	None
Soft bird's-beak	0	0	13	7	Occurrences affected by tidal habitat restoration

	Acres in Study Area	Acres Affected	Occurrences in Study Area	Occurrences Affected	Impacts
Suisun Marsh aster	0	0	164	27	Occurrences affected by construction of water conveyance facilities, Yolo Bypass fisheries enhancements, and tidal habitat restoration
Suisun thistle	0	0	4	0	Occurrences affected by tidal habitat restoration
<b>Noncovered Species</b>					
Bolander's water hemlock	0	0	8	3	Occurrences affected by tidal habitat restoration

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### Impact BIO-173: Effects on Habitat and Populations of Tidal Wetland Plants

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Alternative 1C would have adverse effects on tidal marsh special-status plants through implementation of CM1, CM2, CM4, and CM5. No adverse effects are expected from implementation of CM3, CM6, CM7, CM8, and CM9.

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The individual effects of each relevant conservation measure are addressed below. A summary statement of the combined impacts and NEPA and CEQA conclusions follows the individual conservation measure discussions.

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- CM1 Water Facilities and Operations:* Construction of the Alternative 1C water conveyance facilities would remove 27 acres of modeled habitat for delta mudwort and Mason's lilaepsis and 17 acres of modeled habitat for side-flowering skullcap. The extent to which modeled habitat is actually occupied by these species is not known; however, 2 occurrences of Mason's lilaepsis and one occurrence of Suisun Marsh aster in the study area could be affected by construction impacts. No known occurrences of the other covered and noncovered tidal wetland species would be affected by construction of the water conveyance facilities.

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- CM2 Yolo Bypass Fisheries Enhancement:* Construction of the Yolo Bypass fisheries enhancements would remove 5 acres of modeled habitat for Mason's lilaepsis and delta mudwort. The extent to which modeled habitat is actually occupied by these species is not known; however, no known occurrences in the study area would be affected. Yolo Bypass operations would result in more frequent and longer inundation of 8 acres of modeled habitat Delta tule peas and Suisun Marsh aster. Two occurrences of Suisun Marsh aster would be affected by Yolo Bypass operations. Habitat for these species is normally periodically inundated or saturated; therefore, a small increase in the frequency and duration of periodic inundation of the habitat would not be expected to have a substantial effect.

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- CM3 Natural Communities Protection and Restoration:* The BDCP proposes restoring or creating 20 linear miles of transitional tidal areas within other natural communities that would be created or restored, including 6,000 acres of tidal brackish emergent wetland and 24,000 acres of tidal freshwater emergent wetland. In addition, the habitat and ecosystem functions of these areas would be maintained and enhanced. The BDCP does not specifically propose to protect any occurrences of tidal wetland plants nor does it propose active restoration of affected habitat or occurrences. Instead, the BDCP assumes that the 20 linear miles of restored transitional tidal areas would be passively colonized by the covered tidal wetland plants.

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- 1       ● *CM4 Tidal Natural Communities Restoration:* Tidal habitat restoration would permanently  
2       remove 6 acres of modeled habitat for Mason’s lilaepsis and Delta mudwort. Habitat loss would  
3       occur through conversion of the species habitat (at and immediately above the tidal zone in  
4       marshes and along rivers and streams) to inundated tidal habitat. The extent to which modeled  
5       habitat is actually occupied by the species is not known; however, 14 of 181 known occurrences  
6       of Mason’s lilaepsis and 3 of 58 known occurrences of delta mudwort in the study area could be  
7       affected by tidal habitat restoration.

8       Tidal habitat restoration would remove 4 acres of modeled habitat for side-flowering skullcap.  
9       Whether the affected modeled habitat is actually occupied by side-flowering skullcap is not  
10      known; however, none of the 12 known occurrences in the study area would be affected.

11      Tidal habitat restoration would remove 2 acres of modeled habitat for Delta tule pea and Suisun  
12      Marsh aster. However, the BDCP would allow up to 50 acres of modeled habitat to be removed.  
13      Habitat loss would result from conversion of the species habitat (at and immediately above the  
14      tidal zone in marshes and along rivers and streams) to inundated tidal habitat. The extent to  
15      which modeled habitat is actually occupied by the species is not known; however, 26 of 106  
16      known occurrences of Delta tule pea and 24 of 164 occurrences of Suisun Marsh aster in the  
17      study area would be affected.

18      Tidal habitat restoration could affect 73 acres of modeled habitat for soft bird’s-beak and Suisun  
19      thistle, including 1.3 acres of critical habitat. The extent to which modeled habitat is actually  
20      occupied by the species is not known; however, seven of 13 known occurrences of soft bird’s-  
21      beak in the study area could be affected. None of the four known occurrences of Suisun thistle in  
22      the study area would be affected.

23      Tidal habitat restoration could affect three of eight known occurrences of Bolander’s water-  
24      hemlock, a noncovered special-status species in the study area. Because Bolander’s water-  
25      hemlock occurs in tidal marsh, it may benefit from tidal marsh restoration. However, site  
26      preparation, earthwork, and other site activities could adversely affect Bolander’s water-  
27      hemlock through direct habitat removal.

- 28      ● *CM5 Seasonally Inundated Floodplain Restoration:* Floodplain restoration levee construction  
29      would remove 3 acres of modeled habitat for Mason’s lilaepsis and delta mudwort and 2 acres  
30      of modeled habitat for side-flowering skullcap. No known occurrences of these species in the  
31      study area would be affected by floodplain restoration.

32      Floodplain restoration would result in more frequent and longer inundation of 2 acres of  
33      modeled habitat for Mason’s lilaepsis and delta mudwort, 18 acres of modeled habitat for side-  
34      flowering skullcap, and 1 acre of modeled habitat for Delta tule peas and Suisun Marsh aster. No  
35      known occurrences of these species in the study area would be affected by periodic inundation  
36      of restored floodplain habitat. Habitat for these species is normally periodically inundated or  
37      saturated; therefore, a small increase in the frequency and duration of periodic inundation of the  
38      habitat would not be expected to have a substantial effect.

- 39      ● *CM6 Channel Margin Enhancement:* Effects of channel margin enhancement were not analyzed  
40      separately from the effects of tidal habitat restoration. Channel margin enhancement would  
41      have adverse effects on tidal wetland plants through direct removal and habitat modification.  
42      However, it would have beneficial effects on these species by improving the habitat functions for  
43      these species as a result of riprap removal and creation of floodplain benches. Side-flowering  
44      skullcap would benefit from installation of large woody material, which it appears to colonize.

- 1       ● *CM7 Riparian Natural Community Restoration*: Riparian habitat restoration is not expected to  
2       adversely affect special-status tidal wetland plants. Preparatory work that involves habitat  
3       disturbance would occur during implementation of CM4 and CM5. Riparian plantings carried out  
4       for CM7 would be placed in floodplain areas, not in tidal wetlands.
- 5       ● *CM8 Grassland Natural Community Restoration*: No tidal wetlands or occurrences of special-  
6       status tidal wetland plants are present within areas proposed for grassland communities  
7       restoration. Therefore, grassland communities restoration would have no impacts on covered  
8       and noncovered tidal wetland plants.
- 9       ● *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*: No tidal wetlands or  
10       occurrences of special-status tidal wetland plants are present within areas proposed for vernal  
11       pool complex restoration. Therefore, vernal pool complex restoration would have no impacts on  
12       covered and noncovered tidal wetland plants.
- 13       ● *CM10 Nontidal Marsh Restoration*: Nontidal marsh restoration would take place through  
14       conversion of cultivated lands. Therefore, nontidal marsh restoration would avoid tidal wetland  
15       habitat and would have no impacts on covered and noncovered tidal wetland plants.
- 16       ● *CM22 Avoidance and Minimization Measures*: Effects on covered tidal wetland plants potentially  
17       resulting from implementation of CM1, CM2, CM4, and CM5 would be avoided or minimized  
18       through *AMM11 Covered Plant Species*, *AMM2 Construction Best Management Practices and*  
19       *Monitoring*, *AMM30 Transmission line Design and Alignment Guidelines*, and *AMM37*. Under  
20       AMM11, surveys for covered plant species would be performed during the planning phase of  
21       projects, and any impacts on populations of covered species would be avoided through project  
22       design or subsequently minimized through AMM2. In addition, AMM11 contains specific  
23       guidance to avoid adverse modification of any of the primary constituent elements for Suisun  
24       thistle or soft bird's-beak critical habitat. AMM30, which specifies that the alignment of  
25       proposed transmission lines will be designed to avoid sensitive terrestrial and aquatic habitats  
26       when siting poles and towers, to the maximum extent feasible, would avoid some impacts on  
27       Mason's lilaepsis and Suisun Marsh aster. AMM37 requires that new recreation trails avoid  
28       populations of covered tidal wetland plants.

29       In summary, the GIS analysis indicates that Alternative 1C would result in the loss of modeled  
30       habitat for all of the covered species and result in adverse effects on known occurrences of most of  
31       the special-status plants occurring in tidal wetlands. However, the BDCP predicts that habitat  
32       restoration activities would greatly expand the amount of habitat available to each of these species,  
33       offsetting any potential loss of habitat or occurrences resulting from covered activities.

34       Delta mudwort could lose 41 acres of modeled habitat (0.7%), including all or part of three  
35       occurrences. The BDCP predicts that tidal habitat restoration activities proposed under CM4  
36       (Objectives TBEWNC1.1 and TFEWNC1.1) would increase the extent of habitat available for  
37       colonization by Delta mudwort, which could offset this habitat loss. Channel margin enhancement  
38       (CM6) and riparian natural community restoration (CM7) will also consider the potential for  
39       creating habitat for Delta mudwort; creation of suitable habitat under these measures could also  
40       help offset this habitat loss. Although active restoration of this species is not proposed, the BDCP  
41       predicts that natural expansion of populations into the restored habitat would take place and result  
42       in no net loss of occurrences (Objective DMW/ML1.1, associated with CM11). Post-implementation  
43       monitoring of affected occurrences and occurrences in reserve lands would be done to confirm that  
44       no net loss of occurrences has been achieved (Monitoring Action CM11-21, associated with CM11).

1 Mason's lilaepsis could lose 41 acres of modeled habitat (0.7%), including all or part of 17  
2 occurrences. The BDCP predicts that tidal habitat restoration activities proposed under CM4  
3 (Objectives TBEWNC1.1 and TFEWNC1.1) would increase the extent of habitat available for  
4 colonization by Mason's lilaepsis, which could offset this habitat loss. Channel margin enhancement  
5 (CM6) and riparian natural community restoration (CM7) will also consider the potential for  
6 creating habitat for Mason's lilaepsis; creation of suitable habitat under these measures could also  
7 help offset this habitat loss. Although active restoration of this species is not proposed, the BDCP  
8 predicts that natural expansion of populations into the restored habitat would take place and result  
9 in no net loss of occurrences (Objective DMW/ML1.1, associated with CM11). Post-implementation  
10 monitoring of affected occurrences and occurrences in reserve lands would be done to confirm that  
11 no net loss of occurrences has been achieved (Monitoring Action CM11-21, associated with CM11).

12 Delta tule pea could lose 1 acre of modeled habitat (0.02%), including all or part of 26 occurrences.  
13 The BDCP predicts that tidal habitat restoration activities proposed under CM4 (Objectives  
14 TBEWNC1.1 and TFEWNC1.1) would increase the extent of habitat available for colonization by  
15 Delta tule pea, which could offset this habitat loss. Channel margin enhancement (CM6) and riparian  
16 natural community restoration (CM7) will also consider the potential for creating habitat for Delta  
17 tule pea; creation of suitable habitat under these measures could also help offset this habitat loss.  
18 Although active restoration of this species is not proposed, the BDCP predicts that natural expansion  
19 of populations into the restored habitat would take place and result in no net loss of occurrences  
20 (Objective DTP/SMA1.1, associated with CM11). Post-implementation monitoring of affected  
21 occurrences and occurrences in reserve lands would be done to confirm that no net loss of  
22 occurrences has been achieved (Monitoring Action CM11-22, associated with CM11).

23 Suisun Marsh aster could lose 1 acre of modeled habitat (0.02%), including all or part of 27  
24 occurrences. The BDCP predicts that tidal habitat restoration activities proposed under CM4  
25 (Objectives TBEWNC1.1 and TFEWNC1.1) would increase the extent of habitat available for  
26 colonization by Suisun Marsh aster, which could offset this habitat loss. Channel margin  
27 enhancement (CM6) and riparian natural community restoration (CM7) will also consider the  
28 potential for creating habitat for Suisun marsh aster; creation of suitable habitat under these  
29 measures could also help offset this habitat loss. Although active restoration of this species is not  
30 proposed, the BDCP predicts that natural expansion of populations into the restored habitat would  
31 occur and result in no net loss of occurrences (Objective DTP/SMA1.1, associated with CM11). Post-  
32 implementation monitoring of affected occurrences and occurrences in reserve lands would be done  
33 to confirm that no net loss of occurrences has been achieved (Monitoring Action CM11-22,  
34 associated with CM11).

35 All four of these species (Delta mudwort, Mason's lilaepsis, Delta tule pea, and Suisun Marsh aster)  
36 are widespread in the study area with many occurrences. Habitat modification and loss are the  
37 primary stressors that are responsible for their decline and that currently limit their distribution  
38 and abundance. Therefore, restoring large areas of habitat and improving habitat functions for these  
39 species would provide a reasonable expectation that the distribution and abundance of these  
40 species would also improve. Because a relatively small amount of modeled habitat would be  
41 adversely affected (less than 1% of the total), it is likely that the initial adverse effects of covered  
42 activities on these species would be offset and that the overall effect of Alternative 1C on these  
43 species would not be adverse.

44 Side-flowering skullcap could lose 22 acres of modeled habitat (0.9%), although no occurrences  
45 would be affected. The BDCP predicts that tidal habitat restoration activities proposed under CM4

1 (Objectives TBEWNC1.1 and TFEWNC1.1) would increase the extent of habitat available for  
2 colonization by side-flowering skullcap, which could offset this habitat loss. Channel margin  
3 enhancement (CM6) and riparian natural community restoration (CM7) will also consider the  
4 potential for creating habitat for side-flowering skullcap; creation of suitable habitat under these  
5 measures could also help offset this habitat loss. No active restoration of this species is proposed,  
6 and no post-implementation monitoring of affected occurrences and occurrences in reserve lands  
7 would be done. Because impacts on occurrences of side-flowering skullcap would be avoided, and  
8 because loss of modeled habitat for the species would be offset through restoration, the overall  
9 effect of Alternative 1C on this species would not be adverse.

10 Soft bird's-beak could lose 73 acres of modeled habitat (6%), including all or part of seven  
11 occurrences. The BDCP predicts that tidal habitat restoration activities proposed under CM4  
12 (Objectives TBEWNC1.1 and TFEWNC1.1) would increase the extent of habitat available for  
13 colonization by soft bird's-beak, which could offset this habitat loss. Tidal restoration in the Hill  
14 Slough Ecological Reserve would be done to increase potential habitat there for soft bird's-beak  
15 (Objective SBB/SuT1.1, associated with CM4). In addition, activities to control invasive plants and  
16 manage livestock in tidal marsh habitat under CM11 could enhance habitat for soft bird's-beak.  
17 Although no active restoration of this species is proposed, post-implementation monitoring of soft  
18 bird's-beak occurrences in proximity to tidal restoration sites would be done to confirm that  
19 occurrences are stable or increasing (Monitoring Action CM11-22, associated with CM11). Soft  
20 bird's-beak has a restricted distribution in the study area with highly localized occurrences, and  
21 habitat modification is the primary factor responsible for the species' decline and limiting the  
22 species' distribution and abundance. Improving habitat functions for this species would provide a  
23 reasonable expectation that the distribution and abundance of soft bird's-beak would also improve.  
24 Although a substantial amount of modeled habitat could be affected, the primary habitat for soft  
25 bird's-beak is high tidal brackish marsh, and the affected habitat is low tidal brackish marsh.  
26 Therefore, it is likely that the overall effect of Alternative 1C on this species would not be adverse.

27 Suisun thistle could lose 73 acres of modeled habitat (6%), although no occurrences would be  
28 affected. The BDCP predicts that tidal habitat restoration activities proposed under CM4 (Objectives  
29 TBEWNC1.1 and TFEWNC1.1) would increase the extent of habitat available for colonization by  
30 Suisun thistle, which could offset this habitat loss. Tidal restoration in the Hill Slough Ecological  
31 Reserve and at Rush Ranch would be done to increase potential habitat there for Suisun thistle  
32 (Objective SBB/SuT1.1, associated with CM4). In addition, activities to control invasive plants and  
33 manage livestock in tidal marsh habitat under CM11 could enhance habitat for Suisun thistle. In  
34 addition, two new occurrences of Suisun thistle would be established in CZ 11 (Objective  
35 SBB/SuT1.4, associated with CM11). Post-implementation monitoring of Suisun thistle occurrences  
36 in proximity to tidal restoration sites would be done to confirm that occurrences are stable or  
37 increasing (Monitoring Action CM11-22, associated with CM11). Habitat restoration, enhancement  
38 of habitat functions, and establishment of new occurrences would offset any potential loss of  
39 modeled habitat for Suisun Marsh thistle.

40 Three occurrences of Bolander's water-hemlock could be affected. Although the extent of potential  
41 habitat affected was not determined, it would be comparable to that for Delta tule pea and Suisun  
42 Marsh aster (5 acres). Tidal habitat restoration activities proposed under CM4 (Objectives  
43 TBEWNC1.1 and TFEWNC1.1) could increase the extent of habitat available for colonization by  
44 Bolander's water-hemlock, which could offset this habitat loss. Because only a few scattered  
45 occurrences of Bolander's water-hemlock are present in the study area, there is no reasonable  
46 expectation that habitat restoration without active species-specific restoration activities would

1 result in the establishment of new occurrences to offset the losses. Also, because Bolander’s water-  
2 hemlock is a noncovered species, the species protections and occurrence monitoring afforded to  
3 covered species under the BDCP would not apply to this species. Therefore, the effects of Alternative  
4 1C on Bolander’s water hemlock could be adverse.

5 **NEPA Effects:** The loss of modeled and occupied habitat for special-status tidal wetland plants  
6 would be offset through tidal habitat restoration (CM4). Therefore, implementation of Alternative  
7 1C would result in no adverse effects on seven of eight special-status grassland plants in the study  
8 area. Alternative 1C would result in a reduction in the range and numbers of Bolander’s water-  
9 hemlock, which would be an adverse effect. Adverse effects on Bolander’s water-hemlock could be  
10 avoided or offset through implementation of Mitigation Measure BIO-170.

11 **CEQA Conclusion:** Because loss of occurrences and modeled habitat for covered tidal habitat plant  
12 species would be offset through habitat restoration, impacts on covered tidal wetland plants  
13 resulting from implementation of Alternative 1C would be less than significant. However, the loss of  
14 Bolander’s water-hemlock populations in CZ 11 would be a reduction in the species’ numbers and  
15 range, which would be a significant impact. Implementation of Mitigation Measure BIO-170 would  
16 reduce this impact to a less-than-significant level.

17 **Mitigation Measure BIO-170: Avoid, Minimize, or Compensate for Impacts on Noncovered**  
18 **Special-Status Plant Species**

19 Please see Mitigation Measure BIO-170 under Impact BIO-169.

20 **Inland Dune Plants**

21 **Impact BIO-174: Effects on Habitat and Populations of Inland Dune Plants**

22 Alternative 1C would have no adverse effects on inland dune plants (Table 12-1C-67). No  
23 construction activities or habitat restoration would take place where the species occur. No specific  
24 actions to benefit inland dune species are proposed.

25 **Table 12-1C-67. Summary of Impacts on Inland Dune Plants under Alternative 1C**

	Acres in Study Area	Acres Affected	Occurrences in Study Area	Occurrences Affected	Impacts
<b>Modeled Habitat</b>					
Inland Dunes	19	0	0	0	None
<b>Noncovered Species</b>					
Hoover’s cryptantha	0	0	1	0	None
Antioch Dunes buckwheat	0	0	1	0	None
Mt. Diablo buckwheat	0	0	1	0	None
Contra Costa wallflower	0	0	3	0	None
Antioch Dunes evening- primrose	0	0	9	0	None

26

1 **NEPA Effects:** Implementing the BDCP under Alternative 1C would not affect special-status inland  
2 dune plant species.

3 **CEQA Conclusion:** Alternative 1C would have no impacts on inland dune plant species. No mitigation  
4 is required.

5 **Nontidal Wetland Plants**

6 No covered plant species occur in nontidal wetlands in the study area; however, six noncovered  
7 special-status plant species occur in nontidal wetlands in the study area. Table 12-1C-68  
8 summarizes the acreage of nontidal wetland habitat in the study area and the number of  
9 occurrences of each special-status nontidal wetland plant in the study area.

10 **Table 12-1C-68. Summary of Impacts on Nontidal Wetland Plants under Alternative 1C**

	Acreage in Study Area	Acreage Affected	Occurrences in Study Area	Occurrences Affected	Impacts
<b>Habitat</b>					
Nontidal freshwater aquatic	5,567	311	0	0	Loss of habitat from construction of water conveyance facilities, tidal habitat restoration, and floodplain restoration
Nontidal freshwater perennial emergent wetland	1,509	131	0	0	Loss of habitat from construction of water conveyance facilities, tidal habitat restoration, Yolo Bypass fisheries enhancements, and floodplain restoration
<b>Noncovered Species</b>					
Watershield	0	0	3	0	None
Bristly sedge	0	0	18	0	Loss of habitat from construction of water conveyance facilities
Woolly rose-mallow <sup>a</sup>	0	0	121	4	Loss of habitat from construction of water conveyance facilities and tidal habitat restoration
Eel-grass pondweed	0	0	1	1	Loss of habitat from construction of water conveyance facilities
Sanford's arrowhead	0	0	23	1	Loss of habitat from tidal habitat restoration
Marsh skullcap <sup>a</sup>	0	0	3	0	None
<sup>a</sup> Also occurs in valley/foothill riparian habitat.					

11

## 1 **Impact BIO-175: Effects on Habitat and Populations of Nontidal Wetland Plants**

2 Under Alternative 1C, known occurrences of woolly rose-mallow, eel-grass pondweed, and Sanford's  
3 arrowhead are within the proposed footprint for the water conveyance facilities or within the  
4 hypothetical footprint for restoration activities and could be adversely affected. Alternative 1C  
5 would have no adverse effects on watershield, bristly sedge, or marsh skullcap.

6 The individual effects of each relevant conservation measure are addressed below. A summary  
7 statement of the combined impacts and NEPA and CEQA conclusions follows the individual  
8 conservation measure discussions.

- 9 ● *CM1 Water Facilities and Operations*: Construction of the Alternative 1C water conveyance  
10 facilities would adversely affect two noncovered special-status plants occurring in nontidal  
11 wetlands. One occurrence of woolly rose-mallow in CZ 3 and two occurrences in CZ 8 would be  
12 affected by construction activities. One occurrence of eel-grass pondweed could be affected by  
13 construction activities on the Webb Tract in CZ 6. Four other noncovered nontidal wetland  
14 plants would not be affected by construction of the water conveyance facilities.
- 15 ● *CM2 Yolo Bypass Fisheries Enhancement*: No known occurrences of special-status nontidal  
16 wetland plants are present in the hypothetical footprint for construction or operation of the  
17 Yolo Bypass fisheries enhancements. Therefore, construction and operation of the Yolo Bypass  
18 Fisheries enhancements would not affect special-status nontidal marsh plants.
- 19 ● *CM3 Natural Communities Protection and Restoration*: No specific natural communities  
20 protection is proposed for nontidal wetlands under the BDCP. Therefore, no occurrences of  
21 special-status nontidal plants are proposed for protection.
- 22 ● *CM4 Tidal Natural Communities Restoration*: One known occurrence of Sanford's arrowhead is  
23 present within areas proposed for tidal habitat restoration in CZ 2, and one occurrence of woolly  
24 rose-mallow is present in areas proposed for tidal habitat restoration in CZ 7. Therefore, tidal  
25 habitat restoration would have an adverse effect on these species. No other special-status tidal  
26 wetland plants would be affected.
- 27 ● *CM5 Seasonally Inundated Floodplain Restoration*: No known occurrences of special-status  
28 nontidal wetland plants are present within areas proposed for floodplain restoration. Therefore,  
29 floodplain restoration and construction of new floodplain levees would have no impacts on  
30 special-status nontidal wetland plants.
- 31 ● *CM6 Channel Margin Enhancement*: No known occurrences of special-status nontidal wetland  
32 plants are present within areas proposed for channel margin habitat enhancement. Therefore,  
33 channel margin habitat enhancement would have no impacts on special-status nontidal wetland  
34 plants.
- 35 ● *CM7 Riparian Natural Community Restoration*: No known occurrences of special-status nontidal  
36 wetland plants are present within areas proposed for riparian habitat restoration. Therefore,  
37 riparian habitat restoration would have no impacts on special-status nontidal wetland plants.
- 38 ● *CM8 Grassland Natural Community Restoration*: No known occurrences of special-status nontidal  
39 wetland plants are present within areas proposed for grassland communities restoration.  
40 Therefore, grassland communities restoration would have no impacts on special-status nontidal  
41 wetland plants.

- 1 • *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*: No known occurrences of  
2 special-status nontidal wetland plants are present within areas proposed for vernal pool and  
3 alkali seasonal wetland complex restoration. Therefore, vernal pool and alkali seasonal wetland  
4 complex restoration would have no impacts on special-status nontidal wetland plants.
- 5 • *CM10 Nontidal Marsh Restoration*: Nontidal marsh restoration would take place through  
6 conversion of cultivated lands. Therefore, nontidal marsh restoration would avoid existing  
7 nontidal marsh and would have no adverse effects on special-status nontidal wetland plants.  
8 The BDCP may benefit nontidal wetland species by creating 400 acres of nontidal freshwater  
9 marsh, including components of nontidal perennial aquatic and nontidal freshwater perennial  
10 emergent wetland communities, and by maintaining and enhancing the habitat functions of  
11 protected and created nontidal wetland habitats for covered and other native species. However,  
12 no specific actions to benefit noncovered species are proposed.  
13

14 Under Alternative 1C, 1,500 acres of nontidal marsh would be restored (Objective NFEW/NPANC1.1,  
15 addressed under CM10). However, these wetlands would be restored primarily as habitat for giant  
16 garter snake. These habitat restoration activities would be unlikely to expand the amount of habitat  
17 available to woolly rose-mallow, eel-grass pondweed, and Sanford's arrowhead, potential loss of  
18 habitat or occurrences resulting from covered activities would not be compensated for. Moreover,  
19 because special-status nontidal wetland plant species are not covered under the BDCP, the species  
20 protections afforded to covered species under CM22 do not apply to these species, and the effects of  
21 Alternative 1C on these species would be adverse.

22 **NEPA Effects:** Implementation of the BDCP under Alternative 1C could result in a reduction in the  
23 range and numbers of woolly rose-mallow, eel-grass pondweed, and Sanford's arrowhead, three  
24 noncovered nontidal wetland species, which would be an adverse effect. Adverse effects on these  
25 species could be avoided or offset through implementation of Mitigation Measure BIO-170.

26 **CEQA Conclusion:** Under Alternative 1C, tidal habitat restoration could result in a reduction in the  
27 range and numbers of woolly rose-mallow and eel-grass pondweed. Tidal habitat restoration could  
28 result in a reduction in the range and numbers of Sanford's arrowhead and woolly rose-mallow.  
29 These impacts would be significant. Implementation of Mitigation Measure BIO-170 would reduce  
30 these impacts to a less-than-significant level.

### 31 **Mitigation Measure BIO-170: Avoid, Minimize, or Compensate for Impacts on Noncovered** 32 **Special-Status Plant Species**

33 Please see Mitigation Measure BIO-170 under Impact BIO-169.

## 34 **General Terrestrial Biology**

### 35 **Wetlands and Other Waters of the United States**

36 Alternative 1C actions would both permanently and temporarily remove or convert wetlands and  
37 open water that is potentially jurisdictional as regulated by USACE under Section 404 of the CWA.  
38 The following two impacts address the project-level effects of CM1 on these potential wetlands and  
39 waters, and the programmatic-level effects of other relevant conservation actions (CM2–CM10).  
40 CM11–CM22 would not directly result in loss or conversion of wetlands or other waters of the

1 United States. The methods used to conduct these analyses are described in Section 12.3.2.4 of this  
2 chapter.

3 **Impact BIO-176: Effects of Constructing Water Conveyance Facilities (CM1) on Wetlands and**  
4 **Other Waters of the United States**

5 Construction of the Alternative 1C water conveyance facilities would both temporarily and  
6 permanently remove potential wetlands and other waters of the United States as regulated by  
7 Section 404 of the CWA (Table 12-1C-69). Based on the methodology used to conduct this analysis,  
8 these losses would occur at pipeline, canal and intake areas, RTM and borrow/spoil storage sites,  
9 transmission corridors, forebay site, and multiple temporary work areas associated with the  
10 construction activity. The permanent open water and wetland losses (416 acres) would occur at  
11 various locations along the water conveyance facility alignment, but the majority of the loss would  
12 occur due to construction of Alternative 1C's five intake structures along the western bank of the  
13 Sacramento River from just north of Clarksburg to Courtland in the north Delta (including  
14 associated spoil/borrow areas), along the entire canal route in the west and south Delta, and at the  
15 southern forebay site in the south Delta. The temporary open water and wetland effects (217 acres)  
16 would also occur mainly at the five intake construction sites along the western bank of the  
17 Sacramento River, at temporary siphon work areas where the canal crosses under north and west  
18 Delta sloughs and waterways, and at barge offloading sites in the west Delta.

19 **Table 12-1C-69. Loss of Potential Wetlands and Other Waters of the United States from**  
20 **Construction of Alternative 1C Water Conveyance Facilities**

Wetland/Other Water Type <sup>a</sup>	Permanent	Temporary	Total
<b>Open Water</b>			
Nontidal Flow	254	60	314
Muted Tidal Flow	0	0	0
Tidal Flow	24	116	140
Pond or Lake (nontidal)	39	5	44
Clifton Court Forebay	0	0	0
<b>Wetland</b>			
Nontidal Wetland	84	17	101
Tidal Wetland	3	13	16
Seasonal Wetland	12	6	18
<b>Total Impact Acres</b>	<b>416</b>	<b>217</b>	<b>633</b>

<sup>a</sup> Wetland types are described in the methods section of this chapter (Section 12.3.2.4).

Source: California Department of Water Resources 2013.

21

22 **NEPA Effects:** The permanent and temporary loss of these potential jurisdictional wetlands as a  
23 result of constructing Alternative 1C water conveyance facilities would be a substantial effect if not  
24 compensated by wetland protection and/or restoration. This loss would represent a removal of  
25 federally protected wetlands as defined by Section 404 of the CWA. However, Alternative 1C  
26 includes conservation measures (CM4 and CM10) that would restore and protect large acreages of  
27 both tidal and nontidal wetlands and open water in the study area. Through the course of the BDCP  
28 restoration program, this alternative would restore 65,000 acres of tidal and 1,200 acres of nontidal  
29 wetland or open water. Impacts on wetlands from CM1 construction would occur in the first 10

1 years after BDCP approval. Approximately 19,550 acres of this wetland restoration would occur  
2 during this time period, thereby offsetting the impacts of CM1 construction. These acreages greatly  
3 exceed the no net loss (1:1 replacement ratio) requirement for Alternative 1C (633 acres).  
4 Therefore, there would be an overall beneficial effect on potential jurisdictional wetlands and other  
5 waters of the United States from BDCP implementation.

6 **CEQA Conclusion:** The permanent and temporary loss of potential jurisdictional wetlands as a result  
7 of constructing Alternative 1C water conveyance facilities would be substantial effect if not  
8 compensated for by wetland protection and/or restoration. This loss would represent either  
9 temporary or permanent removal of federally protected wetlands or other waters of the United  
10 States as defined by Section 404 of the CWA. However, Alternative 1C includes conservation  
11 measures (CM4 and CM10) that would restore and protect large acreages of both tidal and nontidal  
12 wetlands and open water. Through the course of the BDCP restoration program, this alternative  
13 would result in restoration of 65,000 acres of tidal and 1,200 acres of nontidal wetlands and open  
14 water. Impacts on wetlands from CM1 construction would occur in the first 10 years after BDCP  
15 approval. Approximately 19,550 acres of this wetland restoration would occur during this time  
16 period, thereby offsetting the impacts of CM1 construction. These acreages greatly exceed the no net  
17 loss (1:1 replacement ratio) requirement for Alternative 1C (633 acres). Therefore, there would be a  
18 beneficial impact on potential jurisdictional wetlands and other waters of the United States from  
19 BDCP implementation.

#### 20 **Impact BIO-177: Effects of Implementing Other Conservation Measures (CM2–CM10) on** 21 **Wetlands and Other Waters of the United States**

22 The habitat protection and restoration activities associated with Alternative 1C's other conservation  
23 measures (CM2–CM10) would alter the acreages and functions and values of wetlands and other  
24 waters of the United States in the study area during the course of BDCP conservation action  
25 implementation. Because these conservation measures have not been defined to the level of site-  
26 specific footprints, it is not possible to delineate and quantify these effects in detail. Several of the  
27 conservation measures (CM2, CM4, and CM5) have been described with theoretical footprints for  
28 purposes of the effects analysis contained in Chapter 5 of the BDCP. These theoretical footprints  
29 have been used to predict the acres of natural communities that would be affected through loss or  
30 conversion, which gives some indication of jurisdictional wetland effects. Any CM2–CM10 effects  
31 ascribed to tidal perennial aquatic, tidal brackish emergent, tidal freshwater emergent, other natural  
32 seasonal, nontidal freshwater perennial emergent, and nontidal perennial aquatic wetlands natural  
33 communities are likely to also be effects on wetlands and other waters of the United States. Effects  
34 ascribed to other natural communities and land cover types with small jurisdictional wetland  
35 components (valley/foothill riparian, alkali seasonal wetland complex, vernal pool complex,  
36 managed wetland, grassland and cultivated land) are not easily converted to effects on wetlands and  
37 other Waters of the US by the use of theoretical footprints. Because of this lack of detail, a  
38 programmatic assessment is provided for these other conservation measures.

39 **NEPA Effects:** The conversion of existing wetland natural communities to other types of wetland  
40 natural communities through implementation of CM2–CM10 for Alternative 1C would be in the  
41 range of 5,500 to 6,000 acres, assuming that 100 percent of the predominantly wetland natural  
42 communities listed in Table 12-1C-69 and that 10 percent of all of the non-wetland natural  
43 communities listed in that table would qualify as wetlands or other waters of the United States  
44 under the CWA. Most of these wetlands would be converted to tidal and nontidal wetlands and open  
45 water through implementation of CM4 and CM10. The wetlands and open water created by these

1 two restoration actions would be approximately 66,200 acres, far exceeding what is required under  
2 the no net loss policy used by the USACE in considering Section 404 permits, even if one were to  
3 assume that all conversions represented a functional wetland loss. Therefore, there would be a  
4 beneficial effect on potential jurisdictional wetlands and other waters of the United States from  
5 implementing CM2–CM10.

6 **CEQA Conclusion:** The permanent and temporary loss of potential jurisdictional wetlands as a result  
7 of implementing the other conservation measures (CM2–CM10) of Alternative 1C would be a  
8 substantial effect if not compensated for by wetland protection and/or restoration. This loss would  
9 represent a removal of federally protected wetlands or other waters of the United States as defined  
10 by Section 404 of the CWA. However, Alternative 1C includes conservation measures (CM4 and  
11 CM10) that would restore large acreages of both tidal and nontidal wetlands and open water in the  
12 study area. Over the life of the BDCP restoration program, this alternative would result in  
13 restoration of 66,200 acres of tidal and nontidal wetlands and open water, of which 19,550 acres  
14 would be restored in the first 10 years. These acreages greatly exceed the no net loss (1:1  
15 replacement ratio) requirement for Alternative 1C (5,500–6,000 acres). Therefore, there would be a  
16 beneficial impact on potential jurisdictional wetlands and other waters of the United States from  
17 implementing CM2–CM10.

## 18 **Shorebirds and Waterfowl**

19 Managed wetlands, tidal natural communities, and cultivated lands (including grain and hay crops,  
20 pasture, field crops, rice, and idle lands) provide freshwater nesting, feeding, and resting habitat for  
21 a large number of Pacific flyway waterfowl and shorebirds. The primary effects of concern for  
22 shorebirds and waterfowl are related to the conversion of managed wetland and cultivated lands to  
23 tidal marsh associated with habitat restoration. Ducks Unlimited (2013) conducted an analysis to  
24 determine the effects of BDCP conservation measures on waterfowl, as well as to determine whether  
25 BDCP actions would impede attainment of the goals established by the Central Valley Joint Venture  
26 (CVJV) Implementation Plan for the Delta, Yolo, and Suisun Marsh drainage basins. The CVJV efforts  
27 are guided by its 2006 Implementation Plan, which is founded on the principles of strategic habitat  
28 conservation (Central Valley Joint Venture 2006). Those principles emphasize the establishment of  
29 population abundance objectives and the use of species-habitat models to link population objectives  
30 to habitat needs. The CVJV has used species-habitat models to translate bird abundance objectives  
31 into habitat objectives, while explicitly identifying the biological assumptions that underpin these  
32 models and the data used to populate them. As a result, the CVJV's biological planning provides a  
33 framework for evaluating the effects of the BDCP on waterfowl.

34 The Ducks Unlimited waterfowl analysis focused primarily on dabbling ducks. Less than 5% of all  
35 geese in the Central Valley occur in the Yolo, Delta, and Suisun Marsh drainage basins. Moreover,  
36 geese in the Central Valley rely mostly on agricultural habitats to meet their food energy needs. The  
37 BDCP's effect on agricultural habitats is limited to the Delta Basin where about 2500 acres of corn  
38 now available to geese would be converted to other habitats (Ducks Unlimited 2013: Table 5). Food  
39 supplies for geese would still be well in excess of demand even with the loss of these agricultural  
40 habitats (Central Valley Joint Venture 2006, Ducks Unlimited 2013). The duck population objectives  
41 used in the analysis were taken directly from the CVJV Plan. Dabbling duck species make up 92% of  
42 this objective, while diving duck species make up the remaining 8%. Thus, the results were mostly  
43 driven by dabbling duck needs and largely interpreted in the context of dabbling duck foraging  
44 ecology. The 55,000 acres of Tidal Natural Communities Restoration (CM4) would be expected to  
45 benefit diving ducks by providing deep water foraging habitat. Refer to the Ducks Unlimited Report

1 (Ducks Unlimited 2013) for details of the analysis and methods with respect to the TRUMET model  
2 used to quantify effects on food biomass and food quality.

3 An analysis was conducted to determine the effects of the BDCP covered activities on wintering and  
4 breeding shorebird habitat (ICF International 2013). This analysis evaluated the relative increase  
5 and decrease in natural communities known to provide important foraging, roosting, and breeding  
6 habitat. Similar to the waterfowl analysis, the results were broken up into the three Central Valley  
7 Joint Venture Basins that overlap with the BDCP study area: Yolo, Delta, and Suisun. Natural  
8 community losses and gains were then translated into species-specific outcomes, comparing the  
9 relative habitat value of each BDCP natural community for each Central Valley shorebird species  
10 (Table 1, ICF International 2013). The shorebird species ranking system displayed in Table 1 (ICF  
11 International 2013) was modified from a table in Stralberg et. al (2010). The table was created using  
12 survey data and experts' species-specific habitat rankings. The survey data included fall, winter, and  
13 spring density data. This resulted in an overall, cross-season representation of habitat requirements.

#### 14 **Impact BIO-178: Loss or Conversion of Habitat for Waterfowl and Shorebirds as a Result of** 15 **Water Conveyance Facilities Construction**

16 Development of the water conveyance facilities (CM1) would result in the permanent removal of  
17 approximately 1 acre of managed wetland, 22 acres of nontidal wetlands, and 4,140 acres of suitable  
18 cultivated lands (including grain and hay crops, pasture, field crops, rice, and idle lands). In addition,  
19 145 acres of managed wetland, 1 acre of tidal wetlands, 26 acres of nontidal wetlands, and 5,429  
20 acres of cultivated lands would be temporarily impacted.

21 These losses of habitat would occur within the first 10 years of Alternative 1C implementation in the  
22 Delta Basin. The BDCP has committed to the near-term protection of 15,400 acres of non-rice  
23 cultivated lands, 200 acres of rice, and 700 acres of rice or "rice equivalent" natural communities  
24 including nontidal wetlands in the near-term. In addition, 4,100 acres of managed wetlands would  
25 be created, protected, and enhanced, 8,850 acres of freshwater tidal wetlands would be restored,  
26 and 2,000 acres of tidal brackish emergent wetland would be restored (Table 3-4, Chapter 3).

27 Construction activities could have an adverse effect on nesting shorebirds or waterfowl if they were  
28 present in or adjacent to work areas and could result in destruction of nests or disturbance of  
29 nesting and foraging behaviors. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird*  
30 *Surveys and Avoid Disturbance of Nesting Birds*, would be available to minimize adverse effects on  
31 nesting birds.

32 **NEPA Effects:** Habitat loss from construction of the Alternative 1C water conveyance facilities would  
33 not result in an adverse effect on shorebirds and waterfowl because of the acres of natural  
34 communities and cultivated lands that would be restored and protected in the near-term timeframe.  
35 If waterfowl were present in or adjacent to work areas, construction activities could result in  
36 destruction of nests or disturbance of nesting and foraging behaviors, which would be an adverse  
37 affect on nesting shorebirds and waterfowl. Mitigation Measure BIO-75, *Conduct Preconstruction*  
38 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to minimize adverse  
39 effects on nesting birds.

40 **CEQA Conclusion:** Habitat loss from construction of the Alternative 1C water conveyance facilities  
41 would have a less-than-significant impact on shorebirds and waterfowl because of the acres of  
42 natural communities and cultivated lands that would be restored and protected in the near-term  
43 timeframe. If waterfowl were present in or adjacent to work areas, construction activities could

1 result in destruction of nests or disturbance of nesting and foraging behaviors, which would be a  
2 significant impact. Implementation of Mitigation Measure BIO-75, *Conduct Preconstruction Nesting*  
3 *Bird Surveys and Avoid Disturbance of Nesting Birds*, would reduce this impact on nesting birds to a  
4 less-than-significant level.

5 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**  
6 **Disturbance of Nesting Birds**

7 See Mitigation Measure BIO-75 under Impact BIO-75.

8 **Impact BIO-179: Loss or Conversion of Habitat for Wintering Waterfowl as a Result of**  
9 **Implementation of Conservation Components**

10 **Suisun Marsh:** Managed seasonal wetlands in Suisun Marsh would be reduced by an estimated  
11 8,818 acres as a result of Alternative 1C implementation. This would represent a 25% decrease in  
12 managed seasonal wetlands compared with long-term conditions without Alternative 1C (Ducks  
13 Unlimited 2013, Table 5). There is considerable uncertainty about the biomass and nutritional  
14 quality of waterfowl foods produced in Suisun Marsh's managed wetlands, which makes it difficult  
15 to identify the amount of mitigation needed. To address this uncertainty, three levels of food  
16 biomass and three levels of nutritional quality were modeled for these existing habitats (Ducks  
17 Unlimited 2013, Table 7). Three mitigation scenarios based on these energetic assumptions of  
18 biomass and food quality were then run to determine a minimum acreage of managed seasonal  
19 wetlands to be protected and enhanced to compensate for the loss of productivity resulting from  
20 habitat conversion to tidal wetlands.

- 21 ● Scenario 1) Assume that existing managed seasonal wetlands provide low food biomass and low  
22 food quality. Under this assumption, the managed seasonal wetlands in Suisun Marsh produce  
23 50% of the seed biomass of seasonal wetlands elsewhere in the Central Valley, and these seeds  
24 have 60% of the metabolizable energy of seeds produced outside of Suisun Marsh. Given the  
25 assumption that managed seasonal wetlands in Suisun could be enhanced to provide high food  
26 biomass and high food quality (equal to wetlands in the Central Valley), 5,000 acres of managed  
27 wetlands protected and managed for high biomass and high food quality would mitigate the  
28 conversion of 8,857 acres of managed seasonal wetland to tidal marsh.
- 29 ● Scenario 2) Assume that the managed seasonal wetlands lost provide medium food biomass and  
30 medium food quality. Under this assumption, the managed seasonal wetlands in Suisun Marsh  
31 produce 75% of the seed biomass of seasonal wetlands elsewhere in the Central Valley, and  
32 these seeds have 80% of the metabolizable energy of seeds produced outside of Suisun Marsh.  
33 Given the assumption that managed seasonal wetlands in Suisun Marsh could be enhanced to  
34 provide high food biomass and high food quality (equal to wetlands in the Central Valley),  
35 13,300 acres of managed wetlands protected and managed for high biomass and high food  
36 quality would mitigate the conversion of 8,857 acres of managed seasonal wetland to tidal  
37 marsh.
- 38 ● Scenario 3) Assume that existing managed seasonal wetlands provide low food biomass and low  
39 food quality. Given the assumption that managed seasonal wetlands in Suisun Marsh could only  
40 be enhanced to provide medium food biomass and medium food quality (produce 75% of the  
41 seed biomass of seasonal wetlands elsewhere in the Central Valley, with these seeds having 80%  
42 of the metabolizable energy of seeds produced outside of Suisun Marsh), 8,800 acres of

1 managed wetlands protected and managed for medium biomass and medium food quality would  
2 mitigate the conversion of 8,857 acres of managed seasonal wetland to tidal marsh.

3 The BDCP has committed to protecting and enhancing a minimum of 5,000 acres of managed  
4 seasonal wetlands in Suisun Marsh to compensate for the loss of productivity from habitat  
5 conversion to tidal marsh. This minimum commitment of 5,000 acres would mitigate the reduced  
6 productivity resulting from conversion of managed seasonal wetlands under the assumptions that  
7 1) existing managed seasonal wetlands on average in Suisun Marsh provide low biomass and low-  
8 quality food to wintering waterfowl and 2) protected seasonal wetlands can be managed to produce  
9 high biomass and high food quality. However, the food biomass and productivity in Suisun Marsh  
10 would need to be quantified in order to determine if the 5,000 acres was sufficient to avoid an  
11 adverse effect on wintering waterfowl in the Suisun Marsh, or if additional mitigation would be  
12 needed. Mitigation Measure BIO-179a, *Conduct Food Studies and Monitoring for Wintering Waterfowl*  
13 *in Suisun Marsh*, would be available to address this potential effect.

14 **Yolo and Delta Basins:** The replacement of 1,400 acres of managed seasonal wetland with 19,000  
15 acres of palustrine tidal wetlands in the Delta watershed, and the replacement of 600 acres of  
16 managed seasonal wetlands with 2,000 acres of palustrine tidal wetlands in the Yolo watershed  
17 would not be expected to have an adverse effect on food productivity, under the assumption that  
18 these wetlands would provide adequate food sources. However, a monitoring component and a food  
19 study in these tidal habitats would be necessary in order to demonstrate that there would be a less  
20 than significant loss of food value in these habitats for wintering waterfowl. If it is determined from  
21 monitoring that there in fact would be a significant loss in food productivity resulting from habitat  
22 conversion to tidal wetlands, the protection and enhancement of managed wetlands in these  
23 watersheds would require mitigation for the change in food biomass and quality. Mitigation  
24 Measure *BIO-179b, Conduct Food Studies and Monitoring to Demonstrate Food Quality of Palustrine*  
25 *Tidal Wetlands in the Yolo and Delta Basins*, would be available to address this uncertainty.

26 **NEPA Effects:** There is considerable uncertainty about the biomass and nutritional quality of  
27 waterfowl foods produced in Suisun Marsh's managed wetlands, which makes it difficult to identify  
28 the level of effect that Alternative 1C habitat loss or conversion would have. The BDCP has  
29 committed to protecting and enhancing a minimum of 6,600 acres of managed seasonal wetlands in  
30 Suisun Marsh to compensate for the loss of productivity resulting from habitat conversion to tidal  
31 marsh. Of this 6,600 acres, at least 5,000 acres would be managed to benefit wintering waterfowl.  
32 This minimum commitment of 5,000 acres for wintering waterfowl would mitigate the reduced  
33 productivity from conversion of managed seasonal wetlands under the assumptions that 1) existing  
34 managed seasonal wetlands on average in Suisun Marsh provide low biomass and low-quality food  
35 to wintering waterfowl and 2) protected seasonal wetlands can be managed to produce high  
36 biomass and high-quality food. However, the food biomass and productivity in Suisun Marsh would  
37 need to be quantified to determine if the 5,000 acres would be sufficient for Alternative 1C to avoid  
38 an adverse effect on wintering waterfowl in the Suisun Marsh. Mitigation Measure BIO-179a,  
39 *Conduct Food Studies and Monitoring for Wintering Waterfowl in Suisun Marsh*, would be available to  
40 address this adverse effect.

41 The replacement of 1,400 acres of managed seasonal wetlands with 19,000 acres of palustrine tidal  
42 wetlands in the Delta watershed, and the replacement of 600 acres of managed seasonal wetlands  
43 with 2,000 acres of palustrine tidal wetlands in the Yolo watershed would not be expected to alter  
44 food productivity for wintering waterfowl. However, the conclusion that these new wetlands would  
45 provide adequate food sources is entirely dependent on assumptions about food production in

1 palustrine tidal habitats. Mitigation Measure BIO-179b, *Conduct Food Studies and Monitoring to*  
2 *Demonstrate Food Quality of Palustrine Tidal Wetlands in the Yolo and Delta Basins*, would be  
3 available to address this uncertainty and avoid an adverse effect on wintering waterfowl.

4 **CEQA Conclusion:** There is considerable uncertainty about the biomass and nutritional quality of  
5 waterfowl foods produced in Suisun Marsh's managed wetlands, which makes it difficult to identify  
6 the level of impact that Alternative 1C habitat loss or conversion would have. The BDCP has  
7 committed to protecting and enhancing a minimum of 6,600 acres of managed seasonal wetlands in  
8 Suisun Marsh to compensate for the loss of productivity resulting from habitat conversion to tidal  
9 marsh. Of this 6,600 acres, at least 5,000 acres would be managed to benefit wintering waterfowl.  
10 This minimum commitment of 5,000 acres for wintering waterfowl would mitigate the reduced  
11 productivity resulting from conversion of managed seasonal wetlands under the assumptions that  
12 1) existing managed seasonal wetlands on average in Suisun Marsh provide low biomass and low-  
13 quality food for wintering waterfowl and 2) protected seasonal wetlands can be managed to  
14 produce high biomass and high-quality food. However, the food biomass and productivity in Suisun  
15 Marsh would need to be quantified to determine if the 5,000 acres would be sufficient for  
16 Alternative 1C to avoid having a significant impact on wintering waterfowl in the Suisun Marsh, or if  
17 additional mitigation would be needed. Implementation of Mitigation Measure BIO-179a, *Conduct*  
18 *Food Studies and Monitoring for Wintering Waterfowl in Suisun Marsh*, would address this potential  
19 significant impact.

20 The replacement of 1,400 acres of managed seasonal wetlands with 19,000 acres of palustrine tidal  
21 wetlands in the Delta watershed, and the replacement of 600 acres of managed seasonal wetlands  
22 with 2,000 acres of palustrine tidal wetlands in the Yolo watershed would not be expected to alter  
23 food productivity. However, the conclusion that these tidal wetlands would provide adequate food  
24 sources for wintering waterfowl is entirely dependent on assumptions about food production in  
25 palustrine tidal habitats. Studies of food biomass and food quality in palustrine tidal habitats are  
26 needed to confirm that no mitigation for wintering waterfowl would be required in the Yolo and  
27 Delta Basins. Implementation of Mitigation Measure BIO-179b, *Conduct Food Studies and Monitoring*  
28 *to Demonstrate Food Quality of Palustrine Tidal Wetlands in the Yolo and Delta Basins*, would address  
29 this uncertainty and would reduce this impact on wintering waterfowl to a less-than-significant  
30 level.

### 31 **Mitigation Measure BIO-179a: Conduct Food Studies and Monitoring for Wintering** 32 **Waterfowl in Suisun Marsh**

33 Poorly managed wetlands (considered low biomass and food quality) will be identified and  
34 managed by BDCP proponents to improve food quality and biomass. Studies will be required to  
35 quantify 1) food production of existing managed wetlands in Suisun Marsh and 2) energetic  
36 productivity of brackish and tidal marsh habitats. Protected wetlands will be monitored to  
37 measure changes in the energetic productivity of these sites. Based on the food studies and  
38 monitoring results, BDCP proponents will determine if the minimum commitment of 5,000 acres  
39 is sufficient to meet the goal of 1:1 compensation for loss of wintering waterfowl habitat with  
40 the protection and management of managed wetlands in perpetuity. If monitoring demonstrates  
41 that additional acreage is needed to meet this goal, additional acreage of protection or creation  
42 of managed wetlands and management will be required.

1           **Mitigation Measure BIO-179b: Conduct Food Studies and Monitoring to Demonstrate**  
2           **Food Quality of Palustrine Tidal Wetlands in the Yolo and Delta Basins**

3           In order to address the uncertainty of the impact of loss of managed wetlands in the Yolo and  
4           Delta Basins on wintering waterfowl, BDCP proponents will conduct food studies and  
5           monitoring to demonstrate the food quality of palustrine tidal habitats in these basins. If studies  
6           show that the assumption of no effect was inaccurate, and the food quality goal of 1:1  
7           compensation for wintering waterfowl food value is not met, additional acreage of protection or  
8           creation of managed wetland and management will be required.

9           **Impact BIO-180: Loss or Conversion of Habitat for Breeding Waterfowl from Implementation**  
10          **of Conservation Components**

11          Implementation of Alternative 1C would reduce managed wetlands in the Yolo and Delta basins by  
12          437 acres and 1,155 acres respectively. Under the assumption that 15% of these wetlands are  
13          managed as semi-permanent wetlands, Alternative 1C implementation would reduce  
14          semipermanent wetlands in the Yolo and Delta drainage basins by 77 acres and 203 acres  
15          respectively. While a reduction in these semipermanent habitats would represent a habitat loss for  
16          breeding waterfowl, with the restoration of 24,000 acres of palustrine tidal wetlands (Table 3-4,  
17          Chapter 3) in the Yolo and Delta basins there would be a less than adverse effect on breeding  
18          waterfowl. These palustrine habitats would presumably contain water during the breeding period  
19          (i.e., March through July), and would be expected to compensate for the loss of 280 acres of managed  
20          semi-permanent wetlands in the Yolo and Delta watersheds attributed to Alternative 1C.

21          **Suisun Marsh:** Total managed wetlands in Suisun Marsh would decline from 41,012 acres to 30,640  
22          acres from the conversion of managed seasonal and semi-permanent wetlands to tidal habitats.  
23          Some of the remaining seasonal wetlands could be managed as semi-permanent wetlands to offset  
24          the loss of breeding habitat, but this could further reduce food supplies available to wintering  
25          waterfowl under the assumption that semi-permanent wetlands provide few food resources  
26          compared to seasonally managed habitats (Central Valley Joint Venture 2006).

27          The BDCP includes a commitment to protect and enhance 1,600 acres of permanently flooded  
28          managed wetlands in Suisun Marsh to provide habitat for breeding waterfowl. In addition, 5,000  
29          acres of semipermanent wetlands that would be protected and enhanced for wintering and  
30          migratory waterfowl (Objective MWNC1.1, BDCP Chapter 3, *Conservation Strategy*).

31          Food studies and monitoring would be necessary to determine how increases in tidal marsh and  
32          salinity levels would affect the overall reproductive capacity of the marsh. These studies would be  
33          needed in order to quantify impacts on breeding waterfowl in Suisun Marsh and to determine not  
34          only the number of acres that would compensate for loss of breeding habitat at a ratio of 1:1 for  
35          habitat value, but how those acres should be managed. Mitigation Measure BIO-180, *Conduct Food*  
36          *and Monitoring Studies of Breeding Waterfowl in Suisun Marsh*, would be available to address the  
37          uncertainty of this effect.

38          In addition to providing semipermanent wetlands to breeding waterfowl, the Suisun Marsh contains  
39          several key upland areas that have significant nesting value. The largest block of upland habitat in  
40          the region is the core area on the Grizzly Island Wildlife Area. This area does not overlap with the  
41          hypothetical footprint for *CM4 Tidal Natural Communities Restoration*. However, this core area  
42          includes over 2,000 acres of upland grasslands that have some of the highest duck nesting densities  
43          in California (Central Valley Joint Venture 2006). A few small wetland areas are scattered within this

1 core grassland mosaic that provide necessary freshwater brooding habitat. If restoration footprints  
2 were changed during the implementation process of BDCP to overlap with this area, the effects on  
3 breeding waterfowl would likely be greatly increased.

4 **NEPA Effects:** Alternative 1C would reduce managed wetlands in the Yolo and Delta basins by 437  
5 acres and 1,155 acres, respectively. Under the assumption that 15% of these wetlands are managed  
6 as semi-permanent wetlands, Alternative 1C would reduce semi-permanent wetlands in the Yolo  
7 and Delta drainage basins by 77 acres and 203 acres, respectively. The reduction in these semi-  
8 permanent habitats would represent a habitat loss for breeding waterfowl. However, with the  
9 restoration of 24,000 acres of palustrine tidal wetlands in the Yolo and Delta basins, Alternative 1C  
10 would not have an adverse effect on breeding waterfowl. These palustrine habitats would  
11 presumably contain water during the breeding period (March through July), and would be expected  
12 to compensate for the loss of 280 acres of managed semi-permanent wetlands in the Yolo and Delta  
13 watersheds attributed to Alternative 1C implementation. Total managed wetlands in Suisun Marsh  
14 would decline from 41,012 acres to 30,640 acres with the conversion of managed seasonal and  
15 semi-permanent wetlands to tidal habitats. Some of the remaining seasonal wetlands could be  
16 managed as semi-permanent wetlands to offset the loss of breeding habitat, but such management  
17 could further reduce food supplies available to wintering waterfowl under the assumption that  
18 semi-permanent wetlands provide few food resources compared with seasonally managed habitats.  
19 The protection and enhancement of 1,600 acres of permanently flooded managed wetlands would  
20 provide habitat for breeding waterfowl. However, food studies and monitoring would be necessary  
21 to determine how increases in tidal marsh and salinity levels would affect the overall reproductive  
22 capacity of the marsh. Therefore, the loss of breeding waterfowl habitat resulting from  
23 implementation of Alternative 1C could have an adverse effect. Mitigation Measure BIO-180, *Conduct*  
24 *Food and Monitoring Studies of Breeding Waterfowl in Suisun Marsh*, would be available to address  
25 the uncertainty of model assumptions and the potential adverse effect of habitat conversion on  
26 breeding waterfowl in Suisun Marsh.

27 **CEQA Conclusion:** Alternative 1C would reduce managed wetlands in the Yolo and Delta basins by  
28 437 acres and 1,155 acres, respectively. Under the assumption that 15% of these wetlands are  
29 managed as semi-permanent wetlands, Alternative 1C would reduce semi-permanent wetlands in  
30 the Yolo and Delta drainage basins by 77 acres and 203, acres respectively. The reduction in these  
31 semi-permanent habitats would represent a habitat loss for breeding waterfowl. However, with the  
32 restoration of 24,000 acres of palustrine tidal wetlands in the Yolo and Delta basins, Alternative 1C  
33 would have a less-than-significant impact on breeding waterfowl. These palustrine habitats would  
34 presumably contain water during the breeding period (March through July), and would be expected  
35 to compensate for the loss of 280 acres of managed semi-permanent wetlands in the Yolo and Delta  
36 watersheds attributed to Alternative 1C.

37 Total managed wetlands in Suisun Marsh would decline from 41,012 acres to 30,640 acres with the  
38 conversion of managed seasonal and semi-permanent wetlands to tidal habitats. Some of the  
39 remaining seasonal wetlands could be managed as semi-permanent wetlands to offset the loss of  
40 breeding habitat, but this management could further reduce food supplies available to wintering  
41 waterfowl under the assumption that semi-permanent wetlands provide few food resources  
42 compared with seasonally managed habitats. The protection and enhancement of 1,600 acres of  
43 permanently flooded managed wetlands would provide habitat for breeding waterfowl. However,  
44 food studies and monitoring would be necessary to determine how increases in tidal marsh and  
45 salinity levels would affect the overall reproductive capacity of the marsh. Therefore, the loss or  
46 conversion of habitat from implementation of Alternative 1C could have a significant impact on

1 breeding waterfowl in Suisun Marsh. Implementation of Mitigation Measure BIO-180, *Conduct Food*  
2 *and Monitoring Studies of Breeding Waterfowl in Suisun Marsh*, would address the uncertainty of  
3 model assumptions and reduce the impact to a less-than-significant level.

4 **Mitigation Measure BIO-180: Conduct Food and Monitoring Studies of Breeding**  
5 **Waterfowl in Suisun Marsh**

6 To address the uncertainty of the impact of loss of managed wetlands in Suisun Marsh on  
7 breeding waterfowl, BDCP proponents will conduct food studies and monitoring to determine  
8 how increases in tidal marsh and salinity levels will affect the overall reproductive capacity of  
9 the marsh.

10 The required studies will examine how increases in tidal marsh and salinity levels will affect the  
11 overall reproductive capacity of the Marsh. Reproductive studies will address but will not be  
12 limited to the following questions:

- 13 • How does the distribution of breeding waterfowl in Suisun Marsh differ in tidal versus  
14 managed habitats and across salinity gradients?
- 15 • How does waterfowl nest success and nest density vary with respect to tidal versus  
16 managed habitats and across salinity gradients?
- 17 • What are the patterns of habitat selection and movements by waterfowl broods in relation  
18 to tidal vs. managed habitats, and are there impacts on duckling survival?
- 19 • What is the current relationship between waterfowl reproductive success and interactions  
20 with alternate prey and predators, and how is tidal restoration likely to alter these  
21 relationships?

22 **Impact BIO-181: Loss or Conversion of Habitat for Shorebirds from Implementation of**  
23 **Conservation Components**

24 Shorebird use of the study area varies by species and fluctuates both geographically and by habitat  
25 type throughout the year. Shallow flooded agricultural fields and wetlands support large numbers of  
26 wintering and migrating shorebirds (Shuford et al. 1998), particularly least and western sandpipers,  
27 dunlin, greater yellowlegs and long-billed dowitcher. Rice lands of the Sacramento Valley provide  
28 important breeding habitat for shorebirds such as American avocet and black-necked stilt (Shuford  
29 et al. 2004) and have been designated as a Western Hemisphere Shorebird Reserve Network Site of  
30 International Importance (Hickey et al. 2003). Managed wetlands provide suitable foraging and  
31 roosting habitat for shorebirds; black-necked stilts, avocets, and yellowlegs use this habitat type  
32 almost exclusively. Water depth in all of these habitat types is an important habitat variable as the  
33 majority of shorebird species require water depths of approximately 10–20cm for foraging (Isola et  
34 al. 2000, Hickey et al. 2003).

35 ***Managed Wetlands***

36 **Yolo Basin:** Primarily as a result of *CM4 Tidal Natural Communities Restoration* within the Yolo  
37 Basin, 1,185 acres of managed wetland habitat would be permanently converted; 1,066 acres of  
38 which are protected. In addition, 42 acres of managed wetland habitat would be temporarily lost by  
39 construction-related activities associated with tidal restoration (CM4) and fisheries enhancement  
40 activities (CM2). Increased inundation frequency, depth and duration associated with the ongoing  
41 operation of a modified Fremont Weir (CM2) could periodically affect managed wetlands ranging

1 from an estimated 643 acres during a notch flow of 1,000 cfs to an estimated 2,055 acres during a  
2 notch flow of 4,000 cfs (Table 5.4-2, in BDCP Chapter 5, *Effects Analysis*) in the Yolo Basin.

3 **Delta Basin:** Within the Delta Basin, 90 acres of managed wetland habitat would be permanently  
4 converted, as a result of tidal restoration (CM4). Thirteen of the 90 acres are protected (Table 3, ICF  
5 International 2013). Periodic flooding would not affect this natural community type in Delta Basin.

6 **Suisun Basin:** Within the Suisun Basin, 11,532 acres of managed wetland habitat would be  
7 permanently converted as a result of tidal restoration (CM4); 10,354 of which are protected. (Table  
8 4, ICF International 2013). Periodic flooding would not affect this natural community type in Suisun  
9 Basin.

10 According to Stralberg et al. 2010, the following species of shorebirds had a rank 1 designation for  
11 managed wetland habitat suitability (Table 1, ICF International 2013): black-necked stilt  
12 (*Himantopus mexicanus*), greater yellowlegs (*Tringa melanoleuca*), and long-billed dowitcher  
13 (*Limnodromus scolopaceus*). Dunlin (*Calidris alpina*), least sandpiper (*Calidris minutilla*),  
14 semipalmated plover (*Charadrius semipalmatus*), and western sandpiper (*Calidris mauri*), had a rank  
15 2 for managed wetland habitat suitability. Black-bellied plover (*Pluvialis squatarola*) and whimbrel  
16 (*Numenius phaeopus*) both had rank 3 for managed wetland habitat suitability.

17 Managed wetlands would decrease in overall extent by 20% (Table 5, ICF International 2013). Most  
18 of this loss would occur in Suisun with some additional acreage loss in the Yolo Basin. The loss of  
19 managed wetland habitat for covered species and waterfowl would be compensated for with 8,200  
20 acres remaining managed wetland protection in Suisun Marsh. Of these 8,200 acres, the 5,000 acres  
21 of seasonal wetland protected, enhanced, and managed to provide overwintering waterfowl foraging  
22 habitat would be the habitat type most likely to benefit overwintering shorebirds. However, the  
23 1,600 acres of semi-permanent and permanent managed wetlands for breeding waterfowl and 1,500  
24 acres of managed wetlands for salt marsh harvest mouse would also be expected to have some  
25 benefit to wintering and breeding shorebirds.

### 26 **Cultivated Lands**

27 **Yolo Basin:** Primarily as a result of tidal restoration (CM4) and Fisheries Enhancement activities  
28 (CM2) within the Yolo Basin, 8,309 acres of cultivated lands would be permanently converted; 1,272  
29 acres of which are protected. Also within the Yolo Basin, increased inundation frequency, depth and  
30 duration associated with the ongoing operation of a modified Fremont Weir (CM2) could affect an  
31 estimated 3,219 acres of cultivated lands during a notch flow of 1,000 cfs to an estimated 5,512  
32 acres during a notch flow of 6,000 cfs (Table 5.4-2 in BDCP Chapter 5, *Effects Analysis*).

33 **Delta Basin:** Within the Delta Basin, as a result of tidal restoration (CM4) and floodplain restoration  
34 (CM5), 25,633 acres of cultivated lands would be permanently converted. There would also be an  
35 additional 112 acres lost temporarily due to CM5 activities. Of the total permanently converted  
36 lands, 3,925 acres are protected (Table 3, ICF International 2013). Seasonal flooding (CM5) on the  
37 restored floodplain would periodically affect 738 acres of cultivated lands in Delta.

38 According to Stralberg et al. 2010, the following species of shorebirds had a rank 1 designation for  
39 cultivated lands habitat suitability (Table 1, ICF International 2013): killdeer (*Charadrius*  
40 *vociferous*), long-billed curlew, and whimbrel within pasture habitat and sandhill crane was ranked  
41 1 for grain and hay crops. Long-billed dowitcher and killdeer both had a rank 2 for idle crop habitat  
42 suitability and black-bellied plover was ranked 2 for pasture habitat. Red-necked phalarope  
43 (*Phalaropus lobatus*) and Wilson's phalarope (*Phalaropus tricolor*) were both ranked 2 for grain and

1 hay crops. Long-billed dowitcher, dunlin, least sandpiper, and long-billed curlew were all ranked 3  
2 for rice habitat suitability and killdeer was ranked 3 for field crop habitat suitability.

3 Cultivated land loss would occur in all three basins, but the majority of acreage loss would occur in  
4 the Delta basin. Pasture crop types would decrease in overall extent by 15% over baseline (Table 5,  
5 ICF International 2013), but would increase in protection by 135%. More than half of all cultivated  
6 lands within the 48,000-acre BDCP cultivated lands reserve would be in pasture production  
7 (primarily alfalfa) and enhanced and managed to benefit Swainson's hawk. Idle crop types are not  
8 identified as a specific conservation target in the BDCP, are expected to occur within the reserve and  
9 are recognized in the BDCP as having "moderate" foraging habitat value for Swainson's hawk, white-  
10 tailed kite, and greater sandhill crane.

11 Grain and hay crop would be expected to decrease by 13% (Table 5, ICF International 2013) while  
12 protection, enhancement and management would be expected to increase by 28% (Table 6, ICF  
13 International 2013). These crop types would be managed for a tricolored blackbirds, Swainson's  
14 hawk, white-tailed kite, greater sandhill crane, and burrowing owls.

15 Rice would decrease in overall extent by 2% (Table 5, ICF International 2013) but increase in total  
16 protection by 57%. Rice lands would be protected, enhanced, and managed for the benefit for giant  
17 garter snake.

#### 18 **Tidal Wetlands**

19 **Yolo Basin:** As a result of tidal restoration (CM4) and Fisheries Enhancement activities (CM2)  
20 within the Yolo Basin, 194 acres of tidal wetland habitat would be permanently converted; 180 acres  
21 of which are protected. In addition, 12 acres of tidal wetland habitat would be temporarily lost by  
22 construction-related activities associated with Fisheries Enhancement activities (CM2) (Table 2, ICF  
23 International 2013). Periodic flooding in Yolo Bypass would affect 3,957 acres of tidal wetlands in  
24 Yolo Basin.

25 **Delta Basin:** Within the Delta Basin, 54 acres of tidal wetlands would be permanently converted as  
26 a result of tidal restoration (CM4) (Table 3, ICF International 2013). Of the total permanently  
27 converted lands, 26 acres are protected. Periodic flooding in Yolo Bypass would affect 26 acres of  
28 tidal wetlands in Delta Basin.

29 **Suisun Basin:** Within the Suisun Basin, 219 acres of tidal wetland habitat would be permanently  
30 converted as a result of tidal restoration (CM4); 215 of which are protected. (Table 4, ICF  
31 International 2013). Periodic flooding would not affect this natural community type in Suisun Basin.

32 According to Stralberg et al. 2010, the following species of shorebirds had a rank 1 designation for  
33 tidal mudflat habitat suitability (Table 6, ICF International 2013): black-bellied plover, dunlin, least  
34 sandpiper, marbled godwit (*Limosa fedoa*), semipalmated plover, short-billed dowitcher  
35 (*Limnodromus griseus*), western sandpiper, and willet (*Tringa semipalmata*). Long-billed curlew  
36 (*Numenius americanus*) and whimbrel both had a rank 2 for tidal mudflat habitat suitability.  
37 American avocet (*Recurvirostra americana*) was ranked 3 for tidal mudflat habitat suitability. For  
38 tidal brackish emergent wetland/tidal freshwater emergent wetland, willet was ranked 2 and long-  
39 billed curlew and whimbrel were both ranked 3 for habitat suitability.

40 Tidal mudflat habitat would be estimated to increase in extent by 1,780 acres. This extremely large  
41 increase in tidal mudflat habitat would occur almost exclusively in Suisun Marsh as the result of  
42 tidal restoration and the conversion of existing mid- and high-marsh types to low marsh and tidal

1 mudflats in response to sea level rise. BDCP Appendix 3.B, *BDCP Tidal Habitat Evolution Assessment*,  
2 details the methods and assumptions modeled to come about this result. Tidal mudflat habitats  
3 would be expected to require management, however, sediment augmentation has been discussed as  
4 an experimental method that could be employed in places like Suisun to combat the loss of intertidal  
5 marshes in the face of sea level rise and reduced sediment supplies.

6 Tidal emergent wetland habitat would increase in extent by 152% (Table 5, ICF International 2013).  
7 Of the 30,000 acres of emergent wetland restoration, 6,000 acres would be in the Suisun Basin and  
8 the rest would be distributed between the Yolo and Delta Basins. Enhancement and management on  
9 these lands would be likely to be focused on nonnative, invasive species management. Any  
10 additional actions in Suisun would be focused on salt marsh harvest mouse, Suisun shrew, California  
11 clapper rail, black rail, Suisun thistle, and soft bird's-beak. In freshwater marshes, enhancement and  
12 management would be likely to focus on black rail, western pond turtle, and, in some cases, giant  
13 garter snake.

#### 14 ***Nontidal Wetlands***

15 **Yolo Basin:** As a result of tidal restoration (CM4) and Fisheries Enhancement activities (CM2)  
16 within the Yolo Basin, 313 acres of nontidal wetland habitat would be permanently converted; 119  
17 acres of which are protected. In addition, 11 acres of nontidal wetland habitat would be temporarily  
18 lost by construction-related activities associated with Fisheries Enhancement activities (CM2)  
19 (Table 2, ICF International 2013). Periodic flooding in Yolo Bypass associated with ongoing Fremont  
20 Weir operation (CM2) would affect 305 acres of nontidal wetlands in Yolo Basin, specifically  
21 nontidal perennial aquatic habitat.

22 **Delta Basin:** Within the Delta Basin, 99 acres of nontidal wetlands would be permanently converted  
23 as a result of tidal restoration (CM4) and floodplain restoration (CM5) (Table 3, ICF International  
24 2013). There would also be 8 acres of nontidal perennial aquatic habitat temporarily lost from CM5  
25 activities. Of the total permanently converted lands, 29 acres are protected. Periodic flooding from  
26 CM5 would affect 4 acres of nontidal perennial aquatic habitat in Delta Basin.

27 **Suisun Basin:** Within the Suisun Basin, 1 acre of nontidal wetland habitat, specifically vernal pool  
28 complex, would be permanently converted as a result of tidal restoration (CM4); and is not  
29 protected. (Table 4, ICF International 2013). Periodic flooding would not affect this natural  
30 community type in Suisun Basin.

31 According to Stralberg et al. 2010, the following species of shorebirds had a rank 1 designation for  
32 nontidal wetland habitat suitability (Table 6, ICF International 2013): red-necked phalarope and  
33 Wilson's phalarope for nontidal freshwater perennial emergent wetland and American avocet for  
34 alkali seasonal wetland complex. Greater yellowlegs had a rank 2 for vernal pool complex habitat  
35 suitability. Red-necked phalarope and western sandpiper were both ranked 3 for alkali seasonal  
36 wetland habitat suitability and greater yellowlegs was ranked 3 for nontidal freshwater perennial  
37 emergent wetland habitat suitability.

38 Nontidal freshwater emergent wetland would increase in extent by 88% as a result of BDCP  
39 implementation (Table 5, ICF International 2013). These lands would be managed to benefit giant  
40 garter snake and located within the Delta Basin (likely in the vicinity of White Slough) and the Yolo  
41 Basin (in the Cache Slough area).

42 Impacts on wetted acres of vernal pool complex and alkali seasonal wetland complex would be  
43 avoided and thus loss of this community is not expected. However, up to 10 acres of wetted acre loss

1 could be permitted under the Plan. Protection of vernal pool complex natural community would  
2 increase by 13% and by 6% for alkali seasonal wetlands (Table 6, ICF International 2013).  
3 Protection of these two community types would enhance and manage habitat for vernal pool  
4 crustaceans and alkali-related plant species.

5 The protection and restoration of natural communities would also include management and  
6 enhancement actions under *CM11 Natural Communities Enhancement and Management*. The  
7 following management activities to benefit shorebirds would be considered for implementation  
8 under CM11, in areas where they would not conflict with covered species management.

9 ● Managed Wetlands

- 10 ○ Managed wetlands can be potentially manipulated to provide the optimum water depths for  
11 foraging shorebirds and islands for nesting (Hickey et al. 2003).
- 12 ○ During fall and spring, stagger the timing and location of draining and flooding to optimize  
13 the extent of shallow-water habitat; varying depths within the wetland unit helps to create  
14 temporal variation in foraging opportunities. During warm, dry springs when wetland units  
15 dry quickly, wetland units can be re-supplied with water to extend habitat availability for  
16 shorebirds.
- 17 ○ Provide open, shallow water habitat adjacent to minimally vegetated, shallowly sloped  
18 edges for nesting shorebirds between April and July.
- 19 ○ Provide islands with little to no vegetation to increase the likelihood of shorebird roosting  
20 and nesting.
- 21 ○ Create low slopes on islands and levees; gradual angles (10-12:1) are better than steep  
22 angles.
- 23 ○ Limit levee maintenance during the nesting season (April through July). However, mowing  
24 the center of levees is fine.
- 25 ○ Potentially add material to levees or to islands to encourage nesting for some species.

26 ● Cultivated Lands

- 27 ○ Maintaining a mosaic of dry and flooded crop types, and varying water depths will promote  
28 a diverse community of waterbirds, including shorebirds, during fall migration and winter  
29 (Shuford et al. 2013).
- 30 ○ To provide wintering habitat for multiple waterbird guilds, including shorebirds, use a  
31 combination of flooding practices that include one-time water application and maintenance  
32 flooding while also providing unflooded habitat (Strum et al. *in review*).
- 33 ○ The post-harvest flooding of winter wheat and potato fields in early fall (July- September)  
34 can provide substantial benefits to shorebirds at a time of very limited shallow-water  
35 habitat on the landscape (Shuford et al. 2013).
- 36 ○ Stagger the drawdown of flooded rice and other winter-flooded agricultural fields to  
37 prolong the availability of flooded habitat (Iglecia et al. 2012). Be aware of soil type because  
38 this practice may not be as effective on soils that drain quickly.
- 39 ○ Remove as much stubble as possible in rice and other agricultural fields after harvest to  
40 increase the potential shorebird habitat on intentionally flooded or unflooded fields that  
41 may passively gather rain water (Iglecia et al. 2012).

- 1           ○ Shallowly flood available agricultural fields during July, August, and September to provide  
2           early fall migration habitat for shorebirds. Fields should be free of vegetation prior to  
3           flooding, have minimal micro-topography (e.g. no large clods), and should remain flooded  
4           for up to three week periods (after three weeks, vegetation encroachment reduces habitat  
5           value for shorebirds; ICF International 2013).
- 6           ○ Manage levee habitats to have minimal vegetation but do not spray herbicide directly or  
7           drive on levees during the nesting season (April- July, Iglecia et al. 2012).
- 8           ○ Maintain a minimum top-width of 30 inches for levees, based on increased avocet use of  
9           wider levees (Iglecia et al. 2012).
- 10          ○ When possible, flood fields with nesting habitat (modified levees and islands) in late April to  
11          provide nesting habitat for American avocets (Iglecia et al. 2012).
- 12          ○ Finer grained substrate (clods smaller than a fist) in rice and other agricultural fields may be  
13          more appealing for nesting shorebirds (Iglecia et al. 2012).
- 14          ○ Maintain gently sloping levees and island sides (10-12:1; Iglecia et al. 2012).
- 15          ○ Islands should be disked along with the rest of the field after harvest to help inhibit  
16          vegetation growth (Iglecia et al. 2012).

17           **NEPA Effects:** Alternative 1C implementation would result in the conversion of managed wetland  
18           and cultivated lands to tidal natural communities, including tidal mudflat. The result would be  
19           substantial loss of the primary habitat of black-necked stilt, American avocet, greater yellowlegs,  
20           and long-billed dowitcher and a gain in the primary habitat of black-bellied plover, dunlin, least  
21           sandpiper, marbled godwit, semipalmated plover, short-billed dowitcher, western sandpiper, and  
22           willet. While substantial losses of cultivated lands would be incurred, protection, enhancement, and  
23           management of the remaining acres would likely have substantial benefits for select species of  
24           wintering and breeding shorebirds. This is because impacts on crop types would be distributed  
25           across all crop types, while protection would focus primarily on pasture lands, grain and hay, corn,  
26           and rice types. While the protection, enhancement, and management of these crop types are being  
27           driven by covered species, these management actions would also benefit shorebirds. The protection,  
28           enhancement, and management of remaining managed wetlands in Suisun Marsh, in compensation  
29           for the loss of substantial acreage, would have some incremental benefits for shorebirds, but would  
30           be unlikely to compensate for the overall loss. However, with the protection and restoration of acres  
31           in the Delta and Yolo watersheds, in addition to the implementation of the management actions  
32           outlined in *CM11 Natural Communities Enhancement and Management*, habitat conversion would not  
33           be expected to result in an adverse effect on shorebird populations in the study area.

34           **CEQA Conclusion:** Alternative 1C implementation would result in the conversion of managed  
35           wetland and cultivated lands to tidal natural communities, including tidal mudflat. The result would  
36           be significant loss of the primary habitat of black-necked stilt, American avocet, greater yellowlegs,  
37           and long-billed dowitcher and a gain in the primary habitat of black-bellied plover, dunlin, least  
38           sandpiper, marbled godwit, semipalmated plover, short-billed dowitcher, western sandpiper, and  
39           willet. While significant losses of cultivated lands would be incurred, protection, enhancement, and  
40           management of the remaining acres would likely have substantial benefits for select species of  
41           wintering and breeding shorebirds. This is because impacts on crop types would be distributed  
42           across all crop types, while protection would focus primarily on pasture lands, grain and hay, corn,  
43           and rice types. While the protection, enhancement, and management of these types are being driven  
44           by covered species, these management actions would also benefit shorebirds. The protection,

1 enhancement, and management of remaining managed wetlands in Suisun Marsh, in compensation  
2 for substantial acreage loss, would have some incremental benefits for shorebirds, but would be  
3 unlikely to compensate for the overall loss. However, with the protection and restoration of acres in  
4 the Delta and Yolo watersheds, in addition to the implementation of the management actions  
5 outlined in *CM11 Natural Communities Enhancement and Management*, habitat conversion would be  
6 expected to have a less-than-significant impact on shorebird populations in the study area.

7 **Impact BIO-182: Effects on Shorebirds and Waterfowl Associated with Electrical**  
8 **Transmission Facilities**

9 New transmission lines installed in the study area would increase the risk for bird-power line  
10 strikes, which could result in injury or mortality of shorebirds and waterfowl. The existing network  
11 of power lines in the study currently poses a risk for shorebirds and waterfowl in the Delta. New  
12 transmission lines would increase this risk and have an adverse effect on shorebird and waterfowl  
13 species in the absence of other conservation actions. The implementation of *AMM20 Greater Sandhill*  
14 *Crane* would reduce potential effects through the installation of flight-diverters on new transmission  
15 lines, and selected existing transmission lines in the study area.

16 **NEPA Effects:** New transmission lines would increase the risk for shorebird and waterfowl power  
17 line strikes. With the implementation of *AMM20 Greater Sandhill Crane*, the potential effect of the  
18 construction of new transmission lines on shorebird and waterfowl would not be adverse.

19 **CEQA Conclusion:** New transmission lines would increase the risk for shorebird and waterfowl  
20 power line strikes. The implementation of *AMM20 Greater Sandhill Crane* would reduce the potential  
21 impact of the construction of new transmission lines on shorebirds and waterfowl to a less-than-  
22 significant level.

23 **Impact BIO-183: Indirect Effects of Plan Implementation on Shorebirds and Waterfowl**

24 **Indirect construction- and operation-related effects:** Noise and visual disturbances associated  
25 with construction-related activities could result in temporary disturbances that affect shorebird and  
26 waterfowl use of modeled habitat. Indirect effects associated with construction include noise, dust,  
27 and visual disturbance caused by grading, filling, contouring, and other ground-disturbing  
28 operations. Construction-related noise and visual disturbances could disrupt nesting and foraging  
29 behaviors, and reduce the functions of suitable habitat which could result in an adverse effect on  
30 these species. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid*  
31 *Disturbance of Nesting Birds*, would be available to minimize adverse effects on active nests. The use  
32 of mechanical equipment during water conveyance construction could cause the accidental release  
33 of petroleum or other contaminants that could affect shorebirds and waterfowl or their prey in the  
34 surrounding habitat. AMM1–AMM7, including *AMM2 Construction Best Management Practices and*  
35 *Monitoring*, would minimize the likelihood of such spills from occurring. The inadvertent discharge  
36 of sediment or excessive dust adjacent to shorebirds and waterfowl in the study area could also have  
37 a negative effect on these species. AMM1–AMM7 would ensure that measures were in place to  
38 prevent runoff from the construction area and the negative effects of dust on wildlife adjacent to  
39 work areas.

40 **Methylmercury Exposure:** Covered activities have the potential to exacerbate bioaccumulation of  
41 mercury in avian species, including shorebird and waterfowl species. Marsh (tidal and nontidal) and  
42 floodplain restoration have the potential to increase exposure to methylmercury. Mercury is  
43 transformed into the more bioavailable form of methylmercury in aquatic systems, especially areas

1 subjected to regular wetting and drying such as tidal marshes and flood plains (Alpers et al. 2008).  
2 Thus, BDCP restoration activities that create newly inundated areas could increase bioavailability of  
3 mercury (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Species sensitivity  
4 to methylmercury differs widely and there is a large amount of uncertainty with respect to species-  
5 specific effects. Increased methylmercury associated with natural community and floodplain  
6 restoration could indirectly affect shorebirds and waterfowl, via uptake in lower trophic levels (as  
7 described in the BDCP, Appendix 5.D, *Contaminants*).

8 In addition, the potential mobilization or creation of methylmercury within the Plan Area varies  
9 with site-specific conditions and would need to be assessed at the project level. *CM12 Methylmercury*  
10 *Management* contains provisions for project-specific Mercury Management Plans. Site-specific  
11 restoration plans that address the creation and mobilization of mercury, as well as monitoring and  
12 adaptive management as described in CM12 would be available to address the uncertainty of  
13 methylmercury levels in restored tidal marsh and potential impacts on shorebirds and waterfowl.

14 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in  
15 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,  
16 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,  
17 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz  
18 2009). The effect of selenium toxicity differs widely between species and also between age and sex  
19 classes within a species. In addition, the effect of selenium on a species can be confounded by  
20 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith  
21 2009).

22 The primary source of selenium bioaccumulation in birds is through their diet (Ackerman and  
23 Eagles-Smith 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the  
24 trophic level at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At  
25 Kesterson Reservoir in the San Joaquin Valley, selenium concentrations in invertebrates have been  
26 found to be two to six times the levels in rooted plants. Furthermore, bivalves sampled in the San  
27 Francisco Bay contained much higher selenium levels than crustaceans such as copepods (Stewart et  
28 al. 2004). Studies conducted at the Grasslands in Merced County recorded higher selenium levels in  
29 black-necked stilts which feed on aquatic invertebrates than in mallards and pintails, which are  
30 primarily herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which  
31 forage on bivalves) have much higher levels of selenium levels than shorebirds that prey on aquatic  
32 invertebrates (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high  
33 levels of selenium have a higher risk of selenium toxicity.

34 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations  
35 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to  
36 exacerbate bioaccumulation of selenium in avian species, including shorebird and waterfowl  
37 species. Marsh (tidal and nontidal) and floodplain restoration have the potential to mobilize  
38 selenium, and therefore increase avian exposure from ingestion of prey items with elevated  
39 selenium levels. Thus, BDCP restoration activities that create newly inundated areas could increase  
40 bioavailability of selenium (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration).  
41 Changes in selenium concentrations were analyzed in Chapter 8, *Water Quality*, and it was  
42 determined that, relative to Existing Conditions and the No Action Alternative, CM1 would not result  
43 in substantial, long-term increases in selenium concentrations in water in the Delta under any  
44 alternative. However, it is difficult to determine whether the effects of potential increases in

1 selenium bioavailability associated with restoration-related conservation measures (CM4 and CM5)  
2 would lead to adverse effects on shorebirds and waterfowl species.

3 Because of the uncertainty that exists at this programmatic level of review, there could be a  
4 substantial effect on shorebirds and waterfowl from increases in selenium associated with  
5 restoration activities. This effect would be addressed through the implementation of *AMM27*  
6 *Selenium Management* (BDCP Appendix 3.C, *Avoidance and Minimization Measures*) which would  
7 provide specific tidal habitat restoration design elements to reduce the potential for  
8 bioaccumulation of selenium and its bioavailability in tidal habitats. Furthermore, the effectiveness  
9 of selenium management to reduce selenium concentrations and/or bioaccumulation would be  
10 evaluated separately for each restoration effort as part of design and implementation. This  
11 avoidance and minimization measure would be implemented as part of the tidal habitat restoration  
12 design schedule.

13 **NEPA Effects:** Noise and visual disturbances from the construction of Alternative 1C water  
14 conveyance facilities could reduce shorebird and waterfowl use of modeled habitat adjacent to work  
15 areas. Moreover, operation and maintenance of the water conveyance facilities, including the  
16 transmission facilities, could result in ongoing but periodic postconstruction disturbances that could  
17 affect shorebird and waterfowl use of the surrounding habitat. AMM1–AMM7 would minimize these  
18 effects, and Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid*  
19 *Disturbance of Nesting Birds*, would be available to address adverse effects on nesting individuals.  
20 Tidal habitat restoration could result in increased exposure of shorebirds and waterfowl to  
21 selenium. This effect would be addressed through the implementation of *AMM27 Selenium*  
22 *Management*, which would provide specific tidal habitat restoration design elements to reduce the  
23 potential for bioaccumulation of selenium and its bioavailability in tidal habitats. Therefore, the  
24 indirect effects associated with noise and visual disturbances, and increased exposure to selenium  
25 from Alternative 1C implementation would not have an adverse effect on shorebirds and waterfowl.  
26 Tidal habitat restoration is unlikely to have an adverse effect on shorebirds and waterfowl through  
27 increased exposure to methylmercury, as these species currently nest and forage in tidal marshes  
28 with elevated methylmercury levels. However, it is unknown what concentrations of methylmercury  
29 are harmful to species of waterfowl and shorebirds, and the potential for increased exposure would  
30 vary substantially within the study area. Site-specific restoration plans in addition to monitoring and  
31 adaptive management, described in *CM12 Methylmercury Management*, would address the  
32 uncertainty of methylmercury levels in restored tidal marsh. Once site-specific sampling and other  
33 information is developed, the site-specific planning phase of marsh restoration would be the  
34 appropriate place to assess the potential risk of shorebird and waterfowl exposure to  
35 methylmercury.

36 **CEQA Conclusion:** Noise, potential hazardous spills, and increased dust and sedimentation as a  
37 result of Alternative 1C water conveyance facilities construction and operation and maintenance  
38 would have a significant impact on shorebirds and waterfowl. AMM1–AMM7 would minimize these  
39 impacts, and implementation of Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird*  
40 *Surveys and Avoid Disturbance of Nesting Birds*, would reduce the impacts to a less-than-significant  
41 level. Tidal habitat restoration is unlikely to have a significant impact on shorebirds and waterfowl  
42 species through increased exposure to methylmercury, as these species currently nest and forage in  
43 tidal marshes with elevated methylmercury levels. However, it is unknown what concentrations of  
44 methylmercury are harmful to species of waterfowl and shorebirds. Site-specific restoration plans  
45 that address the creation and mobilization of mercury, as well as the monitoring and adaptive  
46 management described in *CM12*, would be the appropriate place to assess the potential risk of

1 shorebird and waterfowl exposure to methylmercury in the study area. Tidal habitat restoration  
2 could result in increased exposure of shorebirds and waterfowl to selenium. This effect would be  
3 addressed through the implementation of *AMM27 Selenium Management*, which would provide  
4 specific tidal habitat restoration design elements to reduce the potential for bioaccumulation of  
5 selenium and its bioavailability in tidal habitats. Therefore, the indirect effects of Alternative 1C  
6 implementation would have a less-than-significant impact on shorebirds and waterfowl.

7 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**  
8 **Disturbance of Nesting Birds**

9 See Mitigation Measure BIO-75 under Impact BIO-75.

10 **Common Wildlife and Plants**

11 Common wildlife and plants are widespread, often abundant, species that are not covered under  
12 laws or regulations that address conservation or protection of individual species. Examples of  
13 common wildlife and plants occurring in the study area are provided within the discussion for each  
14 natural community type in Section 12.1.2.2, *Special-Status and Other Natural Communities*. Impacts  
15 on common wildlife and plants would occur through the same mechanisms discussed for natural  
16 communities and special-status wildlife and plants for each alternative.

17 **Impact BIO-184: Effects on Habitat and Populations of Common Wildlife and Plants**

18 Effects on habitat of common wildlife and plants, including habitat removal and conversion, are  
19 discussed in the analysis of Alternative 1C effects on natural communities (Impacts BIO-1 through  
20 BIO-31). In general, effects on habitat of common wildlife and plants would not be adverse because  
21 effects would be greatly offset by protection, restoration and other conservation activities contained  
22 in the BDCP, including *CM3 Natural Communities Protection and Restoration*, *CM4 Tidal Natural*  
23 *Communities Restoration*, *CM5 Seasonally Inundated Floodplain Restoration*, *CM6 Channel Margin*  
24 *Enhancement*, *CM7 Riparian Natural Community Restoration*, *CM8 Grassland Natural Community*  
25 *Restoration*, *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*, *CM10 Nontidal Marsh*  
26 *Restoration*, and *CM11 Natural Communities Enhancement and Management*. In addition, the AMMs  
27 contained in Appendix 3.C of the BDCP are in place to reduce or eliminate the potential to adversely  
28 affect both special-status and common wildlife and plants.

29 Direct effects on common wildlife and plants from constructing water conveyance facilities and  
30 implementing Alternative 1C conservation measures would include construction or inundation-  
31 related disturbances that result in injury or mortality of wildlife or plants and the immediate  
32 displacement of wildlife. Indirect effects include project-related disturbances to nearby wildlife and  
33 plants during construction (e.g., disruption of breeding and foraging behaviors, fugitive dust, runoff)  
34 and effects occurring later in time (e.g., collisions of birds with transmission lines, habitat  
35 fragmentation). Indirect effects could result both from construction and from operations and  
36 maintenance (e.g., ground disturbances could result in the spread and establishment of invasive  
37 plants or noxious weeds).

38 **NEPA Effects:** The effects of constructing water conveyance facilities and restoring tidal and other  
39 habitats associated with Alternative 1C would not be adverse to common wildlife and plants  
40 because conservation measures to avoid or minimize effects on special-status species, to prevent the  
41 introduction and spread of invasive species, and to enhance natural communities would result in  
42 avoiding and minimizing effects on common wildlife and plants as well.

1 **CEQA Conclusion:** Construction and operation of the water conveyance facilities and habitat  
2 restoration activities would have impacts on common wildlife and plants in the study area through  
3 habitat loss and through direct or indirect loss or injury of individuals. The loss of habitat would not  
4 be substantial, because habitat restoration would increase the amount and extent of habitat  
5 available for use by common wildlife and plant species. Conservation measures to avoid or minimize  
6 effects on special-status species, to prevent the introduction and spread of invasive species, and to  
7 enhance natural communities also would result in avoiding and minimizing effects on common  
8 wildlife and plants. Consequently, implementation of Alternative 1C is not expected to cause any  
9 populations of common wildlife or plants to drop below self-sustaining levels, and this impact would  
10 be less than significant. No mitigation would be required.

### 11 **Wildlife Corridors**

12 Essential Connectivity Areas (ECAs) are lands likely to be important to wildlife movement between  
13 large, mostly natural areas at the state wide level. The ECAs form a functional network of wildlands  
14 that are considered important to the continued support of California's diverse natural communities.  
15 Four general areas were identified within the study area that contain ECAs (Figure 12-2). The BDCP  
16 also identified important landscape linkages in the Plan Area to guide reserve design, which can also  
17 be seen on Figure 12-2.

### 18 **Impact BIO-185: Effect of BDCP Conservation Measures on Wildlife Corridors**

19 Alternative 1C water conveyance facilities would cross one of the ECAs identified during the  
20 analysis, the Stone Lake-Yolo Bypass ECA. The conveyance facilities would also cross one landscape  
21 linkage identified in the BDCP, the *West to Contra Costa County* linkage (#2 in Figure 12-2). Though  
22 the conveyance facilities shown on Figure 12-2 overlap with the line representing the *Yolo Bypass*  
23 (#3 in Figure 12-2) and the *Sacramento River* linkage (#9 in Figure 12-2) these lines generally  
24 represent the course of the flooded Yolo Bypass and Sacramento River, respectively, and are  
25 intended to address the needs of fish species and will thus not be addressed in this chapter.

26 The construction of Intakes 1 and 2 and associated borrow/spoils areas near Clarksburg would  
27 occur within the Stone Lake-Yolo Bypass ECA. These activities would result in the permanent loss of  
28 narrow strips of riparian vegetation along the Sacramento River and the permanent and temporary  
29 loss of agricultural lands. These habitat losses would not substantially impede the movement of any  
30 wildlife that could move from Stone Lakes to Yolo Bypass because the Sacramento River and  
31 Sacramento Deep Water Shipping Channel already create a barrier to dispersal for nonavian species  
32 and the loss of the narrow strips of riparian vegetation and agricultural lands would not impede the  
33 movement of bird species between these areas. Though the loss of the narrow strips of riparian  
34 vegetation and cultivated lands would not substantially impede the movement of bird species  
35 between these areas the addition of new transmission lines could adversely affect birds during  
36 periods of low visibility. Sandhill cranes that are known to roost at Stones Lakes could particularly  
37 be adversely affected by the addition of the north-south running transmission line to the west of  
38 Stone Lakes (see impact discussions for greater and lesser sandhill cranes). One record for  
39 Swainson's hawk would be affected by a borrow/spoils area. These effects are addressed in the  
40 Swainson's hawk effects analysis.

41 In general, the Alternative 1C conveyance canal would create a substantial barrier to the movement  
42 of nonavian terrestrial wildlife from north to south in CZ 3 from Hood west to the Sacramento Deep  
43 Water Ship Channel, from east to west where the canal turns to the south to where the canal flows

1 into the pipeline, and another barrier from east to west from where the pipeline spills into the canal  
2 east of Oakley south to where the canal would flow into the Byron Tract Forebay. There are records  
3 of Swainson's hawk, burrowing owl, and pond turtle that would be impacted by the canal but would  
4 not likely isolate any known populations of special-status species (California Department of Fish and  
5 Wildlife 2013). Transmission lines associated with this alternative could also affect the movement of  
6 avian species during periods of low visibility. Sandhill cranes are known to roost in the vicinity of a  
7 few of the lines, yet in general these lines are further to the west of the major roost sites and likely  
8 flight paths.

9 The Alternative 1C canal, work areas, and potential borrow and spoils area cross the *West to Contra*  
10 *Costa County* linkage just west of Clifton Court Forebay. This linkage was established to guide  
11 restoration and protection to provide habitat connectivity for vernal pool and alkali seasonal  
12 wetland species, California red-legged frog, California tiger salamander, and San Joaquin kit fox  
13 between the Plan Area and lands protected to the west in East Contra Costa County. The  
14 construction of these conveyance features would impact habitat and known populations vernal pool  
15 fairy shrimp, California tiger salamander, and California red-legged frog. The canal would not be a  
16 barrier for species moving from Clifton Court Forebay to the west because it is right up against the  
17 forebay but would remove and impact populations that are linked to populations to the west. The  
18 temporary work area on the west side of Italian Slough, where there is a record for California red-  
19 legged frog, would not serve as permanent barrier between this population and ones to the west.

20 Restoration activities would occur in the ECAs within Yolo Bypass (*CM2 Yolo Bypass Fisheries*  
21 *Enhancement*) and within the Grizzly Island-Lake Marie ECA (*CM4 Tidal Natural Communities*  
22 *Restoration*). These activities would generally improve the movement of wildlife within and outside  
23 of the study area. In addition, the preservation of restored lands (CM3) and the enhancement and  
24 management of these areas (CM11) would improve and maintain wildlife corridors within the study  
25 area.

26 **NEPA Effects:** Despite the contributions from restoration and protection activities, Alternative 1C  
27 would create a substantial barrier to the movement of nonavian terrestrial wildlife in the central  
28 portion of the study area and the east-west movement of wildlife in south-central Delta to the west,  
29 and create barriers to safe movement of avian species during periods of low visibility. Alternative 1C  
30 would adversely affect wildlife corridors within the study area.

31 **CEQA Conclusion:** Alternative 1C water conveyance facilities would create a substantial barrier to  
32 the movement of nonavian terrestrial wildlife from north to south in CZ 3 from Hood west to the  
33 Sacramento Deep Water Ship Channel, from east to west where the canal turns to the south to where  
34 the canal flows into the pipeline, and another barrier from east to west from where the pipeline  
35 spills into the canal east of Oakley, south to where the canal would flow into the Byron Tract  
36 Forebay. There are records of Swainson's hawk, burrowing owl, and pond turtle that would be  
37 impacted by the canal but would not likely isolate any known populations of special-status species  
38 (California Department of Fish and Wildlife 2013). Transmission lines associated with this  
39 alternative could also affect the movement of avian species during periods of low visibility. Sandhill  
40 cranes are known to roost in the vicinity of a few of the lines, yet in general these lines are further to  
41 the west of the major roost sites and likely flight paths.

42 Restoration activities would occur in the ECAs within Yolo Bypass (*CM2 Yolo Bypass Fisheries*  
43 *Enhancement*) and within the Grizzly Island-Lake Marie ECA (*CM4 Tidal Natural Communities*  
44 *Restoration*). These activities would generally improve the movement of wildlife within and outside

1 of the study area. In addition, the preservation of restored lands (CM3) and the enhancement and  
2 management of these areas (CM11) would improve and maintain wildlife corridors within the study  
3 area.

4 Despite the contributions from restoration and protection activities, Alternative 1C would create a  
5 substantial barrier to the movement of nonavian terrestrial wildlife the central portion of the study  
6 area and create barriers to safe movement of avian species during periods of low visibility.  
7 Alternative 1C would result in significant unavoidable impacts on wildlife corridors within the study  
8 area. There is no practicable mitigation measure to reduce this impact to a less-than-significant  
9 level.

## 10 **Invasive Plant Species**

11 The invasive plant species that primarily affect each natural community in the study area, which  
12 include water hyacinth, perennial pepperweed, giant reed, and Brazilian waterweed, are discussed  
13 in Section 12.1.4. Invasive species compete with native species for resources and can alter natural  
14 communities by altering fire regimes, hydrology (e.g., sedimentation and erosion), light availability,  
15 nutrient cycling, and soil chemistry but also have the potential to harm human health and the  
16 economy by adversely affecting natural ecosystems, water delivery, flood protection systems,  
17 recreation, agricultural lands, and developed areas (Randall and Hoshovsky 2000). The construction  
18 and restoration activities covered under the BDCP could result in the introduction or spread of  
19 invasive plant species by creating temporary ground disturbance that provides opportunities for  
20 colonization by invasive plants in the study area.

21 The primary mechanisms for the introduction of invasive plants as the result of implementation of  
22 the BDCP are:

- 23 ● Grading, excavation, grubbing, and placement of fill material.
- 24 ● Breaching, modification, or removal of existing levees and construction of new levees.
- 25 ● Modification, demolition, and removal of existing infrastructure (e.g., buildings, roads, fences,  
26 electric transmission and gas lines, irrigation infrastructure).
- 27 ● Maintenance of infrastructure.
- 28 ● Removal of existing vegetation and planting/seeding of vegetation.
- 29 ● Maintaining vegetation and vegetation structure (e.g., grazing, mowing, burning, trimming).
- 30 ● Dredging waterways.

31 Clearing operations and the movement of vehicles, equipment, and construction materials in the  
32 study area would facilitate the introduction and spread of invasive plants by bringing in or moving  
33 seeds and other propagules. These effects would result from:

- 34 ● Spreading chipped vegetative material from clearing operations over topsoil after earthwork  
35 operations are complete.
- 36 ● Importing, distributing, storing, or disposing of fill, reusable tunnel material, borrow, spoil, or  
37 dredge material.
- 38 ● Traffic from construction vehicles (e.g., water and cement trucks) and personal vehicles of  
39 construction staff.

- Transport of construction materials and equipment within the study area and to/from the study area.

Table 12-1C-70 lists the acreages of temporary disturbance in each natural community in the study area that would result from implementation of Alternative 1C of the BDCP.

**Table 12-1C-70. Summary of Temporary Disturbance in Natural Communities under Alternative 1C**

Natural Community	Temporary Impacts (acres)
Tidal perennial aquatic	133
Tidal brackish emergent wetland	0
Tidal freshwater emergent wetland	2
Valley foothill riparian	209
Grassland	594
Inland dune scrub	0
Alkali seasonal wetland complex	9
Vernal pool complex	37
Other natural seasonal wetland	2
Nontidal freshwater perennial emergent wetland	6
Nontidal perennial aquatic	48
Managed wetlands	189
Cultivated lands	11,038
<b>Total</b>	<b>12,267</b>

6

**Impact BIO-186: Adverse Effects on Natural Communities Resulting from the Introduction and Spread of Invasive Plant Species**

Under Alternative 1C, the BDCP would have adverse effects on natural communities from the introduction and spread of invasive plant species through implementation of CM1–CM10 and CM22 (AMM6). No adverse effects are expected from implementation of CM11–CM21.

- *CM1 Water Facilities and Operations:* Construction of the Alternative 1C water conveyance facilities would result in the temporary disturbance of 10,224 acres that would provide opportunities for colonization by invasive plant species.
- *CM2 Yolo Bypass Fisheries Enhancements:* Construction of the Yolo Bypass fisheries enhancements would result in the temporary disturbance of 758 acres that would provide opportunities for colonization by invasive plant species. Vegetation maintenance activities for the Fremont Weir and Yolo Bypass improvements may include the removal of giant reed; however, the clearing of linear areas to facilitate water flow may also result increased opportunities for invasion. Sediment removal, transportation, and application as a source material for restoration or levee projects as part of Fremont Weir and Yolo Bypass maintenance activities could also result in the spread of invasives if the sediment contains viable invasive plant propagules.
- *CM3 Natural Communities Protection and Restoration:* The restoration activities in the natural communities located in the eleven CZs would result in the temporary disturbance of restoration areas that would provide opportunities for colonization by invasive plant species.

26

- 1       ● *CM4 Tidal Natural Communities Restoration*: The activities associated with the restoration of  
2 tidal perennial aquatic, tidal mudflat, tidal freshwater emergent wetland, and tidal brackish  
3 emergent wetland in ROAs would result in the temporary disturbance of tidal areas that would  
4 provide opportunities for colonization by invasive plant species. These adverse effects would be  
5 reduced by designing restoration projects to minimize the establishment of nonnative  
6 submerged aquatic vegetation, and early restoration projects would be monitored to assess the  
7 response of nonnative species to restoration designs and local environmental conditions. If  
8 indicated by monitoring results, the BDCP Implementation Office would implement invasive  
9 plant control measures in restored natural communities to help ensure the establishment of  
10 native marsh plain plant species. Additionally, the BDCP Implementation Office would actively  
11 remove submerged and floating aquatic vegetation in subtidal portions of tidal natural  
12 community restoration sites.
- 13       ● *CM5 Seasonally Inundated Floodplain Restoration*: Floodplain restoration levee construction  
14 would result in the temporary disturbance of 1,285 acres along channels in the north, east, and  
15 south Delta (San Joaquin, Old, and Middle Rivers) that would provide opportunities for  
16 colonization by invasive plant species.
- 17       ● *CM6 Channel Margin Enhancement*: The temporary effects of channel margin enhancement were  
18 not estimated because specific locations for this activity and their areal extent have not been  
19 developed. Channel margin enhancement (Sacramento River between Freeport and Walnut  
20 Grove, San Joaquin River between Vernalis and Mossdale, Steamboat and Sutter Sloughs, and  
21 salmonid migration channels in the interior Delta) would result in the temporary disturbance of  
22 channel areas that would provide opportunities for colonization by invasive plant species.
- 23       ● *CM7 Riparian Natural Community Restoration*: The restoration of valley/foothill riparian habitat  
24 would result in the temporary disturbance of riparian areas that would provide opportunities  
25 for colonization by invasive plant species.
- 26       ● *CM8 Grassland Natural Community Restoration*: The restoration of grassland habitat in CZs 1, 8  
27 and/or 11 would result in the temporary disturbance of degraded grassland or cultivated land  
28 that would provide opportunities for colonization by invasive plant species.
- 29       ● *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*: The restoration of vernal pool  
30 and alkali seasonal wetland complexes in CZs 1, 8, or 11 would result in the temporary  
31 disturbance of grassland areas that would provide opportunities for colonization by invasive  
32 plant species.
- 33       ● *CM10 Nontidal Marsh Restoration*: Nontidal marsh restoration, which would take place through  
34 conversion of agricultural lands in CZs 2 and 4, would result in the temporary disturbance of  
35 fallow agricultural areas that would provide opportunities for colonization by invasive plant  
36 species. These adverse effects would be reduced by monitoring the development of marsh  
37 vegetation to determine if nonnative vegetation needs to be controlled to facilitate the  
38 establishment of native marsh vegetation or if restoration success could be improved with  
39 supplemental plantings of native species. If indicated by monitoring, nonnative vegetation  
40 control measures and supplemental plantings would be implemented.
- 41       ● *CM22 Avoidance and Minimization Measures: AMM6 Disposal and Reuse of Spoils, Reusable Tunnel*  
42 *Material, and Dredged Material* would have adverse effects if spoil, reusable tunnel material,  
43 dredged material, or chipped vegetative materials containing viable invasive plant propagules  
44 are used as topsoil in uninfested areas.

1 The adverse effects that would result from the introduction and spread of invasive plants through  
2 colonization of temporarily disturbed areas would be minimized by implementation of CM11,  
3 AMM4, AMM10, and AMM11.

4 *CM11 Natural Communities Enhancement and Management* would reduce these adverse effects by  
5 implementing invasive plant control within the BDCP reserve system to reduce competition on  
6 native species, thereby improving conditions for covered species, ecosystem function, and native  
7 biodiversity. The invasive plant control efforts would target new infestations that are relatively easy  
8 to control or the most ecologically damaging nonnative plants for which effective suppression  
9 techniques are available. In aquatic and emergent wetland communities, Brazilian waterweed,  
10 perennial pepperweed, barbgrass, and rabbitsfoot grass would be controlled (and tidal mudflats  
11 would be maintained). In riparian areas, invasive plant control would focus on reducing or  
12 eliminating species such as Himalayan blackberry, giant reed, and perennial pepperweed. In  
13 grassland areas, techniques such as grazing and prescribed burning may be used to decrease the  
14 cover of invasive plant species.

15 Implementation of AMM4 and AMM10 in CM22 would also reduce the adverse effects that could  
16 result from construction activities. The AMMs provide methods to minimize ground disturbance,  
17 guidance for developing restoration and monitoring plans for temporary construction effects, and  
18 measures to minimize the introduction and spread of invasive plants. AMM4 would include the  
19 preparation and implementation of an erosion and sediment control plan that would control erosion  
20 and sedimentation and restore soils and vegetation in affected areas. The restoration and  
21 monitoring plans for implementation of AMM10 would include methods for stockpiling, storing, and  
22 restoring topsoil, revegetating disturbed areas, monitoring and maintenance schedules, adaptive  
23 management strategies, reporting requirements, and success criteria. AMM10 would also include  
24 planting native species appropriate for the natural community being restored, with the exception of  
25 some borrow sites in cultivated lands that would be restored as grasslands.

26 AMM11 specifies that the BDCP Implementation Office would retain a qualified botanist or weed  
27 scientist prior to clearing operations to determine if affected areas contain invasive plants. If areas  
28 to be cleared do contain invasive plants, then chipped vegetation material from those areas would  
29 not be used for erosion control but would be disposed to minimize the spread of invasive plant  
30 propagules (e.g., burning, composting). During construction of the water conveyance facilities and  
31 construction activities associated with the other CMs, construction vehicles and construction  
32 machinery would be cleaned prior to entering construction sites that are in or adjacent natural  
33 communities other than cultivated lands and prior to entering any BDCP restoration sites or  
34 conservation lands other than cultivated lands. Vehicles working in or travelling off paved roads  
35 through areas with infestations of invasive plant species would be cleaned before travelling to other  
36 parts of the Plan Area. Cleaning stations would be established at the perimeter of BDCP covered  
37 activities along construction routes as well as at the entrance to reserve system lands. Biological  
38 monitoring would include locating and mapping locations of invasive plant species within the  
39 construction areas during the construction phase and the restoration phase. Infestations of invasive  
40 plant species would be targeted for control or eradication as part of the restoration and revegetation  
41 of temporarily disturbed construction areas.

42 **NEPA Effects:** The implementation of AMM4, AMM10, AMM11, and CM11 under Alternative 1C  
43 would reduce the potential for the introduction and spread of invasive plants and avoid or minimize  
44 the potential effects on natural communities and special-status species; therefore, these effects  
45 would not be adverse.

1 **CEQA Conclusion:** Under Alternative 1C, impacts on natural communities from the introduction or  
2 spread of invasive plants as a result of implementing Alternative 1C would not result in the long-  
3 term degradation of a sensitive natural community due to substantial alteration of site conditions  
4 and would, therefore, be less-than-significant. No mitigation would be required.

## 5 **Compatibility with Plans and Policies**

### 6 **Impact BIO-187: Compatibility of the Proposed Water Conveyance Facilities and Other** 7 **Conservation Measures with Federal, State, or Local Laws, Plans, Policies, or Executive Orders** 8 **Addressing Terrestrial Biological Resources in the Study Area**

9 Constructing the water conveyance facilities (CM1) and implementing CM2–CM22 for Alternative 1C  
10 have the potential for being incompatible with plans and policies related to managing and protecting  
11 terrestrial biological resources of the study area. A number of laws, plans, policies, programs, and  
12 executive orders that are relevant to actions in the study area provide guidance for terrestrial  
13 biological resource issues as overviewed in Section 12.2, *Regulatory Setting*. This overview of plan  
14 and policy compatibility evaluates whether Alternative 1C would be compatible or incompatible  
15 with such enactments, rather than whether impacts would be adverse or not adverse, or significant  
16 or less than significant. If the incompatibility relates to an applicable plan, policy, or executive order  
17 adopted to avoid or mitigate terrestrial biological resource effects, then an incompatibility might be  
18 indicative of a related significant or adverse effect under CEQA and NEPA, respectively. Such  
19 physical effects of Alternative 1C on terrestrial biological resources are addressed in the discussions  
20 of impacts on natural communities and species. The following is a summary of compatibility  
21 evaluations related to terrestrial biological resources for laws, plans, policies, and executive orders  
22 relevant to the BDCP.

#### 23 **Federal and State Legislation**

- 24 ● The federal *Clean Water Act*, *Endangered Species Act*, *Fish and Wildlife Coordination Act*,  
25 *Migratory Bird Treaty Act*, *Rivers and Harbors Act* and *Marine Mammal Protection Act* all contain  
26 legal guidance that either directly or indirectly promotes or stipulates the protection and  
27 conservation of terrestrial biological resources in the process of undertaking activities that  
28 involve federal decisionmaking. The biological goals and objectives contained in the BDCP that  
29 provide the major guidance for implementing the various conservation elements of Alternative  
30 1C are all designed to promote the long-term viability of the natural communities, special-status  
31 species, and common species that inhabit the Plan Area. While some of the conservation  
32 measures of the alternative involve permanent and temporary loss of natural communities and  
33 associated habitats during facilities construction and expansion of certain natural communities,  
34 the long-term guidance in the Plan would provide for the long-term viability and expansion of  
35 the habitats and special-status species populations in the Plan Area. Alternative 1C conservation  
36 actions would be compatible with the policies and directives for terrestrial biological resources  
37 contained in these federal laws.
- 38 ● The *California Endangered Species Act*, *California Native Plant Protection Act*, *Porter-Cologne*  
39 *Water Quality Control Act*, and *Natural Communities Conservation Planning Act* are state laws  
40 that have relevance to the management and protection of terrestrial biological resources in the  
41 study area. Each of these laws promotes consideration of wildlife and native vegetation either  
42 through comprehensive planning or through regulation of activities that may have an adverse  
43 effect on the terrestrial and aquatic natural resources of the state. The BDCP, which is the basis  
44 for Alternative 1C, contains biological goals and objectives that have been developed to promote

1 the species protection and natural resource conservation that are directed by these state laws.  
2 Alternative 1C conservation actions would be compatible with the policies and directives  
3 contained in these laws.

- 4 ● The *Johnston-Baker-Andal-Boatwright Delta Protection Act of 1992* (Delta Protection Act) and the  
5 *Sacramento-San Joaquin Delta Reform Act*, which updated the Delta Protection Act, promote the  
6 maintenance and protection of natural resources and the protection of agricultural land uses in  
7 the Delta's primary zone through the goals and policies contained in the 2009 updated Land Use  
8 and Resources Management Plan (LURMP). While nothing in the LURMP is binding on state  
9 agencies that are BDCP proponents, the LURMP does promote restoration and enhancement of  
10 habitats for the terrestrial and aquatic species of the Delta on public land. The BDCP biological  
11 goals and objectives would be compatible with these LURMP goals (Delta Protection  
12 Commission 2010).
- 13 ● The *Suisun Marsh Preservation Act* of 1974 was designed to protect the Suisun Marsh for long-  
14 term use as wildlife habitat, with a goal of preserving and enhancing the quality and diversity of  
15 the Marsh's aquatic and wildlife habitats. The BDCP and its plans for protection and restoration  
16 of tidal marsh habitats in Suisun Marsh would be compatible with the intent of the Suisun Marsh  
17 Preservation Act.

#### 18 **Plans, Programs, and Policies**

- 19 ● *The Delta Plan*, which was developed by the Delta Stewardship Council in compliance with the  
20 2009 Sacramento-San Joaquin Delta Reform Act, is mandated to achieve two co-equal goals:  
21 provide for a more reliable water supply for California and protect, restore, and enhance the  
22 Delta ecosystem. The co-equal goals are to be achieved in a manner that protects and enhances  
23 the unique cultural, recreational, natural resource, and agricultural values of the Delta as an  
24 evolving place. The BDCP is intended to become a component of the Delta Plan. The Delta  
25 Stewardship Council will determine whether the BDCP is compatible with the goals and  
26 objectives of the Delta Plan prior to its incorporation into the Plan. The compatibility of the  
27 BDCP with the Delta Plan is considered in detail in Section 13.2.2.2 of Chapter 13, *Land Use*.
- 28 ● *California Wetlands Conservation Policy*, which was adopted by Executive Order in 1993,  
29 promotes a long-term gain in the quantity, quality and permanence of wetlands acreages and  
30 values in California. The Alternative 1C conservation measures that provide for a significant  
31 expansion of wetland acreage and quality in the Delta and Suisun Marsh would be compatible  
32 with the intent of the California Wetlands Conservation Policy.
- 33 ● *The North American Waterfowl Management Plan (NAWMP)* and *Central Valley Joint Venture*  
34 *(CVJV)* strive to maintain and expand wetlands and uplands for waterfowl and shorebirds in the  
35 major basins of California's Central Valley. The NAWMP is a management plan jointly approved  
36 by the United States and Canada in 1986. It contains general guidance from the principal wildlife  
37 management agencies of the two countries for sustaining abundant waterfowl populations by  
38 conserving landscapes through self-directed partnerships (joint ventures) that are guided by  
39 sound science. The CVJV is the joint venture established for overseeing NAWMP implementation  
40 in the Central Valley. The CVJV is made up of 21 conservation organizations, state and federal  
41 government agencies, and one corporation that have formed a partnership to improve the  
42 habitat conditions for breeding and nonbreeding waterfowl, breeding and nonbreeding  
43 shorebirds, waterbirds, and riparian-dependent songbirds in the Central Valley. The CVJV's  
44 2006 Implementation Plan (Central Valley Joint Venture 2006) establishes conservation

1 objectives and priorities for these bird groups within the basins of the Central Valley. The BDCP  
2 Plan Area includes all or portions of three Implementation Plan basins—the Delta, Yolo and  
3 Suisun basins. The 2006 Implementation Plan contains basin-specific objectives for wetland  
4 restoration, protection of existing wetland habitats, wetland enhancement, adequate power and  
5 water supplies for wetland management, agricultural land enhancement, farmland easements  
6 that maintain waterfowl food resources on agricultural land, and farmland easements that  
7 buffer existing wetlands from urban and residential growth.

8 Implementation of the Alternative 1C conservation measures would result in significant  
9 reductions in cultivated land and managed wetland acreage in the Delta, Yolo and Suisun basins;  
10 however, significant increases in tidal and nontidal wetlands in these basins would be another  
11 result. Because of the large conversion of managed wetland in the Suisun basin, the BDCP has  
12 included a large managed wetland conservation and enhancement goal for this area. For the  
13 Suisun basin conversions to be compatible with the 2006 Implementation Plan goals, this  
14 EIR/EIS has added mitigation that would require food production studies and adaptive  
15 management to ensure that the Suisun basin would continue to provide the waterfowl and  
16 shorebird habitat envisioned in the Implementation Plan.

- 17 ● *Stone Lakes National Wildlife Refuge Comprehensive Conservation Plan, Cosumnes River Preserve*  
18 *Management Plan, Brannan Island and Franks Tract State Recreation Areas General Plan, Yolo*  
19 *Bypass Wildlife Area Land Management Plan, Grizzly Island Wildlife Area Management Plan, and*  
20 *the Lower Sherman Island Wildlife Area Land Management Plan* are primarily designed to  
21 preserve and enhance the natural resource and recreation qualities of these areas.  
22 Implementing Alternative 1C, especially construction of CM1 and CM2 facilities, and land  
23 modification associated with CM4 restoration activities, could create temporary disruptions to  
24 the terrestrial biological resource management activities in these management areas. The  
25 ultimate goals of aquatic and terrestrial habitat enhancement and restoration contained in the  
26 BDCP would be compatible with the long-term management goals of these areas. Proposed  
27 restoration areas in the Yolo Bypass, on Sherman Island, and in Suisun Marsh would be designed  
28 to be compatible with and to complement the current management direction for these areas and  
29 would be required to adapt restoration proposals to meet current policy established for  
30 managing these areas.
- 31 ● *Suisun Marsh Preservation Agreement and Suisun Marsh Plan* are the most recent efforts by the  
32 state and federal agencies responsible for Suisun Marsh (the Marsh) to maintain its long-term  
33 viability as managed wetlands and wildlife habitat, consistent with the Suisun Marsh  
34 Preservation Act. The Suisun Marsh Preservation Agreement (SMPA) was signed in 1987 and  
35 modified in 2005 by DWR, CDFW, Reclamation and the Suisun Resource Conservation District to  
36 establish the mitigation approach in the Marsh for effects of operating the SWP and CVP. The  
37 primary concerns were the effects of CVP and SWP Delta diversions on salinity in the Marsh. The  
38 SMPA focused on ways to ensure adequate water quality and quantity for the managed wetlands  
39 and wildlife habitats in the Marsh to assure equal waterfowl values in the Marsh. The Suisun  
40 Marsh Plan (SMP), for which a Final EIS/EIR was released in 2010 by these agencies, provides  
41 for restoration of tidal marsh habitat and enhancement of managed wetland in the Marsh,  
42 maintenance of waterfowl hunting and recreational opportunities in the Marsh, maintenance  
43 and improvement of the Marsh levee system, and protection and enhancement of water quality  
44 for beneficial uses of the Marsh. An integral component of the SMP is balancing continued  
45 managed wetland operation with new tidal wetland restoration to provide improved and  
46 greater habitat for fish and wildlife species. The SMP is a programmatic, long-term plan and

1 does not include specific projects, project proponents, or funding mechanisms. However, the  
2 SMP relies on tidal restoration to allow for managed wetland operations to continue. The BDCP  
3 would provide a funding mechanism and increased management potential relative to existing  
4 and restored habitats, assisting the SMP in meeting its broader ecological goals, consistent with  
5 long-term operation of the SWP and CVP water conveyance facilities. The conservation actions  
6 contained in Alternative 1C, which are designed to ensure the long-term protection and  
7 recovery of special-status fish and wildlife species dependent on the Marsh, would be  
8 compatible with the water quality and habitat restoration goals of the SMPA and SMP.

- 9 ● *California Aquatic Invasive Species Management Plan* does not address terrestrial invasive  
10 species. Implementation of the Plan's long-term control and management objectives affect  
11 terrestrial species that utilize study area aquatic habitats. These effects are positive in that Plan  
12 objectives are to control and remove invasive aquatic species that are detrimental to native  
13 aquatic and terrestrial species. Implementation of BDCP's conservation actions would be  
14 undertaken with the goal of avoiding any further spread of aquatic invasive species. Alternative  
15 1C would, therefore, be compatible with the objectives of the California Aquatic Invasive Species  
16 Management Plan.
- 17 ● *Habitat Conservation Plans* and *Natural Community Conservation Plans* are the subject of a  
18 detailed analysis at the end of this chapter. The analysis considers the compatibility of the BDCP  
19 with all HCPs and NCCPs that share planning area with the BDCP Plan Area.

#### 20 **Executive Orders**

- 21 ● *Executive Order 11990: Protection of Wetlands* requires all federal agencies to consider wetland  
22 protection in their policies and actions. The BDCP proposes to protect, enhance and expand the  
23 wetlands of the Plan Area, and, therefore, would be compatible with Executive Order 11990.
- 24 ● *Executive Order 13112: Invasive Species* directs federal agencies to prevent and control the  
25 introduction and spread of invasive species in a cost-effective and environmentally sound  
26 manner. Alternative 1C construction and restoration actions have the potential to both  
27 introduce and spread invasive species in the study area. Implementation of mitigation measures  
28 described in this chapter would be capable of making Alternative 1C implementation compatible  
29 with Executive Order 13112.
- 30 ● *Executive Order 113443: Facilitation of Hunting Heritage and Wildlife Conservation* directs  
31 federal agencies whose activities affect public land management, outdoor recreation, and  
32 wildlife management to facilitate the expansion and enhancement of hunting opportunities, and  
33 the management of game species and their habitat. Alternative 1C conservation measures that  
34 involve conversion of cultivated land and managed wetland to tidal and nontidal wetlands and  
35 other natural communities would conflict with the hunting expansion and enhancement aspects  
36 of this executive order. Refer to Chapter 15, *Recreation*, for a detailed analysis of the effects of  
37 alternatives on hunting opportunities. The habitat protection and expansion conservation  
38 measures of Alternative 1C would be compatible with the executive order's goal of facilitating  
39 the management of habitats for some game species.

40 **CEQA Conclusion:** The potential plan and policy incompatibilities of implementing Alternative 1C  
41 identified in the analysis above indicate the potential for a physical consequence to the environment.  
42 The primary physical consequence of concern is the conversion of large acreages of cultivated lands  
43 and managed wetland to natural wetland and riparian habitat in the Plan Area. The physical effects  
44 are discussed in the *Shorebirds and Waterfowl* analysis above and no additional CEQA conclusion is

1 required related to the compatibility of the alternative with relevant plans and polices. The reader is  
2 referred to Section 13.2.3 of Chapter 13, *Land Use*, for a further discussion of the responsibilities of  
3 state and federal agencies to comply with local regulations and the relationship between plan and  
4 policy consistency and physical consequences to the environment.

1 **12.3.3.5 Alternative 2A—Dual Conveyance with Pipeline/Tunnel and Five**  
2 **Intakes (15,000 cfs; Operational Scenario B)**

3 Alternative 2A, which is described in Section 3.5.5 in Chapter 3, *Description of Alternatives*, and  
4 depicted in Figure 3-2, would affect terrestrial biological resources in a nearly identical fashion to  
5 Alternative 1A. For this reason, Alternative 2A is considered here in a summary fashion; the reader  
6 is referred to the discussion of Alternative 1A for a detailed description of impacts that would be  
7 associated with implementing Alternative 2A, and to Table 12-ES-1 for a summary comparison of  
8 natural community effects of Alternatives 1A and 2A. The impacts associated with Alternatives 1A  
9 and 2A were derived by comparing the alternative with the No Action Alternative for NEPA  
10 purposes, and with Existing Conditions for CEQA purposes.

11 **Comparative Differences in CM1 Construction Effects for Alternatives 1A and 2A**

12 The principal differences in effect between these two alternatives would be related to the differing  
13 construction footprints of the water conveyance facilities (CM1). The Alternative 2A water  
14 conveyance facilities could entail construction at north Delta Intakes 6 and 7 rather than 4 and 5.  
15 The locations of these intakes are depicted in Figure 3-2. Intakes 6 and 7 are located farther south  
16 on the Sacramento River, south of Sutter and Steamboat Sloughs. The analysis in this section  
17 assumes use of Intakes 6 and 7. The operational scenario for Alternative 2A (Scenario B) is also  
18 different from Alternative 1A (Scenario A), but the difference in water operations would not  
19 significantly change the operational effects on terrestrial biological resources in the study area.  
20 Alternative 2A operations would involve placement of a permanent in-stream operable barrier at  
21 the head of Old River in the south Delta and increased Delta freshwater outflows during September  
22 through November of some water years. All of the conservation measures other than CM1 would be  
23 the same as under Alternative 1A.

24 Due to the change in location of the two intakes and their associated pumps and pipelines,  
25 Alternative 2A would create minor differences in the permanent and temporary loss of natural  
26 communities and cultivated lands during water conveyance facilities construction when compared  
27 with Alternative 1A (Table 12-2A-1). All of these differences would occur during the near-term  
28 timeframe associated with water facilities construction. Alternative 2A would permanently remove  
29 3 fewer acres of valley/foothill riparian habitat along the Sacramento River, 7 acres more of  
30 grassland and 14 acres more of cultivated land in the same area when compared to Alternative 1A.  
31 Alternative 2A would also permanently affect a larger acreage of potential jurisdictional waters  
32 (including wetlands) as regulated by Section 404 of the CWA, when compared to Alternative 1A (1  
33 acre more). Refer to Table 12-1A-69 for a summary of Alternative 1A permanent and temporary  
34 jurisdictional waters and wetlands impacts.

35 During the water conveyance facilities construction process, Alternative 2A would involve slightly  
36 more temporary loss of habitat when compared with Alternative 1A because of the lengthy pipelines  
37 needed to serve Intakes 6 and 7. The differences would include cultivated lands east of the river  
38 (492 acres more), tidal perennial aquatic within the river channel (7 acres more), valley/foothill  
39 riparian along the river levee(4 acres more), and grassland along the river levee (9 acres more; see  
40 Table 12-2A-1). Alternative 2A would also temporarily affect a larger acreage of potential  
41 jurisdictional waters (including wetlands) as regulated by Section 404 of the CWA, when compared  
42 to Alternative 1A (19 acres more).

1 Note that the acres of habitat affected by CM1, as listed in Table 12-2A-1, would be acres affected in  
2 the near-term timeframe, or the first 10 years of Plan implementation. The acres represented in  
3 Table 12-2A-2 and Table 12-2A-3 for other conservation actions are for the late long-term  
4 timeframe; the numbers represent acres affected cumulatively over the entire 50-year period of the  
5 Plan. Table 3-4 in Chapter 3, *Description of Alternatives*, describes the schedule for implementation  
6 of natural community protection and restoration conservation measures over the course of the  
7 BDCP.

8 These mostly minor differences in permanent loss of habitat associated with constructing CM1  
9 would create minor differences in effects on covered and noncovered wildlife. The small increase in  
10 permanent loss of cultivated land (primarily alfalfa and irrigated pasture) associated with  
11 Alternative 2A would result in a slightly larger loss of foraging habitat for species such as tricolored  
12 blackbird, Swainson's hawk, white-tailed kite, short-eared owl, loggerhead shrike, northern harrier,  
13 and California horned lark. Alternative 2A would also increase the loss of low- and moderate-value  
14 habitat for western burrowing owl. The reduced level of valley/foothill riparian habitat loss would  
15 be a positive influence on breeding habitat for raptors, herons and egrets (great egret, snowy egret,  
16 great blue heron, Swainson's hawk, Cooper's hawk, white-tailed kite and black-crowned night  
17 heron), and migratory habitat for species that use the river corridor, such as western yellow-billed  
18 cuckoo. The larger temporary losses of cultivated land, grassland and valley/foothill riparian natural  
19 communities associated with Alternative 2A would have near-term effects on the special-status  
20 species that use these communities. There would be 241 more acres of foraging habitat temporarily  
21 lost under Alternative 2A for greater sandhill crane when compared to Alternative 1A because of the  
22 cultivated land loss. However, the effects would be offset in the near-term by AMMs adopted for  
23 specific species, including greater sandhill crane, and over time by on-site restoration required by  
24 *AMM10 Restoration of Temporarily Affected Natural Communities*.

25 The differences in effect that constructing CM1 for Alternatives 1A and 2A could have on special-  
26 status plant species are extremely minor. Habitat modeling indicates that Alternative 2A would  
27 permanently remove 1 less acre of side-flowering skullcap habitat and permanently remove one  
28 more acre of both Mason's lilaepsis and delta mudwort habitat when compared with Alternative  
29 2A.

30 The near-term conservation activities described and evaluated in Appendix 12D, *Feasibility*  
31 *Assessment of Conservation Measures Offsetting Water Conveyance Facilities Construction Impacts on*  
32 *Terrestrial Biological Resources*, would provide for protection, enhancement and restoration of  
33 habitats affected by the near-term water conveyance facilities construction activities. This  
34 conservation activity, which is part of the early implementation of the BDCP, would offset water  
35 conveyance facilities construction effects on both covered and noncovered special-status species in  
36 the study area.

1 **Table 12-2A-1. Alternative 2A Near-Term Effects of Water Conveyance Facilities (CM1) on Natural**  
2 **Communities (acres)<sup>a</sup>**

Natural Community	Total Existing Habitat in Study Area	Conveyance Option			
		Alternative 2A Removed Habitat (Permanent) <sup>c</sup>	Difference from Alternative 1A	Alternative 2A Removed Habitat (Temporary) <sup>d</sup>	Difference from Alternative 1A
Tidal perennial aquatic <sup>b</sup>	86,263	48	0	140	+7
Tidal brackish emergent wetland	8,501	0	0	0	0
Tidal freshwater emergent wetland	8,856	6	0	5	-1
Valley/foothill riparian	17,966	55	-3	32	+4
Nontidal perennial aquatic	5,567	12	0	9	0
Nontidal freshwater perennial emergent wetland	1,509	1	0	1	0
Alkali seasonal wetland complex	3,723	0	0	0	0
Vernal pool complex	12,133	3	0	0	0
Managed wetland	70,798	3	0	83	0
Other natural seasonal wetland	842	0	0	0	0
Grassland	78,047	322	+7	271	+9
Inland dune scrub	19	0	0	0	0
Cultivated lands	487,106	3,850	+14	2,683	+492

<sup>a</sup> Acreages in this table assume Alternative 2A would use north Delta Intakes 6 and 7, not 4 and 5. Impacts of 4 and 5 are addressed in Alternative 1A.

<sup>b</sup> Tidal mudflat has been included in the tidal perennial aquatic natural community.

<sup>c</sup> Features in this category include the following conveyance-related facilities: Forebay, Afterbay, Intake Facilities, Pump Stations, Permanent Access Roads, Shaft Locations, and Reusable Tunnel Material Storage Areas.

<sup>d</sup> Features in this category include the following construction-related work areas: Barge Unloading Facility, Control Structure Work Area, Intake Road Work Area, Intake Work Area, Pipeline, Pipeline Work Area, Road Work Area, Safe Haven Work Area, Temporary Access Road Work Area, Tunnel Work Area, Borrow/Spoil Area.

3

4 **Effects of Restoration-Related Conservation Actions of Alternative 2A**

5 The reader is referred to the Alternative 1A impact analysis above for the broader discussion of  
6 overall terrestrial biological resources effects that would result from implementation of restoration-  
7 related conservation measures under Alternative 2A. The principal effects of concern associated  
8 with both Alternative 1A and 2A are related to the conversion of large acreages of primarily  
9 cultivated lands, managed wetland, grassland and valley/foothill riparian habitat to tidal and other  
10 natural communities (CM2, CM4, CM5, CM7, CM8, CM10 and CM18; Table 12-2A-2 and Table 12-2A-  
11 3). These effects accrue to special-status species and common wildlife species, especially those that  
12 rely on cultivated lands and managed wetlands during some life stage. Foraging raptors and some  
13 waterbirds are regular inhabitants of the Delta's cultivated lands. The Delta's managed wetlands  
14 provide freshwater nesting, feeding and resting habitat for a large number of Pacific flyway

1 waterfowl and shorebirds, as well as nesting passerines, such as tricolored blackbird. Special-status  
2 plant species that occupy the tidal fringe in Suisun Marsh and parts of the Delta would be subject to  
3 losses associated with physical construction activity (levee breaching and reconstruction) and  
4 changes in water depth and salinity in their current habitat as a result of tidal marsh restoration.

5 **Table 12-2A-2. Alternative 2A Late Long-term Effects of Restoration Activities (CM2, CM4, CM5) that**  
6 **Affect Most Natural Communities (acres)**

Natural Community	Conservation Measure					
	CM2 <sup>b</sup>		CM4 <sup>c</sup>		CM5 <sup>d</sup>	
	Permanent <sup>e</sup>	Temporary <sup>f</sup>	Permanent <sup>e</sup>	Temporary <sup>f</sup>	Permanent <sup>e</sup>	Temporary <sup>f</sup>
Tidal perennial aquatic <sup>a</sup>	8	11	18	0	2	5
Tidal brackish emergent wetland	0	0	1	0	0	0
Tidal freshwater emergent wetland	6	0	1	0	1	1
Valley/foothill riparian	89	88	552	0	43	35
Nontidal perennial aquatic	24	12	189	0	28	16
Nontidal freshwater perennial emergent wetland	25	1	99	0	0	0
Alkali seasonal wetland complex	45	0	27	0	0	0
Vernal pool complex	0	0	372	0	0	0
Managed wetland	24	44	13,746	0	0	0
Other natural seasonal wetland	0	0	0	0	0	0
Grassland	388	239	1,122	0	51	34
Inland dune scrub	0	0	0	0	0	0
Cultivated lands	629	363	39,565	0	2,087	1,194

<sup>a</sup> Tidal mudflat has been included in the tidal perennial aquatic natural community.

<sup>b</sup> Yolo Bypass Fisheries Enhancement.

<sup>c</sup> Tidal Natural Communities Restoration.

<sup>d</sup> Seasonally Inundated Floodplain Restoration.

<sup>e</sup> Features in this category include the following: construction of fish passage structures and infrastructure in the Yolo Bypass, construction of permanent structures and infrastructure associated with restoration, and loss of habitat associated with removal and replacement by other habitats.

<sup>f</sup> Features in this category include the following: temporary work areas associated with construction of permanent restoration features, and temporary grading/vegetation removal associated with restoration activities.

7

1 **Table 12-2A-3. Alternative 2A Late Long-Term Effects of Restoration Activities (CM7, CM8, CM10,**  
2 **CM18) that Affect Only Grassland and Cultivated Lands (acres)**

Natural Community	Conservation Measure							
	CM7 <sup>a</sup>		CM8 <sup>b</sup>		CM10 <sup>c</sup>		CM18 <sup>d</sup>	
	Perm <sup>e</sup>	Temp <sup>f</sup>	Perm <sup>e</sup>	Temp <sup>f</sup>	Perm <sup>e</sup>	Temp <sup>f</sup>	Perm <sup>e</sup>	Temp <sup>f</sup>
Grassland	410	0	0	0	0	0	35	0
Cultivated lands	4,553	0	2,000	0	1,950	0	0	0

a Riparian Natural Community Restoration.

b Grassland Natural Community Restoration.

c Nontidal Marsh Restoration.

d Conservation Hatcheries.

e Features in this category include the following: construction of permanent structures and infrastructure associated with restoration, recreation facilities and hatcheries; and loss of habitat associated with removal and replacement by other habitats.

f Features in this category include the following: temporary work areas associated with construction of permanent restoration features, recreation facilities and hatcheries; and temporary grading/vegetation removal associated with restoration activities.

Perm = Permanent.

Temp = Temporary.

3  
4 Some of the permanent habitat loss associated with the restoration components of these  
5 alternatives would occur during the early, construction-related stage of the BDCP. Other losses  
6 would occur over time as some habitats (cultivated lands, managed wetland, valley/foothill riparian  
7 and grassland) are converted to tidal perennial aquatic, tidal brackish emergent wetland and tidal  
8 freshwater emergent wetland natural communities. The BDCP conservation components, including  
9 the restoration components (CM2-CM10), are designed to eventually replace and expand habitats  
10 that would have a positive influence on plant and animal species covered in the Plan. Similar  
11 benefits would accrue to noncovered special-status species and common wildlife in the study area.

12 **NEPA Effects:** Alternative 2A would not have adverse effects on the terrestrial natural communities,  
13 special-status species and common species that occupy the study area. The alternative also would  
14 not disrupt wildlife movement corridors, significantly increase the risk of introducing invasive  
15 species, result in a net loss of wetlands and other waters of the United States, reduce the value of  
16 habitat for waterfowl and shorebirds, or conflict with plans and policies that affect the study area. As  
17 with Alternative 1A, there would be large acreages of existing habitat converted by the Plan's  
18 conservation actions, including the construction of water conveyance tunnels from the north Delta  
19 to Clifton Court Forebay in the south Delta. The temporarily-affected habitat would be restored to its  
20 pre-project condition and the restoration conservation measures (CM2-CM10) would permanently  
21 replace primarily cultivated land and managed wetland with tidal and nontidal marsh, riparian  
22 vegetation, and grassland. The increases in acreage and value of the sensitive natural communities  
23 in the study area would have beneficial effects on covered and noncovered species. Where  
24 conservation actions would not fully offset effects, the Plan has developed AMMs and this document  
25 has included additional mitigation measures to avoid adverse effects. Alternative 2A would not  
26 require mitigation measures beyond what is proposed for Alternative 1A to offset effects.

1 **CEQA Conclusion:** Alternative 2A would not have significant and unavoidable impacts on the  
2 terrestrial natural communities, special-status species and common species that occupy the study  
3 area. The alternative also would not disrupt wildlife movement corridors, significantly increase the  
4 risk of introducing invasive species, result in a net loss of wetlands and other waters of the United  
5 States, reduce the value of habitat for waterfowl and shorebirds, or conflict with plans and policies  
6 that affect the study area. As with Alternative 1A, there would be large acreages of existing habitat  
7 converted by the Plan's conservation actions, including the construction of water conveyance  
8 tunnels from the north Delta to Clifton Court Forebay in the south Delta. The temporarily-affected  
9 habitat would be restored to its pre-project condition and the restoration conservation measures  
10 (CM2-CM10) would permanently replace primarily cultivated land and managed wetland with tidal  
11 and nontidal marsh, riparian vegetation, and grassland. The increases in acreage and value of the  
12 sensitive natural communities in the study area would have beneficial effects on covered,  
13 noncovered, and common species. Where conservation actions would not fully offset impacts, the  
14 Plan has developed AMMs and this document has included additional mitigation measures to avoid  
15 significant impacts. Alternative 2A would not require mitigation measures beyond what is proposed  
16 for Alternative 1A to offset effects.

17 As with Alternative 1A, Alternative 2A would require several mitigation measures to be adopted to  
18 reduce all effects on terrestrial biological resources to less-than-significant levels. These mitigation  
19 measures would be needed beyond the impact offsets provided by Alternative 2A AMMs and CM2-  
20 CM22 conservation actions. The relevant mitigation measures, which are included in detail in the  
21 analysis of Alternative 1A, are as follows:

- 22 • Mitigation Measure BIO-42: Avoid Impacts on Delta Green Ground Beetle and its Habitat
- 23 • Mitigation Measure BIO-43: Avoid and Minimize Loss of Callippe Silverspot Butterfly Habitat
- 24 • Mitigation Measure BIO-55: Conduct Preconstruction Surveys for Noncovered Special-Status  
25 Reptiles and Implement Applicable CM22 Measures
- 26 • Mitigation Measure BIO-66: California Least Tern Nesting Colonies Shall Be Avoided and Indirect  
27 Effects on Colonies Will Be Minimized
- 28 • Mitigation Measure BIO-69a: Compensate for the Loss of Medium to Very High-Value Greater  
29 Sandhill Crane Foraging Habitat
- 30 • Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid  
31 Disturbance of Nesting Birds
- 32 • Mitigation Measure BIO-91: Compensate for Near-Term Loss of High-Value Western Burrowing  
33 Owl Habitat
- 34 • Mitigation Measure BIO-113: Compensate for the Near-Term Loss of Golden Eagle and  
35 Ferruginous Hawk Foraging Habitat
- 36 • Mitigation Measure BIO-117: Avoid Impacts on Rookeries
- 37 • Mitigation Measure BIO-125: Compensate for the Near-Term Loss of Mountain Plover Wintering  
38 Habitat
- 39 • Mitigation Measure BIO-129a: Compensate for Loss of Black Tern Nesting Habitat
- 40 • Mitigation Measure BIO-130: Compensate for the Near-Term Loss of California Horned Lark and  
41 Grasshopper Sparrow Habitat

- 1 • Mitigation Measure BIO-138: Compensate for the Near-Term Loss of High-Value Loggerhead  
2 Shrike Habitat
- 3 • Mitigation Measure BIO-146: Active Bank Swallow Colonies Shall Be Avoided and Indirect  
4 Effects on Bank Swallow Will Be Minimized
- 5 • Mitigation Measure BIO-147: Monitor Bank Swallow Colonies and Evaluate Winter and Spring  
6 Flows Upstream of the Study Area
- 7 • Mitigation Measure BIO-162: Conduct Preconstruction Survey for American Badger
- 8 • Mitigation Measure BIO-166: Conduct Preconstruction Surveys for Roosting Bats and Implement  
9 Protective Measures
- 10 • Mitigation Measure BIO-170: Avoid, Minimize, or Compensate for Impacts on Noncovered  
11 Special-Status Plant Species
- 12 • Mitigation Measure BIO-179a: Conduct Food Studies and Monitoring for Wintering Waterfowl in  
13 Suisun Marsh
- 14 • Mitigation Measure BIO-179b: Conduct Food Studies and Monitoring to Demonstrate Food  
15 Quality of Palustrine Tidal Wetlands in the Yolo and Delta Basins
- 16 • Mitigation Measure BIO-180: Conduct Food and Monitoring Studies of Breeding Waterfowl in  
17 Suisun Marsh

### 18 **12.3.3.6 Alternative 2B—Dual Conveyance with East Alignment and Five** 19 **Intakes (15,000 cfs; Operational Scenario B)**

20 Alternative 2B, which is described in Section 3.5.6 of Chapter 3, *Description of Alternatives*, and  
21 depicted in Figure 3-4, would affect terrestrial biological resources in a similar fashion to  
22 Alternative 1B. For this reason, Alternative 2B is considered here in a summary fashion; the reader  
23 is referred to Alternative 1B for a detailed description of impacts that would be associated with  
24 implementing Alternative 2B, and to Table 12-ES-1 for a summary comparison of natural  
25 community effects of Alternatives 1B and 2B. The impacts associated with Alternatives 1B and 2B  
26 were derived by comparing the alternatives with the No Action Alternative for NEPA purposes, and  
27 with Existing Conditions for CEQA purposes.

### 28 **Comparative Differences in CM1 Construction Effects for Alternatives 1B and 2B**

29 The principal differences between these two alternatives would be related to the differing  
30 construction footprints of the water conveyance facilities (CM1). The Alternative 2B water  
31 conveyance facilities could entail construction at north Delta Intakes 6 and 7 rather than 4 and 5.  
32 The locations of these intakes are depicted in Figure 3-2. Intakes 6 and 7 are located farther south  
33 on the Sacramento River, south of Sutter and Steamboat Sloughs. This location change results in  
34 longer pipeline construction to move water from the Sacramento River to the East Canal. The  
35 analysis in this section assumes use of Intakes 6 and 7. The operational scenario for Alternative 2B  
36 (Scenario B) is also different from Alternative 1B (Scenario A), but the difference in water  
37 operations would not significantly change the operational effects on terrestrial biological resources  
38 in the study area. Alternative 2B operations would involve placement of a permanent operable  
39 barrier at the head of Old River in the south Delta and increased Delta freshwater outflows during  
40 September, October, and November of some water years. All of the conservation measures other  
41 than CM1 would be the same as under Alternative 1B.

1 Due to the change in location of the two intakes and their associated pumps and pipelines,  
 2 Alternative 2B would create minor differences in permanent and larger differences in temporary  
 3 loss of natural communities and cultivated lands during water conveyance facilities construction  
 4 when compared with Alternative 1B (Table 12-2B-1). All of these differences would occur in the  
 5 near-term timeframe associated with water facilities construction. Alternative 2B would  
 6 permanently remove 3 fewer acres of valley/foothill riparian habitat along the Sacramento River  
 7 and 1 fewer acre of cultivated land (primarily alfalfa and irrigated pasture) just east of the river.  
 8 When compared with Alternative 1B, Alternative 2B would permanently remove 6 acres more of  
 9 grassland and 1 acre more of tidal perennial aquatic natural community along the eastern bank of  
 10 the river at intake sites. Alternative 2B would also permanently affect a larger acreage of potential  
 11 jurisdictional waters (including wetlands) as regulated by Section 404 of the CWA, when compared  
 12 to Alternative 1B (50 acres more). Refer to Table 12-1B-69 for a summary of Alternative 1B  
 13 permanent and temporary jurisdictional waters and wetlands impacts.

14 **Table 12-2B-1. Alternative 2B Near-Term Effects of Water Conveyance Facilities (CM1) on Natural**  
 15 **Communities (acres)<sup>a</sup>**

	Total Existing Habitat in Study Area	Conveyance Option			
		Alternative 2B Removed Habitat (Permanent) <sup>c</sup>	Difference from Alternative 1B	Alternative 2B Removed Habitat (Temporary) <sup>d</sup>	Difference from Alternative 1B
Natural Community					
Tidal perennial aquatic <sup>b</sup>	86,263	34	+1	171	+26
Tidal brackish emergent wetland	8,501	0	0	0	0
Tidal freshwater emergent wetland	8,856	8	0	16	+5
Valley/foothill riparian	17,966	48	-3	56	+17
Nontidal perennial aquatic	5,567	19	0	5	0
Nontidal freshwater perennial emergent wetland	1,509	5	0	7	+1
Alkali seasonal wetland complex	3,723	0	0	0	0
Vernal pool complex	12,133	4	0	0	0
Managed wetland	70,798	6	0	20	+2
Other natural seasonal wetland	842	0	0	0	0
Grassland	78,047	406	+6	382	+24
Inland dune scrub	19	0	0	0	0
Cultivated lands	487,106	7,885	-1	13,047	+496

<sup>a</sup> Acreages in this table assume Alternative 2B would use north Delta Intakes 6 and 7, not 4 and 5. Impacts of 4 and 5 are addressed in Alternative 1B.

<sup>b</sup> Tidal mudflat has been included in the tidal perennial aquatic natural community.

<sup>c</sup> Features in this category include the following conveyance-related facilities: Canal, Forebay, Afterbay, Intake Facilities, Pump Stations, Permanent Access Roads, Shaft Locations, and Reusable Tunnel Storage Areas.

<sup>d</sup> Features in this category include the following construction-related work areas: Canal Work Area, Barge Unloading Facility, Control Structure Work Area, Intake Road Work Area, Intake Work Area, Pipeline, Pipeline Work Area, Road Work Area, Safe Haven Work Area, Temporary Access Road Work Area, Tunnel Work Area, and Borrow/Spoil Areas

1 During the water conveyance facilities construction process, Alternative 2B would involve  
2 significantly more temporary loss of tidal perennial aquatic habitat (26 acres), valley/foothill  
3 riparian habitat (17 acres) and grassland (24 acres). These temporary losses would occur primarily  
4 along Snodgrass Slough and the north-south irrigation canal just east of the slough. The Alternative  
5 2B pipelines would also temporarily affect greater acreages of cultivated land (496 acres more),  
6 including alfalfa, vineyard, orchard and other cultivated cropland. There would be much smaller  
7 differences in the acreage of temporary effect on managed wetland and tidal freshwater emergent  
8 wetland (Table 12-2B-1). Alternative 2B would also temporarily affect a larger acreage of potential  
9 jurisdictional waters (including wetlands) as regulated by Section 404 of the CWA, when compared  
10 to Alternative 1B (49 acres more).

11 Note that the acres of habitat affected by CM1, as listed in Table 12-2B-1, would be acres affected in  
12 the near-term timeframe, or the first 10 years of Plan implementation. The acres represented in  
13 Table 12-2B-2 and Table 12-2B-3 for other conservation actions are for the late long-term  
14 timeframe; the numbers represent acres affected cumulatively over the entire 50-year period of the  
15 Plan. Table 3-4 in Chapter 3, *Description of Alternatives*, describes the schedule for implementation  
16 of natural community protection and restoration conservation measures over the course of the  
17 BDCP.

18 The mostly minor differences in permanent loss of habitat associated with constructing CM1 would  
19 create minor differences in effects on covered and noncovered wildlife species. The small reductions  
20 in permanent loss of alfalfa and irrigated pasture associated with Alternative 2B would result in a  
21 slightly smaller loss of foraging habitat for species such as tricolored blackbird, Swainson's hawk  
22 and white-tailed kite. Alternative 2B would result in a slightly smaller permanent loss (20 acres) of  
23 crane foraging habitat compared to Alternative 1B. Alternative 2B would also reduce the loss of low-  
24 and moderate-value habitat for western burrowing owl. The reduced level of valley/foothill riparian  
25 habitat loss would be a positive influence on breeding habitat for raptors and migratory habitat for  
26 species that use the river corridor, such as western yellow-billed cuckoo.

27 The larger acreages of temporary losses of tidal perennial aquatic and tidal freshwater emergent  
28 wetland habitat would affect a number of wetland habitat-dependent birds and reptiles, including  
29 tricolored blackbird, least bittern, giant garter snake and western pond turtle. Construction across  
30 Snodgrass Slough and the adjacent irrigation canal could disrupt both foraging and migration  
31 activities of giant garter snake. The temporary losses of valley/foothill riparian habitat would affect  
32 roosting and nesting habitat for bird species such as Swainson's hawk, white-tailed kite, great egret,  
33 snowy egret, great blue heron, Cooper's hawk, and black-crowned night heron. Temporary losses of  
34 grassland between the Sacramento River and the East Canal would reduce foraging habitat for  
35 species such as short-eared owl, northern harrier, mountain plover, California horned lark, and  
36 greater sandhill crane. Grassland loss would also reduce refugia for giant garter snake. The  
37 temporary losses in cultivated acreage, especially alfalfa and other cultivated cropland, would  
38 reduce foraging habitat for species such as Swainson's hawk, greater sandhill crane, short-eared  
39 owl, mountain plover, and loggerhead shrike. There would be 214 more acres of foraging habitat  
40 temporarily lost under Alternative 2B for greater sandhill crane when compared to Alternative 1B  
41 because of the cultivated land loss. However, the effects of Alternative 2B would be offset in the  
42 near-term by AMMs adopted for specific species, including greater sandhill crane, and over time by  
43 on-site restoration required by *AMM10 Restoration of Temporarily Affected Natural Communities*.

44 The differences in effect that constructing CM1 for Alternatives 1B and 2B could have on special-  
45 status plant species are extremely minor. Habitat modeling indicates that Alternative 2B would

1 create 1 less acre of permanent loss of side-flowering skullcap habitat and 1 acre more of temporary  
2 loss for the same plant. For both delta mudwort and Mason's lilaepsis, Alternative 2B would  
3 permanently remove 1 more acre and temporarily remove 4 more acres of habitat compared to  
4 Alternative 1B. The near-term conservation activities discussed in Appendix 12D, *Feasibility*  
5 *Assessment of Conservation Measures Offsetting Water Conveyance Facilities Construction Impacts on*  
6 *Terrestrial Biological Resources*, would provide for conservation, enhancement and replacement of  
7 habitats affected by the early water conveyance facility construction activities. This conservation  
8 activity, which is part of the early implementation of the BDCP, would offset water conveyance  
9 facilities construction effects on both covered and noncovered special-status species in the study  
10 area.

## 11 **Effects of Restoration-Related Conservation Actions of Alternative 2B**

12 The reader is referred to the Alternative 1B impact analysis above for the broader discussion of  
13 overall terrestrial biological resources effects that would result from implementation of restoration-  
14 related conservation measures under Alternative 2B. The principal effects of concern associated  
15 with both Alternatives 1B and 2B are related to the conversion of large acreages of cultivated lands,  
16 managed wetland, grassland and valley/foothill riparian habitat to tidal marsh and other habitat  
17 types (CM2, CM4, and CM5; Table 12-2B-2 and CM7, CM8, CM10, and CM18; Table 12-2B-3). These  
18 effects accrue to special-status species and common wildlife species, especially those that rely on  
19 cultivated lands and managed wetlands during some life stage. Foraging raptors and some  
20 waterbirds are regular inhabitants of the Delta's cultivated lands. The Delta's managed wetlands  
21 provide freshwater nesting, feeding and resting habitat for a large number of Pacific flyway  
22 waterfowl and shorebirds, as well as nesting passerines, such as tricolored blackbird. Special-status  
23 plant species that occupy the tidal fringe in Suisun Marsh and parts of the Delta would be subject to  
24 losses associated with physical construction activity (levee breaching and reconstruction) and  
25 changes in water depth and salinity in their current habitat as a result of tidal marsh restoration.

1 **Table 12-2B-2. Alternative 2B Late Long-Term Effects of Restoration Activities (CM2, CM4, CM5) that**  
2 **Affect Most Natural Communities (acres)**

Natural Community	Conservation Measure					
	CM2 <sup>b</sup>		CM4 <sup>c</sup>		CM5 <sup>d</sup>	
	Permanent <sup>e</sup>	Temporary <sup>f</sup>	Permanent <sup>e</sup>	Temporary <sup>f</sup>	Permanent <sup>e</sup>	Temporary <sup>f</sup>
Tidal perennial aquatic <sup>a</sup>	8	11	18	0	2	5
Tidal brackish emergent wetland	0	0	1	0	0	0
Tidal freshwater emergent wetland	6	0	1	0	1	1
Valley/foothill riparian	89	88	552	0	43	35
Nontidal perennial aquatic	24	12	189	0	28	16
Nontidal freshwater perennial emergent wetland	25	1	99	0	0	0
Alkali seasonal wetland complex	45	0	27	0	0	0
Vernal pool complex	0	0	372	0	0	0
Managed wetland	24	44	13,746	0	0	0
Other natural seasonal wetland	0	0	0	0	0	0
Grassland	388	239	1,122	0	51	34
Inland dune scrub	0	0	0	0	0	0
Cultivated lands	629	363	39,565	0	2,087	1,194

<sup>a</sup> Tidal mudflat has been included in the tidal perennial aquatic natural community.

<sup>b</sup> Yolo Bypass Fisheries Enhancement.

<sup>c</sup> Tidal Natural Communities Restoration.

<sup>d</sup> Seasonally Inundated Floodplain Restoration.

<sup>e</sup> Features in this category include the following: construction of fish passage structures and infrastructure in the Yolo Bypass, construction of permanent structures and infrastructure associated with restoration, and loss of habitat associated with removal and replacement by other habitats.

<sup>f</sup> Features in this category include the following: temporary work areas associated with construction of permanent restoration features, and temporary grading/vegetation removal associated with restoration activities.

3

1 **Table 12-2B-3. Alternative 2B Late Long-Term Effects of Restoration Activities (CM7, CM8, CM10,**  
2 **CM18) that Affect Only Grassland and Cultivated Lands (acres)**

Natural Community	Conservation Measure							
	CM7 <sup>a</sup>		CM8 <sup>b</sup>		CM10 <sup>c</sup>		CM18 <sup>d</sup>	
	Perm <sup>e</sup>	Temp <sup>f</sup>	Perm <sup>e</sup>	Temp <sup>f</sup>	Perm <sup>e</sup>	Temp <sup>f</sup>	Perm <sup>e</sup>	Temp <sup>f</sup>
Grassland	410	0	0	0	0	0	35	0
Cultivated lands	4,553	0	2,000	0	1,950	0	0	0

<sup>a</sup> Riparian Natural Community Restoration.

<sup>b</sup> Grassland Natural Community Restoration.

<sup>c</sup> Nontidal Marsh Restoration.

<sup>d</sup> Conservation Hatcheries.

<sup>e</sup> Features in this category include the following: construction of permanent structures and infrastructure associated with restoration, recreation facilities and hatcheries; and loss of habitat associated with removal and replacement by other habitats.

<sup>f</sup> Features in this category include the following: temporary work areas associated with construction of permanent restoration features, recreation facilities and hatcheries; and temporary grading/vegetation removal associated with restoration activities.

Perm = Permanent.

Temp = Temporary.

3

4 Some of the permanent habitat loss associated with the restoration components of these  
5 alternatives would occur during the early, construction-related stage of the BDCP. Other losses  
6 would occur over time as some habitats (cultivated lands, managed wetland, valley/foothill riparian  
7 and grassland) are converted to tidal marsh (tidal perennial aquatic, tidal freshwater emergent  
8 wetland, tidal brackish emergent wetland) and other natural communities. The BDCP conservation  
9 components, including restoration components (CM2-CM10) are designed to eventually replace and  
10 expand habitats that would have a positive influence on plant and animal species covered in the  
11 Plan. These conservation components would also have a positive effect on noncovered and common  
12 species that occupy the study area.

13 **NEPA Effects:** Alternative 2B would not have adverse effects on the terrestrial natural communities,  
14 special-status species and common species that occupy the study area except for an adverse effect  
15 on giant garter snake population connectivity and to wildlife movement corridors in general. The  
16 construction of the canal would substantially inhibit the movement of giant garter snakes and other  
17 wildlife from moving within and outside of the Delta. This alternative would not significantly  
18 increase the risk of introducing invasive species, result in a net loss of wetlands and other waters of  
19 the United States, reduce the value of habitat for waterfowl and shorebirds, or conflict with plans  
20 and policies that affect the study area. As with Alternative 1B, there would be large acreages of  
21 existing habitat converted by the Plan's conservation actions, including the construction of the water  
22 conveyance canal from the north Delta to Clifton Court Forebay in the south Delta. The temporarily-  
23 affected habitat would be restored to its pre-project condition and the restoration conservation  
24 measures (CM2-CM10) would permanently replace primarily cultivated land and managed wetland  
25 with tidal and nontidal marsh, riparian vegetation, and grassland. The increases in acreage and  
26 value of the sensitive natural communities in the study area would have beneficial effects on  
27 covered and noncovered species. Where conservation actions would not fully offset effects, the Plan  
28 has developed AMMs and this document has included additional mitigation measures to avoid and

1 minimize adverse effects to the maximum extent practicable. Alternative 2B would not require  
2 mitigation measures beyond what is proposed for Alternative 1B to offset effects.

3 **CEQA Conclusion:** Alternative 2B would not have significant and unavoidable impacts on the  
4 terrestrial natural communities, special-status species and common species that occupy the study  
5 area except for giant garter snake habitat connectivity and to wildlife movement corridors in  
6 general. The construction of the canal would substantially inhibit the movement of giant garter  
7 snakes and other wildlife from moving within and outside of the Delta. The alternative would not  
8 increase the risk of introducing invasive species, result in a net loss of wetlands and other waters of  
9 the United States, reduce the value of habitat for waterfowl and shorebirds, or conflict with plans  
10 and policies that affect the study area. As with Alternative 1B, there would be large acreages of  
11 existing habitat converted by the Plan's conservation actions, including the construction of water  
12 conveyance tunnels from the north Delta to Clifton Court Forebay in the south Delta. The  
13 temporarily-affected habitat would be restored to its pre-project condition and the restoration  
14 conservation measures (CM2-CM10) would permanently replace primarily cultivated land and  
15 managed wetland with tidal and nontidal marsh, riparian vegetation, and grassland. The increases in  
16 acreage and value of the sensitive natural communities in the study area would have beneficial  
17 effects on covered, noncovered, and common species. Where conservation actions would not fully  
18 offset impacts, the Plan has developed AMMs and this document has included additional mitigation  
19 measures to avoid and minimize significant impacts. Alternative 6B would not require mitigation  
20 measures beyond what is proposed for Alternative 1B to offset effects. Despite these measures,  
21 there would remain significant and unavoidable impacts on giant garter snake population  
22 connectivity and wildlife movement corridors from Alternative 2B.

23 As with Alternative 1B, Alternative 2B would require several mitigation measures to be adopted to  
24 reduce all effects on terrestrial biological resources to less-than-significant levels. These mitigation  
25 measures would be needed beyond the impact offsets provided by Alternative 2B AMMs and CM2-  
26 CM22 conservation actions. The relevant mitigation measures, which are included in detail in the  
27 analysis of Alternative 1B, are as follows:

- 28 • Mitigation Measure BIO-42: Avoid Impacts on Delta Green Ground Beetle and its Habitat
- 29 • Mitigation Measure BIO-43: Avoid and Minimize Loss of Callippe Silverspot Butterfly Habitat
- 30 • Mitigation Measure BIO-50a: Provide Connectivity between Coldani Marsh/White Slough  
31 Population and the Giant Garter Snake's Historical Range
- 32 • Mitigation Measure BIO-55: Conduct Preconstruction Surveys for Noncovered Special-Status  
33 Reptiles and Implement Applicable CM22 Measures
- 34 • Mitigation Measure BIO-66: California Least Tern Nesting Colonies Shall Be Avoided and Indirect  
35 Effects on Colonies Will Be Minimized
- 36 • Mitigation Measure BIO-69a: Compensate for the Loss of Medium to Very High-Value Greater  
37 Sandhill Crane Foraging Habitat
- 38 • Mitigation Measure BIO-69b: BDCP-Related Construction Will Not Result in A Net Decrease in  
39 Crane Use Days on Bract Tract
- 40 • Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid  
41 Disturbance of Nesting Birds

- 1 • Mitigation Measure BIO-91: Compensate for Near-Term Loss of High-Value Western Burrowing  
2 Owl Habitat
- 3 • Mitigation Measure BIO-113: Compensate for the Near-Term Loss of Golden Eagle and  
4 Ferruginous Hawk Foraging Habitat
- 5 • Mitigation Measure BIO-117: Avoid Impacts on Rookeries
- 6 • Mitigation Measure BIO-121: Compensate for Loss of Short-Eared Owl and Northern Harrier  
7 Nesting Habitat
- 8 • Mitigation Measure BIO-125: Compensate for the Near-Term Loss of Mountain Plover Wintering  
9 Habitat
- 10 • Mitigation Measure BIO-129a: Compensate for Loss of Black Tern Nesting Habitat
- 11 • Mitigation Measure BIO-130: Compensate for the Near-Term Loss of California Horned Lark and  
12 Grasshopper Sparrow Habitat
- 13 • Mitigation Measure BIO-138: Compensate for the Near-Term Loss of High-Value Loggerhead  
14 Shrike Habitat
- 15 • Mitigation Measure BIO-146: Active Bank Swallow Colonies Shall Be Avoided and Indirect  
16 Effects on Bank Swallow Will Be Minimized
- 17 • Mitigation Measure BIO-147: Monitor Bank Swallow Colonies and Evaluate Winter and Spring  
18 Flows Upstream of the Study Area
- 19 • Mitigation Measure BIO-162: Conduct Preconstruction Survey for American Badger
- 20 • Mitigation Measure BIO-166: Conduct Preconstruction Surveys for Roosting Bats and Implement  
21 Protective Measures
- 22 • Mitigation Measure BIO-170: Avoid, Minimize, or Compensate for Impacts on Noncovered  
23 Special-Status Plant Species
- 24 • Mitigation Measure BIO-179a: Conduct Food Studies and Monitoring for Wintering Waterfowl in  
25 Suisun Marsh
- 26 • Mitigation Measure BIO-179b: Conduct Food Studies and Monitoring to Demonstrate Food  
27 Quality of Palustrine Tidal Wetlands in the Yolo and Delta Basins
- 28 • Mitigation Measure BIO-180: Conduct Food and Monitoring Studies of Breeding Waterfowl in  
29 Suisun Marsh

### 30 **12.3.3.7 Alternative 2C—Dual Conveyance with West Alignment and** 31 **Intakes W1–W5 (15,000 cfs; Operational Scenario B)**

32 Alternative 2C, which is described in Section 3.5.7 of Chapter 3, *Description of Alternatives*, and  
33 depicted in Figure 3-6, would affect terrestrial biological resources in the same manner as  
34 Alternative 1C. For this reason, Alternative 2C is considered here in a summary fashion; the reader is  
35 referred to Alternative 1C for a detailed description of impacts that would be associated with  
36 implementing Alternative 2C. The impacts associated with Alternatives 1C and 2C were derived by  
37 comparing the alternatives to the No Action Alternative for NEPA purposes, and to Existing  
38 Conditions for CEQA purposes.

## 1 **Comparative Differences in CM1 Construction Effects for Alternatives 1C and 2C**

2 The Alternative 2C water conveyance facilities would entail construction at north Delta Intakes W1  
3 through W5, just as with Alternative 1C. Also, Alternative 2C would involve constructing and  
4 operating a combined canal and tunnel conveyance system in the western portion of the Delta using  
5 the same construction footprint as Alternative 1C. The Alternative 2C operational scenario (Scenario  
6 B) would have terrestrial biology effects essentially the same as Alternative 1C and its operational  
7 scenario (Scenario A). Alternative 2C operations would involve placement of a permanent operable  
8 barrier at the head of Old River in the south Delta and increased Delta freshwater outflows during  
9 September, October and November of some water years. All of the conservation measures other  
10 than CM1 operations would be the same as under Alternative 1C.

11 The Alternative 2C water conveyance facilities construction effects on natural communities are  
12 included in Table 12-2C-1. The principal effects of concern associated with both Alternative 1C and  
13 2C are related to the conversion of cultivated lands, grassland, valley/foothill riparian, vernal pool  
14 complex and alkali seasonal wetland complex to water conveyance facilities (CM1; Table 12-2C-1).  
15 Similar to Alternative 1C, Alternative 2C would permanently affect a large acreage of potential  
16 jurisdictional waters (including wetlands) regulated by Section 404 of the CWA. Refer to Table 12-  
17 1C-69 for a summary of Alternative 1C permanent and temporary jurisdictional waters and  
18 wetlands impacts. Alternative 2C would affect the same acreage of wetlands and other waters.

19 Construction of the canal on the west and northwest of Clifton Court Forebay would have significant  
20 impacts on vernal pool, alkali seasonal wetland and other natural seasonal wetland natural  
21 communities. The acreages impacted here would exceed the offsetting restoration and protection  
22 included in the BDCP, so additional mitigation would be required. These effects accrue to special-  
23 status species and common wildlife species that rely on cultivated lands, managed wetlands, and  
24 seasonal wetlands during some life stage. Foraging raptors and passerines and some waterbirds are  
25 regular inhabitants of the Delta's cultivated lands. The Delta's managed wetlands provide freshwater  
26 nesting, feeding and resting habitat for a large number of Pacific flyway waterfowl and shorebirds,  
27 as well as nesting passerines, such as tricolored blackbird. Vernal pools provide habitat to special-  
28 status crustaceans, California tiger salamander, numerous common waterbirds, and a suite of  
29 special-status plants. Alkali seasonal wetland complex provides habitat to California tiger  
30 salamander, numerous common waterbirds, foraging raptors and its own suite of special-status, salt  
31 tolerant plants.

32 The near-term conservation activities described in Appendix 12D, *Feasibility Assessment of*  
33 *Conservation Measures Offsetting Water Conveyance Facilities Construction Impacts on Terrestrial*  
34 *Biological Resources*, would provide for conservation, enhancement and replacement of habitats  
35 affected by the early water conveyance facility construction activities. This conservation activity,  
36 which is part of the early implementation of the BDCP, would offset some, but not all, water  
37 conveyance facilities construction effects on both covered and noncovered special-status species in  
38 the study area.

39 Note that the acres of habitat affected by CM1, as listed in Table 12-2C-1, would be acres affected in  
40 the near-term timeframe, or the first 10 years of Plan implementation. The acres represented in  
41 Table 12-2C-2 and Table 12-2C-3 for the late long-term timeframe are acres affected cumulatively  
42 over the entire 50-year period of the Plan. Table 3-4 in Chapter 3, *Description of Alternatives*,  
43 describes the schedule for implementation of natural community protection and restoration  
44 conservation measures over the course of the BDCP.

1 **Table 12-2C-1. Alternative 2C Near-Term Effects of Water Conveyance Facilities (CM1) on Natural Communities (acres)<sup>a</sup>**

Natural Community	Total Existing Habitat in Study Area	Conveyance Option			
		Alternative 2C Removed Habitat (Permanent) <sup>b</sup>	Difference from Alternative 1C	Alternative 2C Removed Habitat (Temporary) <sup>c</sup>	Difference from Alternative 1C
Tidal perennial aquatic <sup>a</sup>	86,263	25	0	117	0
Tidal brackish emergent wetland	8,501	0	0	0	0
Tidal freshwater emergent wetland	8,856	0	0	1	0
Valley/foothill riparian	17,966	40	0	86	0
Nontidal perennial aquatic	5,567	22	0	21	0
Nontidal freshwater perennial emergent wetland	1,509	0	0	5	0
Alkali seasonal wetland complex	3,723	13	0	9	0
Vernal pool complex	12,133	29	0	37	0
Managed wetland	70,798	1	0	145	0
Other natural seasonal wetland	842	2	0	2	0
Grassland	78,047	359	+1	320	0
Inland dune scrub	19	0	0	0	0
Cultivated lands	487,106	6,073	0	9,481	0

<sup>a</sup> Tidal mudflat has been included in the tidal perennial aquatic natural community.

<sup>b</sup> Features in this category include the following conveyance-related facilities: Canal, Forebay, Afterbay, Intake Facilities, Pump Stations, Permanent Access Roads, Shaft Locations, and Reusable Tunnel Material Storage Areas.

<sup>c</sup> Features in this category include the following conveyance features: Canal Work Area, Barge Unloading Facility, Control Structure Work Area, Intake Road Work Area, Intake Work Area, Pipeline, Pipeline Work Area, Road Work Area, Safe Haven Work Area, Temporary Access Road Work Area, Tunnel Work Area and Borrow/Spoil Areas.

2

## 1 **Effects of Restoration-Related Conservation Actions of Alternative 2C**

2 The reader is referred to the Alternative 1C impact analysis above for the broader discussion of  
3 overall terrestrial biological resources effects that would result from implementation of restoration-  
4 related conservation measures under Alternative 2C. The principal effects of concern associated  
5 with both Alternatives 1C and 2C are related to the conversion of large acreages of cultivated lands,  
6 managed wetland, grassland and valley/foothill riparian habitat to tidal marsh and other habitat  
7 types (CM2, CM4, and CM5; Table 12-2C-2 and CM7, CM8, CM10, and CM18; Table 12-2C-3). These  
8 effects accrue to special-status species and common wildlife species, especially those that rely on  
9 cultivated lands and managed wetlands during some life stage. Foraging raptors and some  
10 waterbirds are regular inhabitants of the Delta's cultivated lands. The Delta's managed wetlands  
11 provide freshwater nesting, feeding and resting habitat for a large number of Pacific flyway  
12 waterfowl and shorebirds, as well as nesting passerines, such as tricolored blackbird. Special-status  
13 plant species that occupy the tidal fringe in Suisun Marsh and parts of the Delta would be subject to  
14 losses associated with physical construction activity (levee breaching and reconstruction) and  
15 changes in water depth and salinity in their current habitat as a result of tidal marsh restoration.

16 Some of the permanent habitat loss associated with the restoration components of these  
17 alternatives would occur during the early, construction-related stage of the BDCP. Other losses  
18 would occur over time as some habitats (cultivated lands, managed wetland, alkali seasonal wetland  
19 complex, valley/foothill riparian and grassland) are converted to tidal marsh (tidal perennial  
20 aquatic, tidal freshwater emergent wetland, tidal brackish emergent wetland) and other natural  
21 communities. The BDCP conservation components, including restoration components (CM2–CM10),  
22 are designed to eventually replace and expand habitats that would have a positive influence on plant  
23 and animal species covered in the Plan. These conservation components would also have a positive  
24 effect on noncovered and common species that occupy the study area.

25 **NEPA Effects:** Alternative 2C would not have adverse effects on the terrestrial natural communities,  
26 special-status species and common species that occupy the study. The construction of the canal and  
27 associated infrastructure would substantially inhibit the movement of wildlife from moving within  
28 and outside of the Delta resulting in an adverse effect. This alternative would not significantly  
29 increase the risk of introducing invasive species, result in a net loss of wetlands and other waters of  
30 the United States, reduce the value of habitat for waterfowl and shorebirds, or conflict with plans  
31 and policies that affect the study area. As with Alternative 1C, there would be large acreages of  
32 existing habitat converted by the Plan's conservation actions, including the construction of the water  
33 conveyance canal from the north Delta to Clifton Court Forebay in the south Delta. The temporarily-  
34 affected habitat would be restored to its pre-project condition and the restoration conservation  
35 measures (CM2-CM10) would permanently replace primarily cultivated land and managed wetland  
36 with tidal and nontidal marsh, riparian vegetation, and grassland. The increases in acreage and  
37 value of the sensitive natural communities in the study area would have beneficial effects on  
38 covered and noncovered species. Where conservation actions would not fully offset effects, the Plan  
39 has developed AMMs and this document has included additional mitigation measures to avoid and  
40 minimize adverse effects to the maximum extent practicable. Alternative 2C would not require  
41 mitigation measures beyond what is proposed for Alternative 1C to offset effects.

42 **CEQA Conclusion:** Alternative 2C would not have significant and unavoidable impacts on the  
43 terrestrial natural communities, special-status species and common species that occupy the study.

1 **Table 12-2C-2. Alternative 2C Late Long-Term Effects of Restoration Activities (CM2, CM4, CM5) that Affect Most Natural Communities (acres)**

Natural Community	Conservation Measure					
	CM2 <sup>b</sup>		CM4 <sup>c</sup>		CM5 <sup>d</sup>	
	Permanent <sup>e</sup>	Temporary <sup>f</sup>	Permanent <sup>e</sup>	Temporary <sup>f</sup>	Permanent <sup>e</sup>	Temporary <sup>f</sup>
Tidal perennial aquatic <sup>a</sup>	8	11	18	0	2	5
Tidal brackish emergent wetland	0	0	1	0	0	0
Tidal freshwater emergent wetland	6	0	1	0	1	1
Valley/foothill riparian	89	88	552	0	43	35
Nontidal perennial aquatic	24	12	189	0	28	16
Nontidal freshwater perennial emergent wetland	25	1	99	0	0	0
Alkali seasonal wetland complex	45	0	27	0	0	0
Vernal pool complex	0	0	372	0	0	0
Managed wetland	24	44	13,246	0	0	0
Other natural seasonal wetland	0	0	0	0	0	0
Grassland	388	239	1,122	0	51	34
Inland dune scrub	0	0	0	0	0	0
Cultivated lands	629	363	39,565	0	2,087	1,194

<sup>a</sup> Tidal mudflat has been included in the tidal perennial aquatic natural community.

<sup>b</sup> Yolo Bypass Fisheries Enhancement.

<sup>c</sup> Tidal Natural Communities Restoration.

<sup>d</sup> Seasonally Inundated Floodplain Restoration.

<sup>e</sup> Features in this category include the following: construction of fish passage structures and infrastructure in the Yolo Bypass, construction of permanent structures and infrastructure associated with restoration, and loss of habitat associated with removal and replacement by other habitats.

<sup>f</sup> Features in this category include the following: temporary work areas associated with construction of permanent restoration features, and temporary grading/vegetation removal associated with restoration activities.

1 **Table 12-2C-3. Alternative 2C Late Long-Term Effects of Restoration Activities (CM7, CM8, CM10,**  
2 **CM18) that Affect Only Grassland and Cultivated Lands (acres)**

	Conservation Measure							
	CM7 <sup>a</sup>		CM8 <sup>b</sup>		CM10 <sup>c</sup>		CM18 <sup>d</sup>	
Natural Community	Perm <sup>e</sup>	Temp <sup>f</sup>	Perm <sup>e</sup>	Temp <sup>f</sup>	Perm <sup>e</sup>	Temp <sup>f</sup>	Perm <sup>e</sup>	Temp <sup>f</sup>
Grassland	410	0	0	0	0	0	35	0
Cultivated lands	4,553	0	2,000	0	1,950	0	0	0

<sup>a</sup> Riparian Natural Community Restoration.  
<sup>b</sup> Grassland Natural Community Restoration.  
<sup>c</sup> Nontidal Marsh Restoration.  
<sup>d</sup> Conservation Hatcheries.  
<sup>e</sup> Features in this category include the following: construction of permanent structures and infrastructure associated with restoration, recreation facilities and hatcheries; and loss of habitat associated with removal and replacement by other habitats.  
<sup>f</sup> Features in this category include the following: temporary work areas associated with construction of permanent restoration features, recreation facilities and hatcheries; and temporary grading/vegetation removal associated with restoration activities.

Perm = Permanent.  
Temp = Temporary.

3

4 The construction of the canal and associated infrastructure would substantially inhibit the  
5 movement of wildlife from moving within and outside of the Delta resulting in an adverse effect. The  
6 alternative would not increase the risk of introducing invasive species, result in a net loss of  
7 wetlands and other waters of the United States, reduce the value of habitat for waterfowl and  
8 shorebirds, or conflict with plans and policies that affect the study area. As with Alternative 1C,  
9 there would be large acreages of existing habitat converted by the Plan's conservation actions,  
10 including the construction of water conveyance tunnels from the north Delta to Clifton Court  
11 Forebay in the south Delta. The temporarily-affected habitat would be restored to its pre-project  
12 condition and the restoration conservation measures (CM2-CM10) would permanently replace  
13 primarily cultivated land and managed wetland with tidal and nontidal marsh, riparian vegetation,  
14 and grassland. The increases in acreage and value of the sensitive natural communities in the study  
15 area would have beneficial effects on covered, noncovered, and common species. Where  
16 conservation actions would not fully offset impacts, the Plan has developed AMMs and this  
17 document has included additional mitigation measures to avoid and minimize significant impacts.  
18 Alternative 2C would not require mitigation measures beyond what is proposed for Alternative 1C  
19 to offset effects. Despite these measures, there would remain a significant and unavoidable impact  
20 on wildlife movement corridors from Alternative 6C.

21 As with Alternative 1C, Alternative 2C would require several mitigation measures to be adopted to  
22 reduce all effects on terrestrial biological resources to less-than-significant levels. These mitigation  
23 measures would be needed beyond the impact offsets provided by Alternative 2C AMMs and CM2-  
24 CM22 conservation actions. The relevant mitigation measures, which are included in detail in the  
25 analysis of Alternative 1C, are as follows:

- 26 ● Mitigation Measure BIO-18: Compensate for Loss of Alkali Seasonal Wetland Complex
- 27 ● Mitigation Measure BIO-27: Compensate for Loss of Other Natural Seasonal Wetland

- 1 • Mitigation Measure BIO-32: Restore and Protect Vernal Pool Crustacean Habitat
- 2 • Mitigation Measure BIO-42: Avoid Impacts on Delta Green Ground Beetle and its Habitat
- 3 • Mitigation Measure BIO-43: Avoid and Minimize Loss of Callippe Silverspot Butterfly Habitat
- 4 • Mitigation Measure BIO-55: Conduct Preconstruction Surveys for Noncovered Special-Status
- 5 Reptiles and Implement Applicable CM22 Measures
- 6 • Mitigation Measure BIO-66: California Least Tern Nesting Colonies Shall Be Avoided and Indirect
- 7 Effects on Colonies Will Be Minimized
- 8 • Mitigation Measure BIO-69a: Compensate for the Loss of Medium to Very High-Value Greater
- 9 Sandhill Crane Foraging Habitat
- 10 • Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid
- 11 Disturbance of Nesting Birds
- 12 • Mitigation Measure BIO-91: Compensate for Near-Term Loss of High-Value Western Burrowing
- 13 Owl Habitat
- 14 • Mitigation Measure BIO-91a, Compensate for Permanent Loss of Low-Value Western Burrowing
- 15 Owl Habitat
- 16 • Mitigation Measure BIO-113: Compensate for the Near-Term Loss of Golden Eagle and
- 17 Ferruginous Hawk Foraging Habitat
- 18 • Mitigation Measure BIO-117: Avoid Impacts on Rookeries
- 19 • Mitigation Measure BIO-121: Compensate for Loss of Short-Eared Owl and Northern Harrier
- 20 Nesting Habitat
- 21 • Mitigation Measure BIO-125: Compensate for the Near-Term Loss of Mountain Plover Wintering
- 22 Habitat
- 23 • Mitigation Measure BIO-129a: Compensate for Loss of Black Tern Nesting Habitat
- 24 • Mitigation Measure BIO-130: Compensate for the Near-Term Loss of California Horned Lark and
- 25 Grasshopper Sparrow Habitat
- 26 • Mitigation Measure BIO-138: Compensate for the Near-Term Loss of High-Value Loggerhead
- 27 Shrike Habitat
- 28 • Mitigation Measure BIO-146: Active Bank Swallow Colonies Shall Be Avoided and Indirect
- 29 Effects on Bank Swallow Will Be Minimized
- 30 • Mitigation Measure BIO-147: Monitor Bank Swallow Colonies and Evaluate Winter and Spring
- 31 Flows Upstream of the Study Area
- 32 • Mitigation Measure BIO-162: Conduct Preconstruction Survey for American Badger
- 33 • Mitigation Measure BIO-166: Conduct Preconstruction Surveys for Roosting Bats and Implement
- 34 Protective Measures
- 35 • Mitigation Measure BIO-170: Avoid, Minimize, or Compensate for Impacts on Noncovered
- 36 Special-Status Plant Species
- 37 • Mitigation Measure BIO-179a: Conduct Food Studies and Monitoring for Wintering Waterfowl in
- 38 Suisun Marsh

- 1 • Mitigation Measure BIO-179b: Conduct Food Studies and Monitoring to Demonstrate Food  
2 Quality of Palustrine Tidal Wetlands in the Yolo and Delta Basins
- 3 • Mitigation Measure BIO-180: Conduct Food and Monitoring Studies of Breeding Waterfowl in  
4 Suisun Marsh

### 5 **12.3.3.8 Alternative 3—Dual Conveyance with Pipeline/Tunnel and** 6 **Intakes 1 and 2 (6,000 cfs; Operational Scenario A)**

7 Alternative 3, which is described in Section 3.5.8 of Chapter 3, *Description of Alternatives*, and  
8 depicted in Figure 3-2, would affect terrestrial biological resources in a similar fashion to  
9 Alternative 1A. For this reason, Alternative 3 is considered here in a summary fashion; the reader is  
10 referred to Alternative 1A for a detailed description of impacts that would be associated with  
11 implementing Alternative 3. The impacts associated with Alternatives 1A and 3 were derived by  
12 comparing the alternatives to the No Action Alternative for NEPA purposes, and to Existing  
13 Conditions for CEQA purposes.

#### 14 **Comparative Differences in CM1 Construction Effects for Alternatives 3 and 1A**

15 The principal differences between these two alternatives would be related to the differing  
16 construction footprints of the water conveyance facilities (CM1). The Alternative 3 water  
17 conveyance facilities would entail construction at north Delta Intakes 1 and 2 rather than Intakes 1–  
18 5. The locations of these intakes are depicted in Figure 3-2. Eliminating Intakes 3–5 would reduce  
19 the construction footprint along the eastern bank of the Sacramento River just upstream and  
20 downstream of the community of Hood. The operational scenario for Alternative 3 (Operational  
21 Scenario A) is the same as for Alternative 1A, although less water would be diverted from the north  
22 Delta during certain periods when compared with Alternative 1A. Also, all of the conservation  
23 measures other than CM1 would be the same as under Alternative 1A. Therefore, operations and  
24 conservation effects on terrestrial biological resources would be identical under these two  
25 alternatives.

26 Due to the elimination of Intakes 3–5 and their associated pumps and pipelines, Alternative 3 would  
27 create differences in the permanent and temporary loss of natural communities and cultivated lands  
28 during water conveyance facilities construction when compared with Alternative 1A (Table 12-3-1).  
29 All of these differences would occur during the near-term timeframe associated with water  
30 conveyance facilities construction. Alternative 3 would permanently remove 9 fewer acres of tidal  
31 perennial aquatic habitat in the Sacramento River, 10 fewer acres of valley/foothill riparian habitat  
32 along the eastern bank of the Sacramento River, 11 fewer acres of grassland adjacent to the river,  
33 and 118 acres of cultivated land just east of the river, all associated with less intake construction  
34 along the eastern bank of the Sacramento River in the vicinity of Hood. Alternative 3 would also  
35 permanently affect a smaller acreage of potential jurisdictional waters (including wetlands) as  
36 regulated by Section 404 of the CWA, when compared with Alternative 1A (10 acres fewer). Refer to  
37 Table 12-1A-69 for a summary of Alternative 1A permanent and temporary jurisdictional waters  
38 and wetlands impacts.

39 There would be similar reductions in temporary losses of natural communities along the  
40 Sacramento River, including 32 fewer acres of tidal perennial aquatic, 3 acres fewer of tidal  
41 freshwater emergent wetland, 10 acres fewer of valley/foothill riparian, one acre fewer of nontidal  
42 perennial aquatic, 28 acres fewer grassland, and 348 acres fewer of cultivated land (Table 12-3-1).  
43 Alternative 3 would also temporarily affect a smaller acreage of potential jurisdictional waters

1 (including wetlands) as regulated by Section 404 of the CWA, when compared to Alternative 1A (40  
2 acres fewer).

3 Note that the acres of habitat affected by CM1, as listed in Table 12-3-1, would be acres affected in  
4 the near-term timeframe, or the first 10 years of Plan implementation. The acres represented in  
5 Table 12-3-2 and Table 12-3-3 for other conservation actions are for the late long-term timeframe;  
6 the numbers represent acres affected cumulatively over the entire 50-year period of the Plan. Table  
7 3-4 in Chapter 3, *Description of Alternatives*, describes the schedule for implementation of natural  
8 community protection and restoration conservation measures over the course of the BDCP.

9 **Table 12-3-1. Alternative 3 Near-Term Effects of Water Conveyance Facilities (CM1) on Natural**  
10 **Communities (acres)**

Natural Community	Total Existing Habitat in Study Area	Conveyance Option			
		Alternative 3 Removed Habitat (Permanent) <sup>b</sup>	Difference from Alternative 1A	Alternative 3 Removed Habitat (Temporary) <sup>c</sup>	Difference from Alternative 1A
Tidal perennial aquatic <sup>a</sup>	86,263	39	-9	101	-32
Tidal brackish emergent wetland	8,501	0	0	0	0
Tidal freshwater emergent wetland	8,856	6	0	3	-3
Valley/foothill riparian	17,966	49	-9	18	-10
Nontidal perennial aquatic	5,567	12	0	9	0
Nontidal freshwater perennial emergent wetland	1,509	1	0	1	0
Alkali seasonal wetland complex	3,723	0	0	0	0
Vernal pool complex	12,133	3	0	0	0
Managed wetland	70,798	3	0	83	0
Other natural seasonal wetland	842	0	0	0	0
Grassland	78,047	304	-11	234	-28
Inland dune scrub	19	0	0	0	0
Cultivated lands	487,106	3,706	-130	1,843	-348

<sup>a</sup> Tidal mudflat has been included in the tidal perennial aquatic natural community.

<sup>b</sup> Features in this category include the following conveyance-related facilities: Canal, Forebay, Afterbay, Intake Facilities, Pump Stations, Permanent Access Roads, Shaft Locations, Reusable Tunnel Material Storage Areas and Borrow/Spoil Areas.

<sup>c</sup> Features in this category include the following conveyance features: Canal Work Area, Barge Unloading Facility, Control Structure Work Area, Intake Road Work Area, Intake Work Area, Pipeline, Pipeline Work Area, Road Work Area, Safe Haven Work Area, Temporary Access Road Work Area, Tunnel Work Area.

11

1 These differences in loss of natural communities associated with construction of CM1 would create  
2 differences in effects on covered and noncovered wildlife. The reduced level of valley/foothill  
3 riparian habitat loss would be a positive influence on valley elderberry longhorn beetle, breeding  
4 habitat for raptors, herons and egrets (great egret, snowy egret, great blue heron, Swainson's hawk,  
5 white-tailed kite, Cooper's hawk, and black-crowned night heron), and migratory habitat for species  
6 that use the river corridor, such as western yellow-billed cuckoo. Species that would benefit from  
7 smaller permanent losses of grassland and cultivated land would include foraging raptors  
8 (Swainson's hawk, short-eared owl, northern harrier, merlin and white-tailed kite), greater sandhill  
9 crane, California horned lark, tricolored blackbird, mountain plover and several species of bats.  
10 Alternative 3 would result in a slightly smaller permanent loss (94 acres less) of crane foraging  
11 habitat compared to Alternative 1A. The significantly smaller temporary habitat conversions  
12 associated with Alternative 3 would have comparable benefits to these species. There would be 262  
13 fewer acres of foraging habitat temporarily lost under Alternative 3 for greater sandhill crane when  
14 compared to Alternative 1A because of the lower acreage of cultivated land loss. However, the  
15 effects would be offset in the near-term by AMMs adopted for specific species, including greater  
16 sandhill crane, and over time by on-site restoration required by *AMM10 Restoration of Temporarily*  
17 *Affected Natural Communities*.

18 The differences in effect that the water conveyance facilities of Alternatives 1A and 3 could have on  
19 special-status plant species are minor. Habitat modeling indicates that Alternative 3 would create 1  
20 fewer acre of permanent habitat loss for side-flowering skullcap, 3 fewer acres of permanent habitat  
21 loss for Mason's lilaeopsis and delta mudwort, and 5 acres less temporary loss of habitat for Mason's  
22 lilaeopsis and delta mudwort when compared with Alternative 1A.

23 The near-term conservation activities described and evaluated in Appendix 12D, *Feasibility*  
24 *Assessment of Conservation Measures Offsetting Water Conveyance Facilities Construction Impacts on*  
25 *Terrestrial Biological Resources*, would provide for protection, enhancement and restoration of  
26 habitats affected by the near-term water conveyance facilities construction activities. This  
27 conservation activity, which is part of the early implementation of the BDCP, would offset water  
28 conveyance facilities construction effects on both covered and noncovered special-status species in  
29 the study area.

### 30 **Effects of Restoration-Related Conservation Actions of Alternative 3**

31 Natural community changes associated with the major restoration-related conservation measures  
32 under Alternative 3 (CM2, CM4, and CM5; see Table 12-3-2 and CM7, CM8, CM10, and CM18; Table  
33 12-3-3) would be identical to those described for Alternative 1A.

1 **Table 12-3-2. Alternative 3 Late Long-Term Effects of Restoration Activities (CM2, CM4, CM5) that**  
2 **Affect Most Natural Communities (acres)**

Natural Community	Conservation Measure					
	CM2 <sup>b</sup>		CM4 <sup>c</sup>		CM5 <sup>d</sup>	
	Permanent <sup>e</sup>	Temporary <sup>f</sup>	Permanent <sup>e</sup>	Temporary <sup>f</sup>	Permanent <sup>e</sup>	Temporary <sup>f</sup>
Tidal perennial aquatic <sup>a</sup>	8	11	18	0	2	5
Tidal brackish emergent wetland	0	0	1	0	0	0
Tidal freshwater emergent wetland	6	0	1	0	1	1
Valley/foothill riparian	89	88	552	0	43	35
Nontidal perennial aquatic	24	12	189	0	28	16
Nontidal freshwater perennial emergent wetland	25	1	99	0	0	0
Alkali seasonal wetland complex	45	0	27	0	0	0
Vernal pool complex	0	0	372	0	0	0
Managed wetland	24	44	13,746	0	0	0
Other natural seasonal wetland	0	0	0	0	0	0
Grassland	388	239	1,122	0	51	34
Inland dune scrub	0	0	0	0	0	0
Cultivated lands	629	363	39,565	0	2,087	1,194

<sup>a</sup> Tidal mudflat has been included in the tidal perennial aquatic natural community.

<sup>b</sup> Yolo Bypass Fisheries Enhancement.

<sup>c</sup> Tidal Natural Communities Restoration.

<sup>d</sup> Seasonally Inundated Floodplain Restoration.

<sup>e</sup> Features in this category include the following: construction of fish passage structures and infrastructure in the Yolo Bypass, construction of permanent structures and infrastructure associated with restoration, and loss of habitat associated with removal and replacement by other habitats.

<sup>f</sup> Features in this category include the following: temporary work areas associated with construction of permanent restoration features, and temporary grading/vegetation removal associated with restoration activities.

3

1 **Table 12-3-3. Alternative 3 Late Long-Term Effects of Restoration Activities (CM7, CM8, CM10, CM18)**  
2 **that Affect Only Grassland and Cultivated Land (acres)**

Natural Community	Conservation Measure							
	CM7 <sup>a</sup>		CM8 <sup>b</sup>		CM10 <sup>c</sup>		CM18 <sup>d</sup>	
	Perm <sup>e</sup>	Temp <sup>f</sup>	Perm <sup>e</sup>	Temp <sup>f</sup>	Perm <sup>e</sup>	Temp <sup>f</sup>	Perm <sup>e</sup>	Temp <sup>f</sup>
Grassland	410	0	0	0	0	0	35	0
Cultivated lands	4,553	0	2,000	0	1,950	0	0	0

<sup>a</sup> Riparian Natural Community Restoration.

<sup>b</sup> Grassland Natural Community Restoration.

<sup>c</sup> Nontidal Marsh Restoration.

<sup>d</sup> Conservation Hatcheries.

<sup>e</sup> Features in this category include the following: construction of permanent structures and infrastructure associated with restoration, recreation facilities and hatcheries; and loss of habitat associated with removal and replacement by other habitats.

<sup>f</sup> Features in this category include the following: temporary work areas associated with construction of permanent restoration features, recreation facilities and hatcheries; and temporary grading/vegetation removal associated with restoration activities.

Perm = Permanent.

Temp = Temporary.

3

4 The reader is referred to the Alternative 1A impact analysis above for the broader discussion of  
5 overall terrestrial biological resources effects that would result from implementation of restoration-  
6 related conservation measures under Alternative 3. The principal effects of concern associated with  
7 both Alternative 1A and 3 are related to the conversion of large acreages of cultivated lands,  
8 managed wetland, grassland and valley/foothill riparian habitat to tidal marsh (tidal perennial  
9 aquatic, tidal brackish emergent wetland, tidal freshwater emergent wetland) and other habitat  
10 types during restoration activities. These effects accrue to special-status species and common  
11 wildlife species, especially those that rely on cultivated lands and managed wetland during some life  
12 stage. Foraging raptors and some waterbirds are regular inhabitants of the Delta's cultivated lands.  
13 The Delta's managed wetlands provide freshwater nesting, feeding and resting habitat for a large  
14 number of Pacific flyway waterfowl and shorebirds, as well as nesting passerines, such as tricolored  
15 blackbird. Special-status plant species that occupy the tidal fringe in Suisun Marsh and parts of the  
16 Delta would be subject to losses associated with physical construction activity (levee breaching and  
17 reconstruction) and changes in water depth and salinity in their current habitat as a result of tidal  
18 marsh restoration.

19 Some of the permanent habitat loss associated with the restoration components of Alternative 3  
20 would occur during the early, construction-related stage of the BDCP. Other losses would occur over  
21 time as some habitats (cultivated lands, managed wetland, valley/foothill riparian and grassland)  
22 are converted to tidal marsh and other natural communities. The BDCP conservation components,  
23 including the restoration components (CM2-CM10) are designed to eventually replace and expand  
24 habitats that would have a positive influence on plant and animal species covered in the Plan,  
25 including those that rely on managed wetland and cultivated land. These conservation components  
26 would also have a positive effect on noncovered and common species that occupy the study area.

27 **NEPA Effects:** Alternative 3 would not have adverse effects on the terrestrial natural communities,  
28 special-status species and common species that occupy the study area. The alternative also would  
29 not disrupt wildlife movement corridors, significantly increase the risk of introducing invasive

1 species, result in a net loss of wetlands and other waters of the United States, reduce the value of  
2 habitat for waterfowl and shorebirds, or conflict with plans and policies that affect the study area. As  
3 with Alternative 1A, there would be large acreages of existing habitat converted by the Plan's  
4 conservation actions, including the construction of water conveyance tunnels from the north Delta  
5 to Clifton Court Forebay in the south Delta. The temporarily-affected habitat would be restored to its  
6 pre-project condition and the restoration conservation measures (CM2-CM10) would permanently  
7 replace primarily cultivated land and managed wetland with tidal and nontidal marsh, riparian  
8 vegetation, and grassland. The increases in acreage and value of the sensitive natural communities  
9 in the study area would have beneficial effects on covered and noncovered species. Where  
10 conservation actions would not fully offset effects, the Plan has developed AMMs and this document  
11 has included additional mitigation measures to avoid adverse effects. Alternative 3 would not  
12 require mitigation measures beyond what is proposed for Alternative 1A to offset effects.

13 **CEQA Conclusion:** Alternative 3 would not have significant and unavoidable impacts on the  
14 terrestrial natural communities, special-status species and common species that occupy the study  
15 area. The alternative also would not disrupt wildlife movement corridors, significantly increase the  
16 risk of introducing invasive species, result in a net loss of wetlands and other waters of the United  
17 States, reduce the value of habitat for waterfowl and shorebirds, or conflict with plans and policies  
18 that affect the study area. As with Alternative 1A, there would be large acreages of existing habitat  
19 converted by the Plan's conservation actions, including the construction of water conveyance  
20 tunnels from the north Delta to Clifton Court Forebay in the south Delta. The temporarily-affected  
21 habitat would be restored to its pre-project condition and the restoration conservation measures  
22 (CM2-CM10) would permanently replace primarily cultivated land and managed wetland with tidal  
23 and nontidal marsh, riparian vegetation, and grassland. The increases in acreage and value of the  
24 sensitive natural communities in the study area would have beneficial effects on covered,  
25 noncovered, and common species. Where conservation actions would not fully offset impacts, the  
26 Plan has developed AMMs and this document has included additional mitigation measures to avoid  
27 significant impacts. Alternative 3 would not require mitigation measures beyond what is proposed  
28 for Alternative 1A to offset effects.

29 As with Alternative 1A, Alternative 3 would require several mitigation measures to be adopted to  
30 reduce all effects on terrestrial biological resources to less-than-significant levels. These mitigation  
31 measures would be needed beyond the impact offsets provided by Alternative 3 AMMs and CM2-  
32 CM22 conservation actions. The relevant mitigation measures, which are included in detail in the  
33 analysis of Alternative 1A, are as follows:

- 34 • Mitigation Measure BIO-42: Avoid Impacts on Delta Green Ground Beetle and its Habitat
- 35 • Mitigation Measure BIO-43: Avoid and Minimize Loss of Callippe Silverspot Butterfly Habitat
- 36 • Mitigation Measure BIO-55: Conduct Preconstruction Surveys for Noncovered Special-Status  
37 Reptiles and Implement Applicable CM22 Measures
- 38 • Mitigation Measure BIO-66: California Least Tern Nesting Colonies Shall Be Avoided and Indirect  
39 Effects on Colonies Will Be Minimized
- 40 • Mitigation Measure BIO-69a: Compensate for the Loss of Medium to Very High-Value Greater  
41 Sandhill Crane Foraging Habitat
- 42 • Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid  
43 Disturbance of Nesting Birds

- 1 • Mitigation Measure BIO-91: Compensate for Near-Term Loss of High-Value Western Burrowing  
2 Owl Habitat
- 3 • Mitigation Measure BIO-113: Compensate for the Near-Term Loss of Golden Eagle and  
4 Ferruginous Hawk Foraging Habitat
- 5 • Mitigation Measure BIO-117: Avoid Impacts on Rookeries
- 6 • Mitigation Measure BIO-125: Compensate for the Near-Term Loss of Mountain Plover Wintering  
7 Habitat
- 8 • Mitigation Measure BIO-129a: Compensate for Loss of Black Tern Nesting Habitat
- 9 • Mitigation Measure BIO-130: Compensate for the Near-Term Loss of California Horned Lark and  
10 Grasshopper Sparrow Habitat
- 11 • Mitigation Measure BIO-138: Compensate for the Near-Term Loss of High-Value Loggerhead  
12 Shrike Habitat
- 13 • Mitigation Measure BIO-146: Active Bank Swallow Colonies Shall Be Avoided and Indirect  
14 Effects on Bank Swallow Will Be Minimized
- 15 • Mitigation Measure BIO-147: Monitor Bank Swallow Colonies and Evaluate Winter and Spring  
16 Flows Upstream of the Study Area
- 17 • Mitigation Measure BIO-162: Conduct Preconstruction Survey for American Badger
- 18 • Mitigation Measure BIO-166: Conduct Preconstruction Surveys for Roosting Bats and Implement  
19 Protective Measures
- 20 • Mitigation Measure BIO-170: Avoid, Minimize, or Compensate for Impacts on Noncovered  
21 Special-Status Plant Species
- 22 • Mitigation Measure BIO-179a: Conduct Food Studies and Monitoring for Wintering Waterfowl in  
23 Suisun Marsh
- 24 • Mitigation Measure BIO-179b: Conduct Food Studies and Monitoring to Demonstrate Food  
25 Quality of Palustrine Tidal Wetlands in the Yolo and Delta Basins
- 26 • Mitigation Measure BIO-180: Conduct Food and Monitoring Studies of Breeding Waterfowl in  
27 Suisun Marsh

### 12.3.3.9 Alternative 4—Dual Conveyance with Modified Pipeline/Tunnel and Intakes 2, 3, and 5 (9,000 cfs; Operational Scenario H)

Section 3.5.9 in Chapter 3, *Description of Alternatives*, provides details of Alternative 4, and Figure 3-9 depicts the alternative.

#### Natural Communities

##### Tidal Perennial Aquatic

Construction, operation, maintenance, and management associated with the conservation components of Alternative 4 would have no long-term adverse effects on the habitats associated with the tidal perennial aquatic natural community. Initial development and construction of CM1, CM2, CM4, CM5, and CM6 would result in both permanent and temporary removal or modification of this community (see Table 12-4-1). Full implementation of Alternative 4 would also include the following conservation actions over the term of the BDCP to benefit the tidal perennial aquatic natural community (BDCP Chapter 3, Section 3.3, *Biological Goals and Objectives*).

- Restore and protect 65,000 acres of tidal natural communities and transitional uplands to accommodate sea level rise (Objective L1.3, associated with CM4).
- Within the restored and protected tidal natural communities and transitional uplands, restore or create tidal perennial aquatic natural community as necessary when creating tidal emergent wetland (Objective TPANC1.1, associated with CM4).
- Control invasive aquatic vegetation that adversely affects native fish habitat (Objective TPANC2.1, associated with CM13).

There is a variety of other, less specific conservation goals and objectives in BDCP Chapter 3, Section 3.3 that would improve the value of tidal perennial aquatic natural community for terrestrial species. As explained below, with the restoration and enhancement of these amounts of habitat, in addition to AMMs, impacts on tidal aquatic natural community would not be adverse for NEPA purposes and would be less than significant for CEQA purposes.

Note that two time periods are represented in Table 12-4-1 and the other tables contained in the analysis of Alternative 4. The near-term (NT) acreage effects listed in the table would occur over the first 10 years of Alternative 4 implementation. The late long-term (LLT) effects contained in these tables represent the combined effects of all activities over the entire 50-year term of the Plan. This table and all impact tables in the chapter include reference to only those conservation measures that would eliminate natural community acreage either through construction or restoration activities, or would result in periodic inundation of the community.

1 **Table 12-4-1. Changes in Tidal Perennial Aquatic Natural Community Associated with Alternative 4**  
2 **(acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Permanent		Temporary		Periodic <sup>d</sup>	
	NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	178	178	2,101 <sup>e</sup>	2,101	0	0
CM2	8	8	11	11	9-36	0
CM4	11	18	0	0	0	0
CM5	0	2	0	5	0	39
CM6	Unk.	Unk.	0	0	0	0
<b>TOTAL IMPACTS</b>	<b>197</b>	<b>206</b>	<b>2,112</b>	<b>2,117</b>	<b>9-36</b>	<b>39</b>

<sup>a</sup> See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

<sup>e</sup> The large acreage of tidal perennial aquatic habitat affected by Alternative 4 is related to dredging of Clifton Court Forebay; the habitat would not be permanently removed.

NT = near-term

LLT = late long-term

Unk. = unknown

3

4 **Impact BIO-1: Changes in Tidal Perennial Aquatic Natural Community as a Result of**  
5 **Implementing BDCP Conservation Measures**

6 Construction and land grading activities that would accompany the implementation of CM1, CM2,  
7 CM4, CM5, and CM6 for Alternative 4 would permanently affect an estimated 206 acres and  
8 temporarily remove 2,117 acres of tidal perennial aquatic natural community in the study area. The  
9 large temporary loss of this natural community would be largely related to dredging of Clifton Court  
10 Forebay. These modifications represent less than 3% of the 86,263 acres of the community that is  
11 mapped in the study area. The majority of the permanent and temporary effects would happen  
12 during the first 10 years of Alternative 4 implementation, as water conveyance facilities are  
13 constructed and habitat restoration is initiated. Natural communities restoration would add 8,300  
14 acres of tidal wetlands, including an estimated 3,400 acres of tidal perennial aquatic natural  
15 community during the same period, which would expand the area of that habitat and offset the  
16 losses. The 3,400-acre increase is estimated, based on modeling reported in BDCP Appendix 3.B  
17 Table 5, by comparing existing Plan Area subtidal habitat to near-term subtidal habitat with the  
18 Plan. The BDCP beneficial effects analysis (BDCP Chapter 5, Section 5.4.1.2) indicates that, while  
19 there would be no minimum restoration requirement for the tidal perennial aquatic natural  
20 community, an estimated approximately 27,000 acres of tidal perennial aquatic natural community  
21 would be restored based on tidal restoration modeling. This estimate is based on Table 5 in BDCP  
22 Appendix 3.B, subtracting late long-term acreage without project from late long-term acreage with  
23 project).

1 The individual effects of each relevant conservation measure are addressed below. A summary  
2 statement of the combined impacts and NEPA and CEQA conclusions follows the individual  
3 conservation measure discussions.

- 4 • *CM1 Water Facilities and Operation*: Construction of the Alternative 4 water conveyance facilities  
5 would permanently remove 178 acres and temporarily remove 2,101 acres of tidal perennial  
6 aquatic community. Most of the permanent loss would occur where Intakes 2, 3, and 5 encroach  
7 on the Sacramento River's east bank between Clarksburg and Courtland (see Terrestrial Biology  
8 Mapbook, a support document to the EIS/EIR, for a detailed view of proposed facilities overlain  
9 on natural community mapping). The footings and the screens at the intake sites would be  
10 placed into the river margin and would displace moderately deep to shallow, flowing open  
11 water with a mud substrate and very little aquatic vegetation. Permanent losses would also  
12 occur where new control structures would be built into the California Aqueduct and the Delta  
13 Mendota Canal adjacent to Clifton Court Forebay, and where permanent new transmission lines  
14 would be constructed along Lambert Road just west of Interstate 5.

15 The temporary effects on tidal perennial aquatic habitats would occur at numerous locations,  
16 with the largest affect occurring at Clifton Court Forebay, where the entire forebay would be  
17 dredged to provide additional storage capacity. Other temporary effects would occur in the  
18 Sacramento River at Intakes 2, 3, and 5, and at temporary barge unloading facilities established  
19 at three locations along the tunnel route. The barge unloading construction would temporarily  
20 affect the South Mokelumne River at the north end of Staten Island, Connection Slough at the  
21 north end of Bacon Island, and Old River just south of its junction with North Victoria Canal. The  
22 details of these locations can be seen in the Terrestrial Biology Mapbook. These losses would  
23 take place during the near-term construction period.

- 24 • *CM2 Yolo Bypass Fisheries Enhancement*: Implementation of CM2 involves a number of  
25 construction activities within the Yolo and Sacramento Bypasses, including Fremont Weir and  
26 stilling basin improvements, Putah Creek realignment activities, Lisbon Weir modification and  
27 Sacramento Weir improvements. Some of these activities could involve excavation and grading  
28 in tidal perennial aquatic areas to improve passage of fish through the bypasses. Based on  
29 hypothetical construction footprints, a total of 8 acres could be permanently lost and another 11  
30 acres could be temporarily removed. This activity would occur primarily in the near-term  
31 timeframe. *CM4 Tidal Natural Communities Restoration*: Based on the use of hypothetical  
32 restoration footprints, implementation of CM4 would affect 18 acres of tidal perennial aquatic  
33 community. CM4 involves conversion of existing natural communities to a variety of tidal  
34 wetlands, including tidal perennial aquatic, tidal brackish emergent, and tidal freshwater  
35 emergent wetlands. Specific locations for these conversions are not known. The 18 acres could  
36 remain tidal perennial aquatic with a modified tidal prism, or they could eventually be  
37 converted to one of the other tidal wetland types. For purposes of this analysis, a conservative  
38 approach has been taken and the effect has been discussed simultaneously with the habitat  
39 losses associated with other conservation measures.

40 An estimated 65,000 acres of tidal wetlands and transitional uplands would be restored during  
41 tidal habitat restoration, consistent with BDCP Objective L1.3. Of these acres, an estimated  
42 27,000 acres of tidal perennial aquatic habitat would be restored, based on modeling conducted  
43 by ESA PWA (refer to Table 5 in BDCP Appendix 3.B, *BDCP Tidal Habitat Evolution Assessment*).  
44 This restoration would be consistent with BDCP Objective TPANC1.1. Approximately 3,400 acres  
45 of the restoration would happen during the first 10 years of Alternative 4 implementation,  
46 which would coincide with the timeframe of water conveyance facilities construction. The

1 remaining restoration would be spread over the following 30 years. Tidal natural communities  
2 restoration is expected to be focused in the ROAs identified in Figure 12-1. Some of the  
3 restoration would occur in the lower Yolo Bypass, but restoration would also be spread among  
4 the Suisun Marsh, South Delta, Cosumnes/Mokelumne and West Delta ROAs.

- 5 • *CM5 Seasonally Inundated Floodplain Restoration*: Floodplain restoration levee construction  
6 would permanently remove 2 acres and temporarily remove 5 acres of tidal perennial aquatic  
7 habitat. The construction-related losses would be considered a permanent removal of the tidal  
8 perennial aquatic habitats directly affected. This activity is scheduled to start following  
9 construction of water conveyance facilities, which is expected to take 10 years. Specific locations  
10 for the floodplain restoration have not been identified, but it is expected that much of the  
11 activity would occur in the south Delta along the major rivers. Floodplain restoration along the  
12 San Joaquin River would improve connectivity for a variety of species that rely on tidal  
13 perennial aquatic habitat. The regional and Plan Area landscape linkages along the San Joaquin  
14 River are included in Figure 12-2.
- 15 • *CM6 Channel Margin Enhancement*: Channel margin habitat enhancement could result in filling  
16 of small amounts of tidal perennial aquatic habitat along 20 miles of river and sloughs. The  
17 extent of this loss cannot be quantified at this time, but the majority of the enhancement activity  
18 would occur on tidal perennial aquatic habitat margins, including levees and channel banks. The  
19 improvements would occur within the study area on sections of the Sacramento, San Joaquin  
20 and Mokelumne Rivers, and along Steamboat and Sutter Sloughs.

21 The following paragraphs summarize the combined effects discussed above and describe other  
22 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA impact conclusions are  
23 also included.

#### 24 ***Near-Term Timeframe***

25 During the near-term timeframe (the first 10 years of BDCP implementation), Alternative 4 would  
26 affect the tidal perennial aquatic community through CM1 construction losses (178 acres permanent  
27 and 2,101 acres temporary) and the CM2 construction losses (8 acres permanent and 11 acres  
28 temporary). These losses would occur primarily at Clifton Court Forebay due to dredging, along the  
29 Sacramento River at intake sites, or in the northern Yolo Bypass. Approximately 11 acres of the  
30 inundation and construction-related effects resulting from CM4 would occur during the near-term  
31 throughout the ROAs mapped in Figure 12-1.

32 The construction losses of this special-status natural community would represent an adverse effect  
33 if they were not offset by avoidance and minimization measures and restoration actions associated  
34 with BDCP conservation components. Loss of tidal perennial aquatic natural community would be  
35 considered both a loss in acreage of a sensitive natural community and a loss of waters of the United  
36 States as defined by Section 404 of the CWA. The largest loss would occur at Clifton Court Forebay,  
37 and would be temporary. This tidal perennial habitat is of relatively low value to special-status  
38 terrestrial species in the study area. The creation of approximately 3,400 acres of high-value tidal  
39 perennial aquatic natural community as part of CM4 during the first 10 years of Alternative 4  
40 implementation would offset this near-term loss, avoiding any adverse effect. Typical project-level  
41 mitigation ratios (1:1 for restoration) would indicate 2,309 acres of restoration would be needed to  
42 offset (i.e., mitigate) the 2,309 acres of effect (the total permanent and temporary near-term effects  
43 listed in Table 12-4-1) associated with near-term activities, including water conveyance facilities  
44 construction.

1 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
2 *Construction Best Management Practices and Monitoring*, *AMM6 Disposal and Reuse of Spoils*,  
3 *Reusable Tunnel Material*, and *Dredged Material*, *AMM7 Barge Operations Plan*, and *AMM10*  
4 *Restoration of Temporarily Affected Natural Communities*. All of these AMMs include elements that  
5 avoid or minimize the risk of affecting habitats at work areas and storage sites. The AMMs are  
6 described in detail in BDCP Appendix 3.C.

### 7 **Late Long-Term Timeframe**

8 Implementation of Alternative 4 as a whole would result in relatively minor (less than 3%)  
9 conversions of or losses to tidal perennial aquatic community in the study area. These losses or  
10 conversions (206 acres of permanent and 2,117 acres of temporary) would be largely associated  
11 with construction of the water conveyance facilities (CM1), construction of Yolo Bypass fish  
12 improvements (CM2), and inundation during tidal marsh restoration (CM4). Inundation conversions  
13 would occur through the course of the BDCP restoration program at various tidal restoration sites  
14 throughout the study area. By the end of the Plan timeframe, a total of more than 27,000 acres of  
15 high-value tidal perennial aquatic natural community would be restored (estimated from Table 5 in  
16 BDCP Appendix 3.B). The restoration would occur over a wide region of the study area, including  
17 within the Suisun Marsh, Cosumnes/Mokelumne, Cache Creek, and South Delta ROAs (see Figure  
18 12-1).

19 **NEPA Effects:** The creation of approximately 3,400 acres of high-value tidal perennial aquatic  
20 natural community as part of CM4 during the first 10 years of Alternative 4 implementation would  
21 offset near-term losses associated with construction activities for CM1, CM2, CM4 and CM6, avoiding  
22 any adverse effect. Alternative 4, which includes restoration of an estimated 27,000 acres of this  
23 natural community over the course of the Plan, would not result in a net long-term reduction in the  
24 acreage of a sensitive natural community; the effect would be beneficial.

### 25 **CEQA Conclusion:**

#### 26 **Near-Term Timeframe**

27 Alternative 4 would result in the near-term loss or conversion of approximately 2,309 acres of tidal  
28 perennial aquatic natural community due to construction of the water conveyance facilities (CM1)  
29 and fish passage improvements (CM2), and inundation during tidal marsh restoration (CM4). The  
30 construction losses would occur primarily at Clifton Court Forebay, along the Sacramento River at  
31 intake sites, along various Delta waterways at barge offloading sites, and within the northern section  
32 of the Yolo Bypass, while inundation conversions would occur at various tidal restoration sites  
33 throughout the study area. The losses and conversions would be spread across the near-term  
34 timeframe. These losses and conversions would be offset by planned restoration of an estimated  
35 3,400 acres of high-value tidal perennial aquatic natural community scheduled for the first 10 years  
36 of Alternative 4 implementation (CM4). AMM1, AMM2, AMM6, AMM7, and AMM10 would also be  
37 implemented to minimize impacts. Because of these offsetting near-term restoration activities and  
38 AMMs, impacts would be less than significant. Typical project-level mitigation ratios (1:1 for  
39 restoration) would indicate that 2,309 acres of restoration would be needed to offset (i.e., mitigate)  
40 the 2,309 acres of loss or conversion. The restoration would be initiated at the beginning of  
41 Alternative 4 implementation to minimize any time lag in the availability of this habitat to special-  
42 status species, and would result in a net gain in acreage of this sensitive natural community.

1 **Late Long-Term Timeframe**

2 At the end of the Plan period, 2,323 acres of the natural community would be lost or converted and  
3 an estimated 27,000 acres of this community would be restored. There would be no net permanent  
4 reduction in the acreage of this sensitive natural community within the study area. Therefore,  
5 Alternative 4 would not have a substantial adverse effect on this natural community; the impact  
6 would be beneficial.

7 **Impact BIO-2: Increased Frequency, Magnitude and Duration of Periodic Inundation of Tidal**  
8 **Perennial Aquatic Natural Community**

9 Two Alternative 4 conservation measures would modify the water depths and inundation/flooding  
10 regimes of both natural and man-made waterways in the study area. CM2, which is designed to  
11 improve fish passage and shallow flooded habitat for Delta fishes in the Yolo Bypass, would increase  
12 periodic inundation of tidal perennial aquatic natural community on small acreages, while CM5  
13 would expose this community to additional flooding as channel margins are modified and levees are  
14 set back to improve fish habitat along some of the major rivers and waterways throughout the study  
15 area.

- 16 • *CM2 Yolo Bypass Fisheries Enhancement*: Operation of the Yolo Bypass under Alternative 4 would  
17 result in an increase in the frequency, magnitude and duration of inundation and changes in  
18 water depth and velocity of 9–36 acres of tidal perennial aquatic natural community. The  
19 methods used to estimate these inundation acreages are described in BDCP Appendix 5.J, *Effects*  
20 *on Natural Communities, Wildlife, and Plants*. The area more frequently affected by inundation  
21 would vary with the flow volume that would pass through the newly constructed notch in the  
22 Fremont Weir. The 9-acre increase in inundation would be associated with a notch flow of 1,000  
23 cfs, and the 36-acre increase would result from a notch flow of 4,000 cfs. Plan-related increases  
24 in flow through Fremont Weir would be expected in 30% of the years. Most of the tidal  
25 perennial aquatic community occurs in the southern section of the bypass on Liberty Island, and,  
26 to a lesser extent, along the eastern edge of the bypass, including the Tule Canal/Toe Drain. The  
27 anticipated change in management of flows in the Yolo Bypass includes more frequent releases  
28 in flows into the bypass from the Fremont and Sacramento Weirs, and in some years, later  
29 releases into the bypass in spring months (April and May). The modification of periodic  
30 inundation events would be expected to be beneficial to the ecological function of tidal perennial  
31 aquatic habitat in the bypass as it relates to BDCP covered aquatic species. The Yolo Bypass  
32 waterway is the key element in the Yolo Bypass landscape linkage mapped in Figure 12-2 and  
33 described in detail in BDCP Chapter 3, Table 3.2-3. The change in periodic inundation in the  
34 bypass would not substantially modify its value for special-status or common terrestrial species.  
35 Water depths and water flow rates would increase over Existing Conditions and the No Action  
36 condition in approximately 30% of the years, but it would not fragment the habitat or make it  
37 less accessible to special-status or common terrestrial species. The modifications would not  
38 result in a loss of this community. The plant species associated with this community are adapted  
39 to inundation. The extended inundation would be designed to expand foraging and spawning  
40 habitat for Delta fishes. The effects of these changes in the inundation regime on terrestrial  
41 species that rely on tidal perennial aquatic habitats are discussed in detail later in this chapter,  
42 under the individual species assessments.
- 43 • *CM5 Seasonally Inundated Floodplain Restoration*: Floodplain restoration would result in a  
44 seasonal increase in the frequency and duration of flooding of 39 acres of tidal perennial aquatic  
45 habitat. Specific locations for this restoration activity have not been identified, but they would

1 likely be focused in the south Delta area, along the major rivers and Delta channels. The more  
2 frequent exposure of these wetlands to stream flooding events would be beneficial to the  
3 ecological function of tidal perennial aquatic habitats, especially as they relate to BDCP target  
4 aquatic species. The plant species associated with these tidal perennial aquatic areas are  
5 adapted to inundation and would not be substantially modified.

6 In summary, 48–75 acres of tidal perennial aquatic community in the study area would be subjected  
7 to more frequent increases in water depth and velocity as a result of implementing two Alternative 4  
8 conservation measures (CM2 and CM5). Tidal perennial aquatic community is already, by definition,  
9 permanently inundated aquatic habitat of value to terrestrial and aquatic species in the study area;  
10 therefore, periodic changes in water depth and velocity would not result in a net permanent  
11 reduction in the acreage of this community in the study area.

12 **NEPA Effects:** Increasing periodic inundation of tidal perennial aquatic natural community would  
13 not have an adverse effect on the community.

14 **CEQA Conclusion:** An estimated 48–75 acres of tidal perennial aquatic community in the study area  
15 would be subjected to more frequent increases in water depth and velocity from flood flows as a  
16 result of implementing CM2 and CM5 under Alternative 4. Tidal perennial aquatic community is  
17 already, by definition, permanently inundated aquatic habitat of value to terrestrial and aquatic  
18 species in the study area. The periodic inundation would not result in a net permanent reduction in  
19 the acreage of this community in the study area. Therefore, there would be no substantial adverse  
20 effect on the community. The impact would be less than significant.

### 21 **Impact BIO-3: Modification of Tidal Perennial Aquatic Natural Community from Ongoing** 22 **Operation, Maintenance and Management Activities**

23 Once the physical facilities associated with Alternative 4 are constructed and the stream flow regime  
24 associated with changed water management is in effect, there would be new ongoing and periodic  
25 actions associated with operation, maintenance and management of the BDCP facilities and  
26 conservation lands that could affect tidal perennial aquatic natural community in the study area. The  
27 ongoing actions include diverting Sacramento River flows in the north Delta, and reduced diversion  
28 from south Delta channels. These actions are associated with CM1 (see Impact BIO-2 for effects  
29 associated with CM2). The periodic actions would involve access road and conveyance facility  
30 repair, vegetation management at the various water conveyance facilities and habitat restoration  
31 sites (CM13), levee repair and replacement of levee armoring, channel dredging, and habitat  
32 enhancement in accordance with natural community management plans. The potential effects of  
33 these actions are described below.

- 34 • *Modified river flows upstream of and within the study area and reduced diversions from south*  
35 *Delta channels.* Changes in releases from reservoirs upstream of the study area, increased  
36 diversion of Sacramento River flows in the north Delta, and reduced diversion from south Delta  
37 channels (associated with Operational Scenario H) would not result in the permanent reduction  
38 in acreage of a sensitive natural community in the study area. Flow levels in the upstream rivers  
39 would not change such that the acreage of tidal perennial aquatic community would be reduced  
40 on a permanent basis. Some increases and some decreases would be expected to occur during  
41 some seasons and in some water-year types, but there would be no permanent loss. Similarly,  
42 increased diversions of Sacramento River flows in the north Delta would not result in a  
43 permanent reduction in tidal perennial aquatic community downstream of these diversions.  
44 Tidal influence on water levels in the Sacramento River and Delta waterways would continue to

1 be dominant. Reduced diversions from the south Delta channels would not create a reduction in  
2 this natural community.

3 The periodic changes in flows in the Sacramento River, Feather River, and American River  
4 associated with Alternative 4 operations would affect salinity, water temperature, dissolved  
5 oxygen levels, turbidity, contaminant levels, and dilution capacity in these rivers and Delta  
6 waterways. These changes are discussed in detail in Chapter 8, *Water Quality*. Potentially  
7 substantial increases in electrical conductivity (salinity) are predicted for the Delta and Suisun  
8 Marsh as a result of increased export of Sacramento River water. These salinity changes are not  
9 expected to result in a permanent reduction in the acreage or value of tidal perennial aquatic  
10 natural community for terrestrial species in the study area.

- 11 • *Access road, water conveyance facility and levee repair.* Periodic repair of access roads, water  
12 conveyance facilities and levees associated with the BDCP actions have the potential to require  
13 removal of adjacent vegetation and could entail earth and rock work in tidal perennial aquatic  
14 habitats. This activity could lead to increased soil erosion, turbidity and runoff entering tidal  
15 perennial aquatic habitats. These activities would be subject to normal erosion, turbidity and  
16 runoff control management practices, including those developed as part of *AMM2 Construction*  
17 *Best Management Practices and Monitoring* and *AMM4 Erosion and Sediment Control Plan*. Any  
18 vegetation removal or earthwork adjacent to or within aquatic habitats would require use of  
19 sediment and turbidity barriers, soil stabilization and revegetation of disturbed surfaces. Proper  
20 implementation of these measures would avoid permanent adverse effects on this community.
- 21 • *Vegetation management.* Vegetation management, in the form of physical removal and chemical  
22 treatment, would be a periodic activity associated with the long-term maintenance of water  
23 conveyance facilities and restoration sites. Vegetation management is also the principal activity  
24 associated with *CM13 Invasive Aquatic Vegetation Control* and is consistent with BDCP Objective  
25 TPANC2.1. Use of herbicides to control nuisance vegetation could pose a long-term hazard to  
26 tidal perennial aquatic natural community at or adjacent to treated areas. The hazard could be  
27 created by uncontrolled drift of herbicides, uncontrolled runoff of contaminated stormwater  
28 onto the natural community, or direct discharge of herbicides to tidal perennial aquatic areas  
29 being treated for invasive species removal. Environmental commitments and *AMM5 Spill*  
30 *Prevention, Containment, and Countermeasure Plan* have been made part of the BDCP to reduce  
31 hazards to humans and the environment from use of various chemicals during maintenance  
32 activities, including the use of herbicides. These commitments are described in Appendix 3B,  
33 including the commitment to prepare and implement spill prevention, containment, and  
34 countermeasure plans and stormwater pollution prevention plans. Best management practices,  
35 including control of drift and runoff from treated areas, and use of herbicides approved for use  
36 in aquatic environments would also reduce the risk of affecting natural communities adjacent to  
37 water conveyance features and levees associated with restoration activities.

38 Herbicides to remove aquatic invasive species as part of CM13 would be used to restore the  
39 normal ecological function of tidal aquatic habitats in planned restoration areas. The treatment  
40 activities would be conducted in concert with the California Department of Boating and  
41 Waterways' invasive species removal program. Eliminating large stands of water hyacinth and  
42 Brazilian waterweed would improve habitat conditions for some aquatic species by removing  
43 cover for nonnative predators, improving water flow and removing barriers to movement (see  
44 Chapter 11, *Fish and Aquatic Resources*). These habitat changes should also benefit terrestrial  
45 species that use tidal perennial aquatic natural community for movement corridors and for

1 foraging. Vegetation management effects on individual species are discussed in the species  
2 sections on following pages.

- 3 • *Channel dredging.* Long-term operation of the Alternative 4 intakes on the Sacramento River  
4 would include periodic dredging of sediments that might accumulate in front of intake screens.  
5 The dredging would occur in tidal perennial aquatic natural community and would result in  
6 short-term increases in turbidity and disturbance of the substrate. These conditions would not  
7 eliminate the community, but would diminish its value for special-status and common species  
8 that rely on it for movement corridor or foraging area. The individual species effects are  
9 discussed later in this chapter.
- 10 • *Habitat enhancement.* The BDCP includes a long-term management element for the natural  
11 communities within the Plan Area (CM11). For tidal perennial aquatic natural community, a  
12 management plan would be prepared that specifies actions to improve the value of the habitats  
13 for covered species. Actions would include control of invasive nonnative plant and animal  
14 species, restrictions on vector control and application of herbicides, and maintenance of  
15 infrastructure that would allow for movement through the community. The enhancement efforts  
16 would improve the long-term value of this community for both special-status and common  
17 species.

18 The various operations and maintenance activities described above could alter acreage of tidal  
19 perennial aquatic natural community in the study area through changes in flow patterns and  
20 changes in water quality. Activities could also introduce sediment and herbicides that would reduce  
21 the value of this community to common and sensitive plant and wildlife species. Other periodic  
22 activities associated with the Plan, including management, protection and enhancement actions  
23 associated with *CM3 Natural Communities Protection and Restoration* and *CM11 Natural*  
24 *Communities Enhancement and Management*, would be undertaken to enhance the value of the  
25 community. While some of these activities could result in small reductions in acreage, these  
26 reductions would be greatly offset by restoration activities planned as part of *CM4 Tidal Natural*  
27 *Communities Restoration*. The management actions associated with levee repair, periodic dredging  
28 and control of invasive plant species would also result in a long-term benefit to the species  
29 associated with tidal perennial aquatic habitats by improving water movement.

30 **NEPA Effects:** Ongoing operation, maintenance and management activities would not result in a net  
31 permanent reduction in this sensitive natural community within the study area. Therefore, there  
32 would be no adverse effect on the tidal perennial aquatic natural community.

33 **CEQA Conclusion:**

34 The operation and maintenance activities associated with Alternative 4 would have the potential to  
35 create minor losses in total acreage of tidal perennial aquatic natural community in the study area,  
36 and could create temporary increases in turbidity and sedimentation. The activities could also  
37 introduce herbicides periodically to control nonnative, invasive plants. Implementation of  
38 environmental commitments and AMM2, AMM4, and AMM5 would minimize these impacts, and  
39 other operations and maintenance activities, including management, protection and enhancement  
40 actions associated with *CM3 Natural Communities Protection and Restoration* and *CM11 Natural*  
41 *Communities Enhancement and Management*, would create positive effects, including improved  
42 water movement in these habitats. Long-term restoration activities associated with *CM4 Tidal*  
43 *Natural Communities Restoration* would greatly expand this natural community in the study area.  
44 Ongoing operation, maintenance and management activities would not result in a net permanent

1 reduction in the acreage or value of this sensitive natural community within the study area.  
2 Therefore, there would be a less-than-significant impact on the tidal perennial aquatic natural  
3 community.

#### 4 **Tidal Brackish Emergent Wetland**

5 Construction, operation, maintenance and management associated with the conservation  
6 components of Alternative 4 would have no adverse effect on the habitats associated with the tidal  
7 brackish emergent wetland natural community. Habitat restoration and construction associated  
8 with CM1, CM2, CM5 and CM6 would not remove tidal brackish emergent wetland; levee breaching  
9 and minor construction associated with CM4 may temporarily remove small amounts of this natural  
10 community (see Table 12-4-2). Full implementation of Alternative 4 would include the following  
11 conservation actions over the term of the BDCP to benefit the tidal brackish emergent wetland  
12 natural community.

- 13 • Restore and protect 65,000 acres of tidal natural communities and transitional uplands to  
14 accommodate sea level rise (Objective L1.3 associated with CM4).
- 15 • Within the restored and protected tidal natural communities and transitional uplands, include  
16 sufficient transitional uplands along the fringes of restored brackish and freshwater tidal  
17 emergent wetlands to accommodate up to 3 feet of sea level rise where possible and allow for  
18 the future upslope establishment of tidal emergent wetland communities (Objective L1.7,  
19 associated with CM4).
- 20 • Within the restored and protected tidal natural communities and transitional uplands, restore  
21 or create at least 6,000 acres of tidal brackish emergent wetland in Conservation Zone 11  
22 (Objective TBEWNC1.1 associated with CM4).
- 23 • Restore connectivity to isolated patches of tidal brackish emergent marsh where isolation has  
24 reduced effective use of these marshes by the species that depend on them (Objective  
25 TBEWNC1.3 associated with CM4).
- 26 • Create topographic heterogeneity in restored tidal brackish emergent wetland to provide  
27 variation in inundation characteristics and vegetative composition (Objective TBEWNC1.4  
28 associated with CM4).
- 29 • Limit perennial pepperweed to no more than 10% cover in tidal brackish emergent wetland  
30 natural community within the reserve system (Objective TBEWNC2.1 associated with CM11).

31 There is a variety of other, less specific conservation goals and objectives in BDCP Chapter 3, Section  
32 3.3 that would improve the value of tidal brackish emergent wetland natural community for  
33 terrestrial species. As explained below, with the restoration and enhancement of these amounts of  
34 habitat, in addition to implementation of AMMs, impacts on this natural community would not be  
35 adverse for NEPA purposes and would be less than significant for CEQA purposes.

36

1 **Table 12-4-2. Changes in Tidal Brackish Emergent Wetland Natural Community Associated with**  
 2 **Alternative 4 (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Permanent		Temporary		Periodic <sup>d</sup>	
	NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	0	0	0	0	0	0
CM2	0	0	0	0	0	0
CM4	Unk.	Unk.	Unk.	Unk.	0	0
CM5	0	0	0	0	0	0
CM6	0	0	0	0	0	0
<b>TOTAL IMPACTS</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

<sup>a</sup> See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only.

NT = near-term

LLT = late long-term

Unk. = unknown

3

4 **Impact BIO-4: Changes in Tidal Brackish Emergent Wetland Natural Community as a Result of**  
 5 **Implementing BDCP Conservation Measures**

6 Construction of the Alternative 4 water conveyance facilities (CM1) would not affect tidal brackish  
 7 emergent wetland natural community.

8 Restoration of tidal marsh habitats associated with CM4 would require site preparation, earthwork,  
 9 and other site activities that could remove tidal brackish emergent wetland. Levee modifications,  
 10 grading or contouring, filling to compensate for land subsidence, and creation of new channels could  
 11 also result in the removal of tidal brackish emergent wetland. All of this construction and land  
 12 modification activity that could affect tidal brackish emergent wetland would take place in Suisun  
 13 Marsh (CZ 11). The acreage of loss has not been calculated because the specific locations for site  
 14 preparation and earthwork have not been identified, but the loss would likely be very small (less  
 15 than 1 acre). These activities would occur in small increments during the course of the CM4  
 16 restoration program. The restoration elements of CM4 would greatly exceed any of the short-term  
 17 losses described above. At least 6,000 acres of tidal brackish emergent wetland would be restored in  
 18 the Plan Area (BDCP Objective TBEWNC1.1, associated with CM4), with 2,000 acres of restoration  
 19 occurring in the near-term timeframe. In addition, the habitat and ecosystem functions of BDCP  
 20 restored tidal brackish emergent wetland would be maintained and enhanced (CM11). The BDCP  
 21 beneficial effects evaluation of Alternative 4 (BDCP Chapter 5, Section 5.4.3.2) states that at least  
 22 6,000 acres of tidal brackish emergent wetland community would be restored in CZ 11, and that  
 23 tidal natural communities restoration would decrease habitat fragmentation by providing additional  
 24 connectivity between isolated patches of tidal brackish emergent wetland.

1 The restoration activities associated with CM4 in Suisun Marsh would result in other effects that  
2 could alter the habitat value of tidal brackish emergent wetland. Disturbances associated with levee  
3 breaching and grading or contouring would increase opportunities for the introduction or spread of  
4 invasive species. Implementation of CM11 would limit this risk through invasive species control and  
5 wetland management and enhancement activities to support native species. Tidal flooding of dry  
6 areas could also increase the bioavailability of methylmercury in Suisun Marsh. Site-specific  
7 conditions would dictate the significance of this hazard to tidal brackish marsh vegetation and  
8 associated wildlife. According to the Suisun Marsh Plan EIR/EIS (Bureau of Reclamation et al. 2010,  
9 pg. 5.2-18), marsh creation may generate less methylmercury than is currently being generated by  
10 managed wetlands. However, this has not been confirmed through comprehensive studies. Because  
11 of the difficulty in assessing this risk at a programmatic level, it will need to be considered at a  
12 project level. Site-specific restoration plans that address the creation and mobilization of mercury,  
13 and monitoring and adaptive management as described in *CM12 Methylmercury Management*, would  
14 be available to address the uncertainty of methylmercury levels in restored tidal marsh. Water  
15 temperature fluctuations in newly created marsh and the potential for increased nitrogen  
16 deposition associated with construction vehicles are also issues of concern that are difficult to  
17 quantify at the current stage of restoration design. None of these effects is expected to limit the  
18 extent or value of tidal brackish emergent wetland in the study area.

19 **NEPA Effects:** The increase of tidal brackish emergent wetland associated with CM4 would be a  
20 beneficial effect on the natural community.

21 **CEQA Conclusion:** Tidal brackish emergent wetland natural community could experience small  
22 losses in acreage in Suisun Marsh (CZ 11) as a result of the large-scale tidal marsh restoration  
23 planned as part of CM4. These losses (expected to not exceed 1 acre) would be associated with levee  
24 modification, site preparation, and other earthwork needed to expose diked lands to tidal influence.  
25 Because at least 6,000 acres of tidal brackish emergent wetland would be restored in the Plan Area  
26 as part of CM4, including 2,000 acres restored in the near-term timeframe, there would be a large  
27 increase in tidal brackish emergent wetland both in the near-term and over the life of the Plan.  
28 Indirect effects associated with the expansion of tidal brackish emergent wetland natural  
29 community, including the potential spread of invasive species, the generation of methylmercury,  
30 increases in marsh water temperatures, and increased nitrogen deposition are not expected to have  
31 a significant impact on this natural community in the study area. Therefore, this impact would be  
32 beneficial.

### 33 **Impact BIO-5: Modification of Tidal Brackish Emergent Wetland Natural Community from** 34 **Ongoing Operation, Maintenance and Management Activities**

35 Once the physical facilities associated with CM1 and CM4 of Alternative 4 are constructed and the  
36 water management practices associated with changed reservoir operations, diversions from the  
37 north Delta, and marsh restoration are in effect, there would be new ongoing and periodic actions  
38 that could affect tidal brackish emergent wetland natural community in the study area. The ongoing  
39 actions include water releases and diversions, access road and levee repair, and replacement of  
40 levee armoring, channel dredging, and habitat enhancement in accordance with natural community  
41 management plans. The potential effects of these actions are described below.

- 42 • *Modified river flows upstream of and within the study area and reduced diversions from south*  
43 *Delta channels.* Changes in releases from reservoirs upstream of the study area, increased  
44 diversion of Sacramento River flows in the north Delta, and reduced diversion from south Delta

1 channels (associated with Operational Scenario H) would not result in the permanent reduction  
2 in acreage of tidal brackish emergent wetland natural community in the study area. Flow levels  
3 in the upstream rivers would not directly affect this natural community because it does not exist  
4 upstream of the Delta. Increased diversions of Sacramento River flows in the north Delta would  
5 not result in a permanent reduction in tidal brackish emergent wetland downstream of these  
6 diversions. Salinity levels in Suisun Marsh channels would be expected to increase with reduced  
7 Sacramento River outflows (see Chapter 8, Section 8.3.3.9), but this change would not be  
8 sufficient to change the acreage of brackish marsh. This natural community persists in an  
9 environment that experiences natural fluctuations in salinity due to tidal ebb and flow. Reduced  
10 diversions from the south Delta channels would not create a reduction in this natural  
11 community.

12 The increased diversion of Sacramento River flows in the north Delta would result in reductions  
13 in sediment load (annual mass) flowing into the central and west Delta, and Suisun Marsh. The  
14 reduction is estimated to be approximately 9% of the river's current sediment load for  
15 Alternative 4, which would have a north Delta diversion capacity of 9,000 cfs under Operational  
16 Scenario H (see BDCP Appendix 5.C, Attachment 5C.D, Section 5C.D.3.3 for a detailed analysis of  
17 this issue). This would contribute to a decline in sediment reaching the Delta and Suisun Marsh  
18 that has been occurring over the past 50-plus years due to a gradual depletion of sediment from  
19 the upstream rivers. The depletion has been caused by a variety of factors, including depletion of  
20 hydraulic mining sediment in upstream areas, armoring of river channels and a cutoff of  
21 sediment due to dam construction on the Sacramento River and its major tributaries (Wright  
22 and Schoellhamer 2004; Barnard et al. 2013).

23 Reduced sediment load flowing into the Delta and Suisun Marsh could have an adverse effect on  
24 tidal marsh, including tidal brackish emergent wetland. Sediment trapped by the marsh  
25 vegetation allows the emergent plants to maintain an appropriate water depth as water levels  
26 gradually rise from the effects of global warming (see Chapter 29, *Climate Change*). The BDCP  
27 proponents have incorporated an environmental commitment (see Appendix 3B, Section  
28 3B.1.19, *Disposal and Reuse of Spoil, Reusable Tunnel Material and Dredged Material*) into the  
29 project that would lessen this potential effect. The Sacramento River water diverted at north  
30 Delta intakes would pass through sedimentation basins before being pumped to water  
31 conveyance structures. The commitment states that sediment collected in these basins would be  
32 periodically removed and reused, to the greatest extent feasible, in the Plan Area for a number of  
33 purposes, including marsh restoration, levee maintenance, subsidence reversal, flood response,  
34 and borrow area fill. The portion of the sediment re-introduced to the Delta and estuary for  
35 marsh restoration would remain available for marsh accretion. With this commitment to reuse  
36 in the Plan Area, the removal of sediment at the north Delta intakes would not result in a net  
37 reduction in the acreage and value of this special-status marsh community. The effect would not  
38 be adverse (NEPA) and would be less than significant (CEQA).

- 39
- 40 • *Access road and levee repair.* Periodic repair of access roads and levees associated with the BDCP  
41 actions have the potential to require removal of adjacent vegetation and could entail earth and  
42 rock work in tidal brackish emergent wetland habitats. This activity could lead to increased soil  
43 erosion, turbidity and runoff entering these habitats. The activities would be subject to normal  
44 erosion, turbidity and runoff control management practices, including those developed as part  
45 of *AMM2 Construction Best Management Practices and Monitoring* and *AMM4 Erosion and*  
46 *Sediment Control Plan*. Any vegetation removal or earthwork adjacent to or within aquatic  
habitats would require use of sediment and turbidity barriers, soil stabilization and revegetation

1 of disturbed surfaces. Proper implementation of these measures would avoid permanent  
2 adverse effects on this community.

- 3 • *Vegetation management.* Vegetation management, in the form of physical removal and chemical  
4 treatment (CM11), would be a periodic activity associated with the long-term maintenance of  
5 restoration sites. Use of herbicides to control nuisance vegetation could pose a long-term hazard  
6 to tidal brackish emergent wetland natural community at or adjacent to treated areas. The  
7 hazard could be created by uncontrolled drift of herbicides, uncontrolled runoff of contaminated  
8 stormwater onto the natural community, or direct discharge of herbicides to wetland areas  
9 being treated for invasive species removal. Environmental commitments and *AMM5 Spill*  
10 *Prevention, Containment, and Countermeasure Plan* have been made part of the BDCP to reduce  
11 hazards to humans and the environment from use of various chemicals during maintenance  
12 activities, including the use of herbicides. These commitments are described in Appendix 3B,  
13 including the commitment to prepare and implement spill prevention, containment, and  
14 countermeasure plans and stormwater pollution prevention plans. Best management practices,  
15 including control of drift and runoff from treated areas, and use of herbicides approved for use  
16 in aquatic environments would also reduce the risk of affecting natural communities adjacent to  
17 levees associated with tidal wetland restoration activities.
- 18 • *Channel dredging.* Long-term maintenance of tidal channels that support wetland expansion in  
19 Suisun Marsh would include periodic dredging of sediments. The dredging would occur adjacent  
20 to tidal brackish emergent wetland natural community and would result in short-term increases  
21 in turbidity and disturbance of the substrate. These conditions would not eliminate the  
22 community, but would diminish its value in the short term for special-status and common  
23 species that rely on it for cover, movement corridor or foraging area. The individual species  
24 effects are discussed later in this chapter.
- 25 • *Habitat enhancement.* The BDCP includes a long-term management element for the natural  
26 communities within the Plan Area (CM11). For tidal brackish emergent wetland natural  
27 community, a management plan would be prepared that specifies actions to improve the value  
28 of the habitats for covered species. Actions would include control of invasive nonnative plant  
29 and animal species, fire management, restrictions on vector control and application of  
30 herbicides, and maintenance of infrastructure that would allow for movement through the  
31 community. The enhancement efforts would improve the long-term value of this community for  
32 both special-status and common species.

33 The various operations and maintenance activities described above could alter acreage and value of  
34 tidal brackish emergent wetland natural community in the study area through water operations,  
35 levee and road maintenance, channel dredging and vegetation management in or adjacent to this  
36 community. Activities could also introduce sediment and herbicides that would reduce the value of  
37 this community to common and sensitive plant and wildlife species. Other periodic activities  
38 associated with the Plan, including management, protection and enhancement actions associated  
39 with *CM3 Natural Communities Protection and Restoration* and *CM11 Natural Communities*  
40 *Enhancement and Management*, would be undertaken to enhance the value of the community. While  
41 some of these activities could result in small changes in acreage, these changes would be greatly  
42 offset by restoration activities planned as part of *CM4 Tidal Natural Communities Restoration*. The  
43 management actions associated with levee repair, periodic dredging and control of invasive plant  
44 species would also result in a long-term benefit to the species associated with tidal brackish  
45 emergent wetland habitats by improving water movement.

1 **NEPA Effects:** Ongoing operation, maintenance and management activities associated with  
2 Alternative 4 would not result in a net permanent reduction in the tidal brackish emergent wetland  
3 natural community within the study area. There would be no adverse effect on the tidal brackish  
4 emergent wetland natural community.

5 **CEQA Conclusion:** The operation and maintenance activities associated with Alternative 4 would  
6 have the potential to create minor changes (not exceeding 1 acre) in total acreage of tidal brackish  
7 emergent wetland natural community in the study area, and could create temporary increases in  
8 turbidity and sedimentation. The activities could also introduce herbicides periodically to control  
9 nonnative, invasive plants. Implementation of environmental commitments and AMM2, AMM4, and  
10 AMM5 would minimize these impacts, and other operations and maintenance activities, including  
11 management, protection and enhancement actions associated with *CM3 Natural Communities*  
12 *Protection and Restoration* and *CM11 Natural Communities Enhancement and Management*, would  
13 create positive effects, including improved water movement in these habitats. Long-term restoration  
14 activities associated with *CM4 Tidal Natural Communities Restoration* would greatly expand this  
15 natural community in the study area. Ongoing operation, maintenance and management activities  
16 would not result in a net permanent reduction in this sensitive natural community within the study  
17 area. Therefore, there would be a less-than-significant impact.

#### 18 **Tidal Freshwater Emergent Wetland**

19 Construction, operation, maintenance and management associated with the conservation  
20 components of Alternative 4 would have no long-term adverse effects on the habitats associated  
21 with the tidal freshwater emergent wetland natural community. Initial development and  
22 construction of CM1, CM2, CM4, CM5, and CM6 would result in both permanent and temporary  
23 removal of small acreages of this community. (see Table 12-4-3). Full implementation of Alternative  
24 4 would also include the following conservation actions over the term of the BDCP to benefit the  
25 tidal freshwater emergent wetland natural community.

- 26 ● Restore and protect 65,000 acres of tidal natural communities and transitional uplands to  
27 accommodate sea level rise (Objective L1.3 associated with CM4).
- 28 ● Within the 65,000 acres of tidal natural communities and transitional uplands, include sufficient  
29 transitional uplands along the fringes of restored brackish and freshwater tidal emergent  
30 wetlands to accommodate up to 3 feet of sea level rise where possible and allow for the future  
31 upslope establishment of tidal emergent wetland communities (Objective L1.7, associated with  
32 CM4).
- 33 ● Within the 65,000 acres of tidal natural communities, restore or create at least 24,000 acres of  
34 tidal freshwater emergent wetland in Conservation Zones 1, 2, 4, 5, 6 and/or 7 (Objective  
35 TFEWNC1.1, associated with CM4).
- 36 ● Restore tidal freshwater emergent wetlands in areas that increase connectivity among  
37 conservation lands (Objective TFEWNC1.2, associated with CM4).
- 38 ● Restore and sustain a diversity of marsh vegetation that reflects historical species compositions  
39 and high structural complexity (Objective TFEWNC2.1, associated with CM4).
- 40 ● Create topographic heterogeneity in restored tidal freshwater emergent wetland to provide  
41 variation in inundation characteristics and vegetative composition (Objective TFEWNC2.2,  
42 associated with CM4).

1 There is a variety of other, less specific conservation goals and objectives in BDCP Chapter 3, Section  
 2 3.3 that would improve the value of tidal freshwater emergent wetland natural community for  
 3 terrestrial species. As explained below, with the restoration and enhancement of these amounts of  
 4 habitat, in addition to implementation of AMMs, impacts on this natural community would not be  
 5 adverse for NEPA purposes and would be less than significant for CEQA purposes.

6 **Table 12-4-3. Changes in Tidal Freshwater Emergent Wetland Natural Community Associated with**  
 7 **Alternative 4 (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Permanent		Temporary		Periodic <sup>d</sup>	
	NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	6	6	10	10	0	0
CM2	6	6	0	0	24–58	0
CM4	1	1	0	0	0	0
CM5	0	1	0	1	0	3
CM6	Unk.	Unk.	Unk.	Unk.	0	0
<b>TOTAL IMPACTS</b>	<b>13</b>	<b>14</b>	<b>10</b>	<b>11</b>	<b>24–58</b>	<b>3</b>

<sup>a</sup> See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

Unk. = unknown

8

9 **Impact BIO-6: Changes in Tidal Freshwater Emergent Wetland Natural Community as a Result**  
 10 **of Implementing BDCP Conservation Measures**

11 Construction and land grading activities that would accompany the implementation of CM1, CM2,  
 12 CM4, CM5, and CM6 for Alternative 4 would permanently eliminate an estimated 14 acres and  
 13 temporarily remove 11 acres of tidal freshwater emergent wetland natural community in the study  
 14 area. These modifications represent less than 1% of the 8,856 acres of the community that is  
 15 mapped in the study area. The majority of the permanent and temporary losses would happen  
 16 during the first 10 years of Alternative 4 implementation, as water conveyance facilities are  
 17 constructed and habitat restoration is initiated. Natural communities restoration would add at least  
 18 24,000 acres of tidal freshwater emergent wetland natural community during the course of Plan  
 19 restoration activities, which would greatly expand the area of that habitat and offset the losses. The  
 20 BDCP beneficial effects evaluation of Alternative 4 (BDCP Chapter 5, Section 5.4.4.2) states that the  
 21 implementation of *CM4 Tidal Natural Communities Restoration* would restore at least 24,000 acres of  
 22 tidal freshwater emergent wetland community in Cache Slough (Conservation Zones 1, 2, and 3), the  
 23 Cosumnes/Mokelumne (Conservation Zone 4), West Delta (Conservation Zone 5 and 6), and South  
 24 Delta (Conservation Zone 7) ROAs. The BDCP evaluation also states that the objectives in the Plan

1 would promote vegetation diversity and structural complexity (as incorporated into the restoration  
2 design) in restored tidal freshwater marsh.

3 The individual effects of each relevant conservation measure are addressed below. A summary  
4 statement of the combined impacts and NEPA and CEQA conclusions follows the individual  
5 conservation measure discussions.

- 6 • *CM1 Water Facilities and Operation:* Construction of the Alternative 4 water conveyance facilities  
7 would permanently remove 6 acres and temporarily remove 10 acres of tidal freshwater  
8 emergent wetland community. Most of the loss would occur along rivers and canals in the  
9 central Delta from barge unloading facility construction (Old River on the east side of  
10 Woodward Island and Connection Slough at the north end of Bacon Island), and from  
11 transmission line construction (San Joaquin River and Potato Slough at the south and north ends  
12 of Venice Island, Connection Slough at the north end of Bacon Island, and Railroad Slough at the  
13 north end of Woodward Island; see Terrestrial Biology Mapbook). These losses would take place  
14 during the near-term construction period.

15 There is the potential for increased nitrogen deposition associated with construction vehicles  
16 during the construction phase of CM1. BDCP Appendix 5.J, Attachment 5J.A, *Construction-Related*  
17 *Nitrogen Deposition on BDCP Natural Communities*, addresses this issue in detail. It has been  
18 concluded that this potential deposition would pose a low risk of changing tidal freshwater  
19 emergent wetland natural community because the construction would occur primarily  
20 downwind of the natural community and the construction would contribute a negligible amount  
21 of nitrogen to regional projected emissions. No adverse effect is expected.

- 22 • *CM2 Yolo Bypass Fisheries Enhancement:* Implementation of CM2 involves a number of  
23 construction or channel modification activities within the Yolo and Sacramento Bypasses,  
24 including improvements in flow through the west side channel of the bypass, Putah Creek  
25 realignment activities, Lisbon Weir modification and Sacramento Weir improvements. All of  
26 these activities could involve excavation and grading in tidal freshwater emergent wetland areas  
27 to improve passage of fish through the bypasses. Based on hypothetical construction footprints,  
28 a total of 6 acres could be permanently lost to these activities. The loss is expected to occur in  
29 the first 10 years of Alternative 4 implementation.

- 30 • *CM4 Tidal Natural Communities Restoration:* Based on hypothetical footprints of this restoration  
31 activity, initial land grading and levee modification could permanently remove 1 acre of tidal  
32 freshwater emergent wetland natural community. This loss would occur in the near-term  
33 timeframe and would occur throughout the ROAs identified for tidal wetland restoration. At the  
34 same time, an estimated 24,000 acres of tidal freshwater emergent wetland community would  
35 be restored during tidal habitat restoration, consistent with Objective TFEWNC1.1, (associated  
36 with CM4). Approximately 8,850 acres of the restoration would happen during the first 10 years  
37 of Alternative 4 implementation, which would coincide with the timeframe of water conveyance  
38 facilities construction. The remaining restoration would be spread over the following 30 years.  
39 Tidal wetland communities restoration is expected to be focused in the ROAs identified in Figure  
40 12-1. Restoration would be located and designed to improve habitat connectivity (Objective  
41 TFEWNC1.2), improve marsh species diversity (Objective TFEWNC2.1), and provide variation in  
42 inundation characteristics (Objective TFEWNC2.2). Some of the restoration would be  
43 implemented in the lower Yolo Bypass, but restoration would also be spread among the Suisun  
44 Marsh, South Delta, Cosumnes/Mokelumne and West Delta ROAs.

1 The restoration activities associated with CM4 in the Plan Area ROAs would result in other  
2 effects that could alter the habitat value of tidal freshwater emergent wetland. Disturbances  
3 associated with levee breaching and grading or contouring would increase opportunities for the  
4 introduction or spread of invasive species. Implementation of CM11 would limit this risk  
5 through invasive species control and wetland management and enhancement activities to  
6 support native species. Flooding of dry areas for tidal freshwater marsh creation could also  
7 increase the bioavailability of methylmercury, especially in the Cache Slough,  
8 Cosumnes/Mokelumne and Suisun Marsh ROAs. Site-specific conditions would dictate the  
9 significance of this hazard to marsh vegetation and associated wildlife. Because of the difficulty  
10 in assessing this risk at a programmatic level, it will need to be considered at a project level.  
11 Site-specific restoration plans that address the creation and mobilization of mercury, and  
12 monitoring and adaptive management as described in *CM12 Methylmercury Management*, would  
13 be available to address the uncertainty of methylmercury levels in restored tidal marsh. Water  
14 temperature fluctuations in newly created marsh is also an issue of concern that is difficult to  
15 quantify at the current stage of restoration design. None of these effects is expected to limit the  
16 extent or value of tidal freshwater emergent wetland in the study area.

- 17 ● *CM5 Seasonally Inundated Floodplain Restoration*: Floodplain restoration levee construction  
18 would permanently remove 1 acre and temporarily remove 1 acre of tidal freshwater emergent  
19 wetland habitat. The construction-related losses would be considered a permanent removal of  
20 the habitats directly affected. The majority of seasonally inundated floodplain restoration is  
21 expected to occur along the lower San Joaquin River in the south and central Delta areas.  
22 Floodplain restoration along the San Joaquin River would improve connectivity for a variety of  
23 species that rely on freshwater marsh and riparian habitats. The regional and Plan Area  
24 landscape linkages along the San Joaquin River are included in Figure 12-2. This activity is  
25 scheduled to start following construction of water conveyance facilities, which is expected to  
26 take 10 years.
- 27 ● *CM6 Channel Margin Enhancement*: Channel margin habitat enhancement could result in filling  
28 of small amounts of tidal freshwater emergent wetland habitat along 20 miles of river and  
29 sloughs. The extent of this loss cannot be quantified at this time, but the majority of the  
30 enhancement activity would occur on narrow strips of habitat, including levees and channel  
31 banks. The improvements would occur within the study area on sections of the Sacramento, San  
32 Joaquin and Mokelumne Rivers, and along Steamboat and Sutter Sloughs.

33 The following paragraphs summarize the combined effects discussed above and describe other  
34 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA impact conclusions are  
35 also included.

### 36 ***Near-Term Timeframe***

37 During the near-term timeframe (the first 10 years of BDCP implementation), Alternative 4 would  
38 affect the tidal freshwater emergent wetland natural community through CM1 construction losses (6  
39 acres permanent and 10 acres temporary), CM2 construction losses (6 acres permanent), and CM4  
40 construction losses (1 acre permanent). These losses would occur in the central Delta from  
41 construction of barge unloading facilities and transmission lines on the fringes of Venice, Bacon and  
42 Woodward Islands, and in various locations within the Yolo Bypass and the tidal restoration ROAs.

43 The construction losses of this special-status natural community would represent an adverse effect  
44 if they were not offset by avoidance and minimization measures and restoration actions associated

1 with BDCP conservation components. Loss of tidal freshwater emergent wetland natural community  
2 would be considered both a loss in acreage of a sensitive natural community and a loss of wetland as  
3 defined by Section 404 of the CWA. However, the creation of 8,850 acres of tidal freshwater  
4 emergent wetland natural community as part of CM4 during the first 10 years of Alternative 4  
5 implementation would more than offset this near-term loss, avoiding any adverse effect. Typical  
6 project-level mitigation ratios (1:1 for restoration) would indicate that 23 acres of restoration would  
7 be needed to offset (i.e., mitigate) the 23 acres of loss (the total permanent and temporary near-term  
8 effects listed in Table 12-4-3).

9 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
10 *Construction Best Management Practices and Monitoring*, *AMM6 Disposal and Reuse of Spoils*,  
11 *Reusable Tunnel Material, and Dredged Material*, *AMM7 Barge Operations Plan*, and *AMM10*  
12 *Restoration of Temporarily Affected Natural Communities*. All of these AMMs include elements that  
13 avoid or minimize the risk of affecting habitats at work areas. The AMMs are described in detail in  
14 BDCP Appendix 3.C.

### 15 **Late Long-Term Timeframe**

16 Implementation of Alternative 4 as a whole would result in relatively minor (less than 1%) losses of  
17 tidal freshwater emergent wetland community in the study area. These losses (14 acres of  
18 permanent and 11 acres of temporary loss) would be largely associated with construction of the  
19 water conveyance facilities (CM1), construction of Yolo Bypass fish improvements (CM2), and levee  
20 modification and land grading associated with tidal marsh restoration (CM4) and floodplain  
21 restoration (CM5). The CM4 and CM5 losses would occur during the course of conservation actions  
22 at various tidal and floodplain restoration sites throughout the study area. By the end of the Plan  
23 timeframe, a total of 24,000 acres of this natural community would be restored. The restoration  
24 would occur over a wide region of the study area, including within the Suisun Marsh,  
25 Cosumnes/Mokelumne, Cache Creek, and South Delta ROAs (see Figure 12-1).

26 **NEPA Effects:** The creation of 8,850 acres of tidal freshwater emergent wetland natural community  
27 as part of CM4 during the first 10 years of Alternative 4 implementation would more than offset the  
28 construction and inundation-related effects of implementing CM1, CM2, CM4 and CM5, avoiding any  
29 adverse effect in the near-term. Because of the 24,000 acres of tidal freshwater emergent wetland  
30 restoration that would occur over the course of the Plan, Alternative 4 would not result in a net  
31 long-term reduction in the acreage of a sensitive natural community; the effect would be beneficial.

### 32 **CEQA Conclusion:**

#### 33 **Near-Term Timeframe**

34 Alternative 4 would result in the loss of approximately 23 acres of tidal freshwater emergent  
35 wetland natural community due to construction of the water conveyance facilities (CM1) and fish  
36 passage improvements (CM2), and tidal marsh restoration (CM4). The construction losses would  
37 occur in primarily in the central Delta on the fringes of Venice, Bacon and Victoria Islands, and in the  
38 Yolo Bypass and various tidal restoration ROAs. The losses would be spread across a 10-year near-  
39 term timeframe and would be offset by planned restoration of 8,850 acres of tidal freshwater  
40 emergent wetland natural community scheduled for the first 10 years of Alternative 4  
41 implementation (CM4). AMM1, AMM2, AMM6, AMM7 and AMM10 would also be implemented to  
42 minimize impacts. Because of these offsetting near-term restoration activities and AMMs, impacts  
43 would be less than significant. Typical project-level mitigation ratios (1:1 for restoration) would

1 indicate that 23 acres of restoration would be needed to offset (i.e., mitigate) the 23 acres of loss.  
2 The restoration would be initiated at the beginning of Alternative 4 implementation to minimize any  
3 time lag in the availability of this habitat to special-status species, and would result in a net gain in  
4 acreage of this sensitive natural community.

#### 5 ***Late Long-Term Timeframe***

6 At the end of the Plan period, 25 acres of this community would be lost to conservation activities  
7 and 24,000 acres of this community would be restored. There would be no net permanent reduction  
8 in the acreage of this sensitive natural community within the study area. Therefore, Alternative 4  
9 would not have a substantial adverse effect on this natural community; the impact on the tidal  
10 freshwater emergent wetland natural community would be beneficial.

#### 11 **Impact BIO-7: Increased Frequency, Magnitude and Duration of Periodic Inundation of Tidal** 12 **Freshwater Emergent Wetland Natural Community**

13 Two Alternative 4 conservation measures would modify the inundation/flooding regimes of both  
14 natural and man-made waterways in the study area. CM2, which is designed to improve fish passage  
15 and shallow flooded habitat for Delta fishes in the Yolo Bypass, would increase periodic inundation  
16 of tidal freshwater emergent wetland natural community on small acreages, while CM5 would  
17 expose this community to additional flooding as channel margins are modified and levees are set  
18 back to improve fish habitat along some of the major rivers and waterways throughout the study  
19 area.

- 20 ● *CM2 Yolo Bypass Fisheries Enhancement*: Operation of the Yolo Bypass under Alternative 4 would  
21 result in an increase in the frequency, magnitude and duration of inundation of 24–58 acres of  
22 tidal freshwater emergent wetland natural community. The methods used to estimate these  
23 inundation acreages are described in BDCP Appendix 5.J, *Effects on Natural Communities,*  
24 *Wildlife, and Plants*. The area more frequently inundated would vary with the flow volume that  
25 would pass through the newly constructed notch in the Fremont Weir. The 24-acre increase in  
26 inundation would be associated with a notch flow of 1,000 cubic feet per second (cfs), and the  
27 58-acre increase would result from a notch flow of 4,000 cfs. Plan-related increases in flow  
28 through Fremont Weir would be expected in 30% of the years. Most of this community occurs in  
29 the southern section of the bypass on Liberty Island, on the fringes of tidal perennial aquatic  
30 habitats. Smaller areas are scattered among the cropland within the bypass, south of Interstate  
31 80. The anticipated change in management of flows in the Yolo Bypass includes more frequent  
32 releases in flows into the bypass from the Fremont and Sacramento Weirs, and in some years,  
33 later releases into the bypass in spring months (April and May). The modification of periodic  
34 inundation events would not adversely affect the ecological function of tidal freshwater  
35 emergent wetland habitats and would not substantially modify its value for special-status or  
36 common terrestrial species. The plants in this natural community are adapted to periodic  
37 inundation events within the Yolo Bypass. The effects of this inundation on wildlife and plant  
38 species are described in detail in later sections of this chapter.
- 39 ● *CM5 Seasonally Inundated Floodplain Restoration*: Floodplain restoration would result in a  
40 seasonal increase in the frequency and duration of inundation of 3 acres of tidal freshwater  
41 emergent wetland habitats. Specific locations for this restoration activity have not been  
42 identified, but they would likely be focused in the south Delta area, along the major rivers and  
43 Delta channels. The reconnection of these wetlands to stream flooding events would be  
44 beneficial to their ecological function, especially as they relate to BDCP target terrestrial and

1 aquatic species. Foraging activity and refuge sites would be expanded into areas currently  
2 unavailable or infrequently available to some aquatic species.

3 In summary, 27-618 acres of tidal freshwater emergent wetland natural community in the study  
4 area would be subjected to more frequent inundation as a result of implementing two Alternative 4  
5 conservation measures (CM2 and CM5). Tidal freshwater emergent wetland natural community is a  
6 habitat of great value to both terrestrial and aquatic species in the study area, and increases in  
7 inundation for relatively short periods of time would not reduce the acreage or the value of this  
8 community.

9 **NEPA Effects:** Periodic inundation would not result in a net permanent reduction in the acreage or  
10 value of tidal freshwater emergent wetland in the study area. Therefore, there would be no adverse  
11 effect.

12 **CEQA Conclusion:** An estimated 27-61 acres of tidal freshwater emergent wetland natural  
13 community in the study area would be subjected to more frequent inundation as a result of  
14 implementing CM2 and CM5 under Alternative 4. This community is of great value to aquatic and  
15 terrestrial species in the study area. The periodic inundation would not result in a net permanent  
16 reduction in the acreage or value of this community in the study area. Therefore, there would be a  
17 less-than-significant impact on the tidal freshwater emergent wetland natural community.

#### 18 **Impact BIO-8: Modification of Tidal Freshwater Emergent Wetland Natural Community from** 19 **Ongoing Operation, Maintenance and Management Activities**

20 Once the physical facilities associated with Alternative 4 are constructed and the stream flow regime  
21 associated with changed water management is in effect, there would be new ongoing and periodic  
22 actions associated with operation, maintenance and management of the BDCP facilities and  
23 conservation lands that could affect tidal freshwater emergent wetland natural community in the  
24 study area. The ongoing actions would include modified operation of upstream reservoirs, the  
25 diversion of Sacramento River flows in the north Delta, and reduced diversions from south Delta  
26 channels. These actions are associated with CM1 (see Impact BIO-7 for effects associated with CM2).  
27 The periodic actions would involve access road and conveyance facility repair, vegetation  
28 management at the various water conveyance facilities and habitat restoration sites (CM11), levee  
29 repair and replacement of levee armoring, channel dredging, and habitat enhancement in  
30 accordance with natural community management plans. The potential effects of these actions are  
31 described below.

- 32 • *Modified river flows upstream of and within the study area and reduced diversions from south*  
33 *Delta channels.* Reduced diversions from the south Delta channels would not create a reduction  
34 in tidal freshwater emergent wetland in the study area. However, the periodic changes in flows  
35 in the Sacramento River, Feather River, and American River associated with modified reservoir  
36 operations, and the increased diversion of Sacramento River flows at north Delta intakes  
37 associated with Alternative 4 (Operational Scenario H) would affect salinity, water temperature,  
38 dissolved oxygen levels, turbidity, contaminant levels and dilution capacity in these rivers and  
39 Delta waterways. These changes are discussed in detail in Chapter 8, *Water Quality*. Potentially  
40 substantial increases in electrical conductivity (salinity) are predicted for the west Delta and  
41 Suisun Marsh as a result of these changed water operations. These salinity changes may alter the  
42 plant composition of tidal freshwater emergent wetland along the lower Sacramento and San  
43 Joaquin Rivers and west Delta islands. The severity and extent of these salinity changes would  
44 be complicated by anticipated sea level rise and the effects of downstream tidal restoration over

1 the life of the Plan. There is the potential that some tidal freshwater marsh may become  
2 brackish. These potential changes are not expected to result in a significant reduction in the  
3 acreage and value of tidal freshwater emergent wetland natural community in the study area.

4 The increased diversion of Sacramento River flows in the north Delta would result in reductions  
5 in sediment load (annual mass) flowing into the central and west Delta, and Suisun Marsh. The  
6 reduction is estimated to be approximately 9% of the river's current sediment load for  
7 Alternative 4, which would have a north Delta diversion capacity of 9,000 cfs under Operational  
8 Scenario H (see BDCP Appendix 5.C, Attachment 5C.D, Section 5C.D.3.3 for a detailed analysis of  
9 this issue). This would contribute to a decline in sediment reaching the Delta and Suisun Marsh  
10 that has been occurring over the past 50-plus years due to a gradual depletion of sediment from  
11 the upstream rivers. The depletion has been caused by a variety of factors, including depletion of  
12 hydraulic mining sediment in upstream areas, armoring of river channels and a cutoff of  
13 sediment due to dam construction on the Sacramento River and its major tributaries (Wright  
14 and Schoellhamer 2004; Barnard et al. 2013).

15 Reduced sediment load flowing into the Delta and Suisun Marsh could have an adverse effect on  
16 tidal marsh, including tidal freshwater emergent wetland. Sediment trapped by the marsh  
17 vegetation allows the emergent plants to maintain an appropriate water depth as water levels  
18 gradually rise from the effects of global warming (see Chapter 29, *Climate Change*). The BDCP  
19 proponents have incorporated an environmental commitment (see Appendix 3B, Section  
20 3B.1.19, *Disposal and Reuse of Spoil, Reusable Tunnel Material and Dredged Material*) into the  
21 project that would lessen this potential effect. The Sacramento River water diverted at north  
22 Delta intakes would pass through sedimentation basins before being pumped to water  
23 conveyance structures. The commitment states that sediment collected in these basins would be  
24 periodically removed and reused, to the greatest extent feasible, in the Plan Area for a number of  
25 purposes, including marsh restoration, levee maintenance, subsidence reversal, flood response,  
26 and borrow area fill. The portion of the sediment re-introduced to the Delta and estuary for  
27 marsh restoration would remain available for marsh accretion. With this commitment to reuse  
28 in the Plan Area, the removal of sediment at the north Delta intakes would not result in a net  
29 reduction in the acreage and value of this special-status marsh community. The effect would not  
30 be adverse (NEPA) and would be less than significant (CEQA).

- 31 ● *Access road, water conveyance facility and levee repair.* Periodic repair of access roads, water  
32 conveyance facilities and levees associated with the BDCP actions have the potential to require  
33 removal of adjacent vegetation and could entail earth and rock work in or adjacent to tidal  
34 freshwater emergent wetland habitats. This activity could lead to increased soil erosion,  
35 turbidity and runoff entering tidal aquatic habitats. These activities would be subject to normal  
36 erosion, turbidity and runoff control management practices, including those developed as part  
37 of *AMM2 Construction Best Management Practices and Monitoring* and *AMM4 Erosion and*  
38 *Sediment Control Plan*. Any vegetation removal or earthwork adjacent to or within emergent  
39 wetland habitats would require use of sediment and turbidity barriers, soil stabilization and  
40 revegetation of disturbed surfaces. Proper implementation of these measures would avoid  
41 permanent adverse effects on this community.
- 42 ● *Vegetation management.* Vegetation management, in the form of physical removal and chemical  
43 treatment, would be a periodic activity associated with the long-term maintenance of water  
44 conveyance facilities and restoration sites (CM11). Use of herbicides to control nuisance  
45 vegetation could pose a long-term hazard to tidal freshwater emergent wetland natural  
46 community at or adjacent to treated areas. The hazard could be created by uncontrolled drift of

1 herbicides, uncontrolled runoff of contaminated stormwater onto the natural community, or  
2 direct discharge of herbicides to tidal aquatic areas being treated for invasive species removal.  
3 Environmental commitments and *AMM5 Spill Prevention, Containment, and Countermeasure Plan*  
4 have been made part of the BDCP to reduce hazards to humans and the environment from use of  
5 various chemicals during maintenance activities, including the use of herbicides. These  
6 commitments are described in Appendix 3B, including the commitment to prepare and  
7 implement spill prevention, containment, and countermeasure plans and stormwater pollution  
8 prevention plans. Best management practices, including control of drift and runoff from treated  
9 areas, and use of herbicides approved for use in aquatic environments would also reduce the  
10 risk of affecting natural communities adjacent to water conveyance features and levees  
11 associated with restoration activities.

- 12 ● *Channel dredging.* Long-term operation of the Alternative 4 intakes on the Sacramento River  
13 would include periodic dredging of sediments that might accumulate in front of intake screens.  
14 The dredging would occur in waterways adjacent to tidal freshwater emergent wetlands and  
15 would result in short-term increases in turbidity and disturbance of the substrate. These  
16 conditions would not eliminate the community, but would diminish its value for special-status  
17 and common species that rely on it for cover or foraging area. The individual species effects are  
18 discussed later in this chapter.
- 19 ● *Habitat enhancement.* The BDCP includes a long-term management element for the natural  
20 communities within the Plan Area (CM11). For tidal freshwater emergent wetland community, a  
21 management plan would be prepared that specifies actions to improve the value of the habitats  
22 for covered species. Actions would include control of invasive nonnative plant and animal  
23 species, fire management, restrictions on vector control and application of herbicides, and  
24 maintenance of infrastructure that would allow for movement through the community. The  
25 enhancement efforts would improve the long-term value of this community for both special-  
26 status and common species.

27 The various operations and maintenance activities described above could alter acreage of tidal  
28 freshwater emergent wetland natural community in the study area through changes in flow patterns  
29 and resultant changes in water quality. Activities could also introduce sediment and herbicides that  
30 would reduce the value of this community to common and sensitive plant and wildlife species. Other  
31 periodic activities associated with the Plan, including management, protection and enhancement  
32 actions associated with *CM3 Natural Communities Protection and Restoration* and *CM11 Natural*  
33 *Communities Enhancement and Management*, would be undertaken to enhance the value of the  
34 community. While some of these activities could result in small changes in acreage, these changes  
35 would be greatly offset by restoration activities planned as part of *CM4 Tidal Natural Communities*  
36 *Restoration*. The management actions associated with levee repair, periodic dredging and control of  
37 invasive plant species would also result in a long-term benefit to the species associated with tidal  
38 freshwater emergent wetland habitats by improving water movement.

39 **NEPA Effects:** Ongoing operation, maintenance, and management activities would not result in a net  
40 permanent reduction in the tidal freshwater emergent wetland natural community within the study  
41 area. Therefore, there would be no adverse effect on this natural community.

42 **CEQA Conclusion:** The operation and maintenance activities associated with Alternative 4, including  
43 changed water operations in the upstream rivers, would have the potential to create minor changes  
44 in total acreage of tidal freshwater emergent wetland natural community in the study area, and  
45 could create temporary increases in turbidity and sedimentation. The activities could also introduce

1 herbicides periodically to control nonnative, invasive plants. Implementation of environmental  
2 commitments and AMM2, AMM4, and AMM5 would minimize these impacts, and other operations  
3 and maintenance activities, including management, protection and enhancement actions associated  
4 with *CM3 Natural Communities Protection and Restoration* and *CM11 Natural Communities*  
5 *Enhancement and Management*, would create positive effects, including improved water movement  
6 in these habitats. Long-term restoration activities associated with *CM4 Tidal Natural Communities*  
7 *Restoration* would greatly expand this natural community in the study area. Ongoing operation,  
8 maintenance and management activities would not result in a net permanent reduction in this  
9 sensitive natural community within the study area. Therefore, there would be a less-than-significant  
10 impact on the tidal freshwater emergent wetland natural community.

### 11 **Valley/Foothill Riparian**

12 Construction, operation, maintenance and management associated with the conservation  
13 components of Alternative 4 would have no long-term adverse effects on the habitats associated  
14 with the valley/foothill riparian natural community. Initial development and construction of CM1,  
15 CM2, CM4, CM5, and CM6 would result in both permanent and temporary removal of this  
16 community(see Table 12-4-4). Full implementation of Alternative 4 would also include the following  
17 conservation actions over the term of the BDCP to benefit the valley/foothill riparian natural  
18 community.

- 19 ● Restore or create 5,000 acres of valley/foothill riparian natural community, with at least 3,000  
20 acres occurring on restored seasonally inundated floodplain (Objective VFRNC1.1, associated  
21 with CM7).
- 22 ● Protect 750 acres of existing valley/foothill riparian natural community in Conservation Zone 7  
23 by year 10 (Objective VFRNC1.2, associated with CM3).
- 24 ● Maintain 1,000 acres of early- to mid-successional vegetation with a well-developed understory  
25 of dense shrubs on restored seasonally inundated floodplain (Objective VFRNC2.2, associated  
26 with CM5 and CM7).
- 27 ● Maintain 500 acres of mature riparian forest in Conservation Zones 4 or 7 (Objective VFRNC2.3,  
28 associated with CM3 and CM7).
- 29 ● Maintain 500 acres of mature riparian forest (VFRNC2.3) intermixed with a portion of the early-  
30 to late-successional riparian vegetation (VFRNC2.2,) in large blocks with a minimum patch size  
31 of 50 acres and minimum width of 330 feet (Objective VFRNC2.4, associated with CM3 and  
32 CM7).
- 33 ● Maintain or increase abundance and distribution of valley/foothill riparian natural community  
34 vegetation alliances that are rare or uncommon as recognized by California Department of Fish  
35 and Game (2010), such as button willow thickets alliance and blue elderberry stands alliance  
36 (Objective VFRNC3.1).

37 There is a variety of other, less specific conservation goals and objectives in BDCP Chapter 3, Section  
38 3.3 that would improve the value of valley/foothill riparian natural community for terrestrial  
39 species. As explained below, with the restoration and enhancement of these amounts of habitat, in  
40 addition to implementation of AMMs, impacts on this natural community would not be adverse for  
41 NEPA purposes and would be less than significant for CEQA purposes.

1 **Table 12-4-4. Changes in Valley/Foothill Riparian Natural Community Associated with Alternative**  
2 **4 (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Permanent		Temporary		Periodic <sup>d</sup>	
	NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	34	34	30	30	0	0
CM2	89	89	88	88	51-92	0
CM4	298	552	0	0	0	0
CM5	0	43	0	35	0	266
CM6	Unk.	Unk.	Unk.	Unk.	0	0
<b>TOTAL IMPACTS</b>	<b>421</b>	<b>718</b>	<b>118</b>	<b>153</b>	<b>51-92</b>	<b>266</b>

<sup>a</sup> See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

Unk. = unknown

3

4 **Impact BIO-9: Changes in Valley/Foothill Riparian Natural Community as a Result of**  
5 **Implementing BDCP Conservation Measures**

6 Construction, land grading and habitat restoration activities that would accompany the  
7 implementation of CM1, CM2, CM4, CM5, and CM6 would permanently eliminate an estimated 718  
8 acres and temporarily remove 153 acres of valley/foothill riparian natural community in the study  
9 area. These modifications represent approximately 5% of the 17,966 acres of the community that is  
10 mapped in the study area. The majority of the permanent and temporary losses would happen  
11 during the first 10 years of Alternative 4 implementation, as water conveyance facilities are  
12 constructed and habitat restoration is initiated. Valley/foothill riparian protection (750 acres) and  
13 restoration (800 acres) would be initiated during the same period, which would begin to offset the  
14 losses. By the end of the Plan period, 5,000 acres of this natural community would be restored. The  
15 BDCP beneficial effects analysis (BDCP Chapter 5, Section 5.4.5.2) indicates that implementation of  
16 Alternative 4 would restore or create 5,000 acres of riparian forest and scrub in Conservation Zones  
17 1, 2, 4, 5, 6, and 7, with at least 3,000 acres occurring on restored seasonally inundated floodplain.  
18 Alternative 4 would also protect 750 acres of existing valley/foothill riparian natural community in  
19 Conservation Zone 7.

20 The individual effects of each relevant conservation measure are addressed below. A summary  
21 statement of the combined impacts and NEPA and CEQA conclusions follows the individual  
22 conservation measure discussions.

- 23 • *CM1 Water Facilities and Operation:* Construction of the Alternative 4 water conveyance facilities  
24 would permanently remove 34 acres and temporarily remove 30 acres of valley/foothill

1 riparian natural community. The permanent losses would occur where Intakes 2 and 5 encroach  
2 on the Sacramento River's east bank between Freeport and Courtland. The riparian areas here  
3 are very small patches, some dominated by valley oak and others by nonnative trees (acacia)  
4 and scrub vegetation (see Terrestrial Biology Mapbook). Cottonwood, willow and mixed  
5 brambles would be permanently lost at the ponds created by excavation for the peripheral canal  
6 both north and south of Twin Cities Road just west of Interstate 5, as these sites would be used  
7 to deposit reusable tunnel material. Willow and brambles would also be lost to deposit of  
8 reusable tunnel material at the west end of Bouldin Island. Smaller areas dominated by  
9 blackberry would be eliminated at the forebay site adjacent to Clifton Court Forebay and  
10 patches of willow and blackberry would be lost along the transmission line corridors where they  
11 cross waterways in the central and south Delta. Temporary losses would occur where pipelines  
12 cross Snodgrass Slough and other small waterways east of the Sacramento River, where  
13 temporary work areas surround intake sites, and along Lambert Road where permanent utility  
14 lines would be installed. The riparian habitat in these areas is also composed of very small  
15 patches or stringers bordering waterways, which are composed of valley oak, cottonwood,  
16 willow and scrub vegetation. These losses would take place during the near-term construction  
17 period.

- 18 • *CM2 Yolo Bypass Fisheries Enhancement*: Implementation of CM2 involves a number of  
19 construction activities within the Yolo and Sacramento Bypasses, including Fremont Weir and  
20 stilling basin improvements, Putah Creek realignment activities, Lisbon Weir modification and  
21 Sacramento Weir improvements. All of these activities could involve excavation and grading in  
22 valley/foothill riparian areas to improve passage of fish through the bypasses. Based on  
23 hypothetical construction footprints, a total of 89 acres could be permanently lost and another  
24 88 acres could be temporarily removed. Most of the riparian losses would occur at the north end  
25 of Yolo Bypass where major fish passage improvements are planned. This vegetation is a mix of  
26 valley oak, cottonwood, sycamore and willow trees. The riparian areas here are primarily small,  
27 disconnected patches with moderate to low value as wildlife movement corridors. Most of these  
28 patches lack structural complexity. Excavation to improve water movement in the Toe Drain and  
29 in the Sacramento Weir would remove similar linear strips of vegetation. These losses would  
30 occur primarily in the near-term timeframe.
- 31 • *CM4 Tidal Natural Communities Restoration*: Based on the use of hypothetical restoration  
32 footprints, implementation of CM4 would permanently inundate or remove 552 acres of  
33 valley/foothill riparian community. The losses would be spread among most of the ROAs  
34 established for tidal restoration (see Figure 12-1). No losses would occur from Suisun Marsh  
35 restoration. These ROAs support a mix of riparian vegetation types, including valley oak stands,  
36 extensive willow and cottonwood stringers along waterways, and areas of scrub vegetation  
37 dominated by blackberry. These areas are considered of low to moderate habitat value (BDCP  
38 Chapter 5, Section 5.4.5.1.1). The actual loss of riparian habitat to marsh restoration would be  
39 expected to be smaller than predicted by use of the theoretical footprint. As marsh restoration  
40 projects were identified and planned, sites could be selected that avoid riparian areas as much  
41 as possible.
- 42 • *CM5 Seasonally Inundated Floodplain Restoration*: Floodplain restoration levee construction  
43 would permanently remove 43 acres and temporarily remove 35 acres of valley/foothill  
44 riparian natural community. The construction-related losses would be considered a permanent  
45 removal of the habitats directly affected. These losses would be expected to occur along the San

1 Joaquin River and other major waterways in CZ 7 (see Figure 12-1). This activity is scheduled to  
2 start following construction of water conveyance facilities, which is expected to take 10 years.

- 3 • *CM6 Channel Margin Enhancement*: Channel margin habitat enhancement could result in  
4 removal of small amounts of valley/foothill riparian habitat along 20 miles of river and sloughs.  
5 The extent of this loss cannot be quantified at this time, but the majority of the enhancement  
6 activity would occur along waterway margins where riparian habitat stringers exist, including  
7 levees and channel banks. The improvements would occur within the study area on sections of  
8 the Sacramento, San Joaquin and Mokelumne Rivers, and along Steamboat and Sutter Sloughs.
- 9 • *CM7 Riparian Natural Community Restoration*: The valley/foothill riparian natural community  
10 would be restored primarily in association with the tidal (CM4) and floodplain (CM5)  
11 restoration and channel margin enhancements. Following community-specific goals and  
12 objectives in the Plan, a total of 5,000 acres of this community would be restored (Objective  
13 VFRNC1.1) and 750 acres would be protected (Objective VFRNC1.2) over the life of the Plan.  
14 Approximately 800 acres would be restored and the entire 750 acres would be protected in the  
15 first 10 years of Plan implementation. Riparian restoration and protection would be focused in  
16 CZ 4 and CZ 7 (Objective VFRNC2.3), with a goal of adding a 500-acre portion of the restoration  
17 in one or the other of these zones. A variety of successional stages would also be sought to  
18 benefit the variety of sensitive plant and animal species that rely on this natural community in  
19 the study area (Objective VFRNC2.4).

20 The following paragraphs summarize the combined effects discussed above and describe other  
21 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA impact conclusions are  
22 also included.

### 23 ***Near-Term Timeframe***

24 During the near-term timeframe (the first 10 years of BDCP implementation), Alternative 4 would  
25 affect the valley/foothill riparian natural community through CM1 construction losses (34 acres  
26 permanent and 30 acres temporary) and the CM2 construction losses (89 acres permanent and 88  
27 acres temporary). These losses would occur along the eastern bank of the Sacramento River at  
28 intake sites; along transmission lines in the central and south Delta and along Lambert Road; at  
29 reusable tunnel material storage sites near Twin Cities Road, Clifton Court Forebay, and on Bouldin  
30 Island; and in the northern Yolo Bypass. Approximately 298 acres of the inundation and  
31 construction-related loss from CM4 would occur in the near-term. These losses would occur  
32 throughout the ROAs mapped in Figure 12-1.

33 The construction losses of this special-status natural community would represent an adverse effect  
34 if they were not offset by avoidance and minimization measures and protection/restoration actions  
35 associated with BDCP conservation components. Loss of valley/foothill riparian natural community  
36 would be considered a loss in acreage of a sensitive natural community, and could be considered a  
37 loss of wetlands as defined in Section 404 of the CWA. As indicated above, most of the losses would  
38 be in small patches or narrow strips along waterways, with limited structural complexity. However,  
39 the restoration of 800 acres and protection (including significant enhancement) of 750 acres of  
40 valley/foothill riparian natural community as part of CM7 and CM3 during the first 10 years of  
41 Alternative 4 implementation would minimize this near-term loss, avoiding any adverse effect. At  
42 least 400 acres of the protection is planned for the first 5 years of Alternative 4 implementation. The  
43 restoration areas would be large areas providing connectivity with existing riparian habitats and  
44 would include a variety of trees and shrubs to produce structural complexity. Typical project-level

1 mitigation ratios (1:1 for restoration and 1:1 for protection) would indicate that 539 acres of  
2 protection and 539 acres of restoration would be needed to offset (i.e., mitigate) the 539 acres of  
3 loss (the combination of permanent and temporary losses in the near-term listed in Table 12-4-4).  
4 The combination of the two approaches (protection and restoration) are designed to avoid a  
5 temporal lag in the value of riparian habitat available to sensitive species.

6 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
7 *Construction Best Management Practices and Monitoring*, *AMM6 Disposal and Reuse of Spoils*,  
8 *Reusable Tunnel Material*, and *Dredged Material*, *AMM10 Restoration of Temporarily Affected Natural*  
9 *Communities*, and *AMM18 Swainson's Hawk and White-Tailed Kite*. All of these AMMs include  
10 elements that avoid or minimize the risk of affecting habitats at work areas and storage sites. The  
11 AMMs are described in detail in BDCP Appendix 3.C.

### 12 **Late Long-Term Timeframe**

13 Implementation of Alternative 4 as a whole would result in approximately 5% losses of  
14 valley/foothill riparian natural community in the study area. These losses (718 acres of permanent  
15 and 153 acres of temporary) would be largely associated with construction of the water conveyance  
16 facilities (CM1), construction of Yolo Bypass fish improvements (CM2), inundation during tidal  
17 marsh restoration (CM4), and setback of levees during floodplain expansion (CM5). Inundation  
18 losses would occur through the course of the BDCP restoration program at various tidal restoration  
19 sites throughout the study area. By the end of the Plan timeframe, a total of 5,000 acres of this  
20 natural community would be restored and 750 acres would be protected (CM7 and CM3,  
21 respectively), primarily in CZ 4 and CZ 7 in the Cosumnes/Mokelumne and South Delta ROAs (see  
22 Figure 12-1).

23 **NEPA Effects:** The restoration of 800 acres and protection (including significant enhancement) of  
24 750 acres of valley/foothill riparian natural community as part of CM7 and CM3 during the first 10  
25 years of Alternative 4 implementation would minimize the near-term loss of this community,  
26 avoiding any adverse effect. Because of the Plan's commitment to restoration of 5,000 acres and  
27 protection of 750 acres of valley/foothill riparian natural community during the course of the Plan,  
28 Alternative 4 would not result in a net long-term reduction in the acreage of a sensitive natural  
29 community; the effect would be beneficial.

### 30 **CEQA Conclusion:**

#### 31 **Near-Term Timeframe**

32 Alternative 4 would result in the loss of approximately 539 acres of valley/foothill riparian natural  
33 community due to construction of the water conveyance facilities (CM1) and fish passage  
34 improvements (CM2), and inundation during tidal marsh restoration (CM4). The construction losses  
35 would occur primarily along the Sacramento River at intake sites; along transmission corridors in  
36 the central and south Delta and along Lambert Road; at reusable tunnel material storage sites on  
37 Bouldin Island, Clifton Court Forebay and near Twin Cities Road; and within the northern section of  
38 the Yolo Bypass, while inundation losses would occur at various tidal restoration sites throughout  
39 the study area. The construction losses would be spread across a 10-year near-term timeframe.  
40 These losses would be minimized by planned restoration of 800 acres (CM7) and protection  
41 (including significant enhancement) of 750 acres (CM3) of valley/foothill riparian natural  
42 community scheduled for the first 10 years of Alternative 4 implementation. At least 400 acres of  
43 the protection is planned for the first 5 years of Alternative 4 implementation. AMM1, AMM2, AMM6,

1 AMM7, AMM10, and AMM18 would also be implemented to minimize impacts. Because of these  
2 near-term restoration and protection activities and AMMs, impacts would be less than significant.  
3 Typical project-level mitigation ratios (1:1 for protection and 1:1 for restoration) would indicate  
4 that 539 acres of protection and 539 acres of restoration would be needed to offset (i.e., mitigate)  
5 the 539 acres of loss. The combination of the two approaches (protection and restoration) is  
6 designed to avoid a temporal lag in the value of riparian habitat available to sensitive species. The  
7 restoration would be initiated at the beginning of Alternative 4 implementation to minimize any  
8 time lag in the availability of this habitat to special-status species, and would result in a net gain in  
9 acreage of this sensitive natural community.

#### 10 **Late Long-Term Timeframe**

11 At the end of the Plan period, 871 acres of valley/foothill riparian natural community would be  
12 permanently or temporarily removed by conservation actions, 5,000 acres would be restored and  
13 750 acres would be protected. There would be no net permanent reduction in the acreage of this  
14 sensitive natural community within the study area. Therefore, Alternative 4 would not have a  
15 substantial adverse effect on this natural community; the impact would be beneficial.

#### 16 **Impact BIO-10: Increased Frequency, Magnitude and Duration of Periodic Inundation of** 17 **Valley/Foothill Riparian Natural Community**

18 Two Alternative 4 conservation measures would modify the inundation/flooding regimes of both  
19 natural and man-made waterways in the study area. CM2, which is designed to improve fish passage  
20 and shallow flooded habitat for Delta fishes in the Yolo Bypass, would increase periodic inundation  
21 of valley/foothill riparian natural community at scattered locations, while CM5 would expose this  
22 community to additional flooding as channel margins are modified and levees are set back to  
23 improve fish habitat along some of the major rivers and waterways of the study area.

- 24 • *CM2 Yolo Bypass Fisheries Enhancement*: Operation of the Yolo Bypass under Alternative 4 would  
25 result in an increase in the frequency, magnitude and duration of inundation of 51–92 acres of  
26 valley/foothill riparian natural community. The area more frequently inundated would vary  
27 with the flows that would be passed through the newly constructed notch in the Fremont Weir.  
28 The 51 acres would be created by a notch flow of 8,000 cfs and the 92 acres would be created by  
29 a notch flow of 4,000 cfs. The methods used to estimate these inundation acreages are described  
30 in BDCP Appendix 5.J, *Effects on Natural Communities, Wildlife, and Plants*. These increased flow  
31 conditions would be expected to occur in no more than 30% of all years (see BDCP Chapter 5,  
32 Section 5.4.1.2). The valley/foothill riparian community occurs throughout the bypass, including  
33 a large acreage just below Fremont Weir in the north end of the bypass. There are other riparian  
34 habitat areas on Liberty Island, and, to a lesser extent, along the eastern and western edges of  
35 the bypass, including along the Tule Canal/Toe Drain, the west side channels and the  
36 Sacramento Bypass. The anticipated change in management of flows in the Yolo Bypass includes  
37 more frequent releases in flows into the bypass from the Fremont and Sacramento Weirs, and in  
38 some years, later releases into the bypass in spring months (April and May). The modification of  
39 periodic inundation events would not adversely affect riparian habitats, as they have persisted  
40 under similar high flows and extended inundation periods in the Yolo Bypass. The effects of this  
41 inundation on wildlife and plant species are described in detail in later sections of this chapter.
- 42 • *CM5 Seasonally Inundated Floodplain Restoration*: Floodplain restoration would result in an  
43 increase in the frequency and duration of inundation of 266 acres of valley/foothill riparian  
44 habitats. Specific locations for this restoration activity have not been identified, but they would

1 likely be focused in the south Delta area, along the major rivers and Delta channels in CZ 7 (see  
2 Figure 12-1). The reconnection of riparian vegetation to periodic stream flooding events would  
3 be beneficial to the ecological function of this natural community, especially in the germination  
4 and establishment of native riparian plants as flood scour increases.

5 In summary, 317–368 acres of valley/foothill riparian community in the study area would be  
6 subjected to more frequent inundation as a result of implementing two Alternative 4 conservation  
7 measures (CM2 and CM5). The valley/foothill riparian community is conditioned to and benefits  
8 from periodic inundation; therefore, periodic inundation would not result in a net permanent  
9 reduction in the acreage of this community in the study area. The increased inundation could create  
10 a beneficial effect on the community as it relates to germination and establishment of native riparian  
11 plants.

12 **NEPA Effects:** Increasing periodic inundation of valley/foothill riparian natural community in the  
13 Yolo Bypass and along south Delta waterways would have a beneficial effect on the community.

14 **CEQA Conclusion:** An estimated 317–368 acres of valley/foothill riparian community in the study  
15 area would be subjected to more frequent inundation as a result of implementing CM2 and CM5  
16 under Alternative 4. The valley/foothill riparian community is conditioned to and benefits from  
17 periodic inundation; therefore, periodic inundation would not result in a net permanent reduction in  
18 the acreage of this community in the study area. Increasing periodic inundation of valley/foothill  
19 riparian natural community in the Yolo Bypass and along south Delta waterways would have a  
20 beneficial impact on the community.

### 21 **Impact BIO-11: Modification of Valley/Foothill Riparian Natural Community from Ongoing** 22 **Operation, Maintenance and Management Activities**

23 Once the physical facilities associated with Alternative 4 are constructed and the stream flow regime  
24 associated with changed water management is in effect, there would be new ongoing and periodic  
25 actions associated with operation, maintenance and management of the BDCP facilities and  
26 conservation lands that could affect valley/foothill riparian natural community in the study area.  
27 The ongoing actions include modified operation of upstream reservoirs, the diversion of Sacramento  
28 River flows in the north Delta, reduced diversions from south Delta channels, and recreational use of  
29 reserve areas. These actions are associated with CM1 and CM11 (see Impact BIO-10 for effects  
30 associated with CM2). The periodic actions would involve access road and conveyance facility  
31 repair, vegetation management at the various water conveyance facilities and habitat restoration  
32 sites (CM11), levee repair and replacement of levee armoring, channel dredging, and habitat  
33 enhancement in accordance with natural community management plans. The potential effects of  
34 these actions are described below.

- 35 • *Modified releases and water levels in upstream reservoirs.* Modified releases and water levels at  
36 Shasta Lake, Lake Oroville, Whiskeytown Lake, Lewiston Lake, and Folsom Lake would not affect  
37 valley/foothill riparian natural community. The anticipated water levels over time with  
38 Alternative 4, as compared to no action, would be slightly lower in the October to May  
39 timeframe. The small changes in frequency of higher water levels in these lakes would not  
40 substantially reduce the small patches of riparian vegetation that occupy the upper fringes of  
41 the reservoir pools. Changes in releases that would influence downstream river flows are  
42 discussed below.

1       • *Modified river flows upstream of and within the study area and reduced diversions from south*  
2 *Delta channels.* Changes in releases from reservoirs upstream of the study area and their  
3 resultant changes in flows in the Sacramento, American and Feather Rivers (associated with  
4 Operational Scenario H) would not be expected to result in the permanent reduction in acreage  
5 of valley/foothill riparian natural community along these waterways. There is no evidence that  
6 flow levels in the upstream rivers would change such that the acreage of this community would  
7 be reduced on a permanent basis. Riparian habitats along the rivers of the Sacramento Valley  
8 have historically been exposed to significant variations in river stage. Based on modeling  
9 conducted for the BDCP (see Appendix 11C, *CALSIM II Model Results Utilized in the Fish Analysis*),  
10 flow levels in these upstream rivers could be reduced by as much as 19% in the July to  
11 November time frame when compared to No Action, while flow levels in the February to May  
12 time frame could increase as much as 48% with implementation of Alternative 4. Similarly,  
13 increased diversions of Sacramento River flows in the north Delta would not be expected to  
14 result in a permanent reduction in valley/foothill riparian community downstream of these  
15 diversions, even though river flows are modeled to be reduced by 11–27% compared with No  
16 Action, depending on month and water-year type (see Section 11C.4 in Appendix 11C). Reduced  
17 diversions from the south Delta channels would not create a reduction in this natural  
18 community.

19       The periodic changes in flows in the Sacramento River, Feather River, and American River  
20 associated with modified reservoir operations, and the increased diversion of Sacramento River  
21 flows at north Delta intakes associated with Alternative 4 would affect salinity, water  
22 temperature, dissolved oxygen levels, turbidity, contaminant levels and dilution capacity in  
23 these rivers and Delta waterways. These changes are discussed in detail in Chapter 8, *Water*  
24 *Quality*. Potentially substantial increases in electrical conductivity (salinity) are predicted for the  
25 west Delta and Suisun Marsh as a result of these changed water operations. These salinity  
26 changes may alter the plant composition of riparian habitats along the lower Sacramento and  
27 San Joaquin Rivers and west Delta islands. The severity and extent of these salinity changes  
28 would be complicated by anticipated sea level rise and the effects of downstream tidal  
29 restoration over the life of the Plan. There is the potential that some valley/foothill riparian  
30 natural community may be degraded immediately adjacent to river channels. The riparian  
31 communities in the west Delta are dominated by willows, cottonwood and mixed brambles.  
32 These potential changes are not expected to result in a significant reduction in the acreage and  
33 value of valley/foothill riparian natural community in the study area.

34       • *Access road, water conveyance facility and levee repair.* Periodic repair of access roads, water  
35 conveyance facilities and levees associated with the BDCP actions have the potential to require  
36 removal of adjacent vegetation and could entail earth and rock work in valley/foothill riparian  
37 habitats. This activity could lead to increased soil erosion, turbidity and runoff entering these  
38 habitats. These activities would be subject to normal erosion, turbidity and runoff control  
39 management practices, including those developed as part of *AMM2 Construction Best*  
40 *Management Practices and Monitoring* and *AMM4 Erosion and Sediment Control Plan*. Any  
41 vegetation removal or earthwork adjacent to or within riparian habitats would require use of  
42 sediment barriers, soil stabilization and revegetation of disturbed surfaces (*AMM10 Restoration*  
43 *of Temporarily Affected Natural Communities*). Proper implementation of these measures would  
44 avoid permanent adverse effects on this community.

45       • *Vegetation management.* Vegetation management, in the form of physical removal and chemical  
46 treatment, would be a periodic activity associated with the long-term maintenance of water

1 conveyance facilities and restoration sites (*CM11 Natural Communities Enhancement and*  
2 *Management*). Use of herbicides to control nuisance vegetation could pose a long-term hazard to  
3 valley/foothill riparian natural community at or adjacent to treated areas. The hazard could be  
4 created by uncontrolled drift of herbicides, uncontrolled runoff of contaminated stormwater  
5 onto the natural community, or direct discharge of herbicides to riparian areas being treated for  
6 invasive species removal. Environmental commitments and *AMM5 Spill Prevention, Containment,*  
7 *and Countermeasure Plan* have been made part of the BDCP to reduce hazards to humans and  
8 the environment from use of various chemicals during maintenance activities, including the use  
9 of herbicides. These commitments are described in Appendix 3B, including the commitment to  
10 prepare and implement spill prevention, containment, and countermeasure plans and  
11 stormwater pollution prevention plans. Best management practices, including control of drift  
12 and runoff from treated areas, and use of herbicides approved for use in terrestrial  
13 environments would also reduce the risk of affecting natural communities adjacent to water  
14 conveyance features and levees associated with restoration activities.

- 15 ● *Channel dredging.* Long-term operation of the Alternative 4 intakes on the Sacramento River  
16 would include periodic dredging of sediments that might accumulate in front of intake screens.  
17 The dredging could occur adjacent to valley/foothill riparian natural community. This activity  
18 should not adversely affect riparian plants as long as dredging equipment is kept out of riparian  
19 areas and dredge spoil is disposed of outside of riparian corridors.
- 20 ● *Habitat enhancement.* The BDCP includes a long-term management element for the natural  
21 communities within the Plan Area (CM11). For the valley/foothill riparian natural community, a  
22 management plan would be prepared that specifies actions to improve the value of the habitats  
23 for covered species. Actions would include control of invasive nonnative plant and animal  
24 species, fire management, restrictions on vector control and application of herbicides, and  
25 maintenance of infrastructure that would allow for movement through the community. The  
26 enhancement efforts would improve the long-term value of this community for both special-  
27 status and common species.
- 28 ● *Recreation.* The BDCP would allow for certain types of recreation in and adjacent to  
29 valley/foothill riparian natural community in the reserve system. The activities could include  
30 wildlife and plant viewing and hiking. *CM11 Natural Communities Enhancement and*  
31 *Management* (BDCP Chapter 3, Section 3.4.11) describes this program and identifies applicable  
32 restrictions on recreation that might adversely affect riparian habitat. The BDCP also includes an  
33 avoidance and minimization measure (AMM37) that further dictates limits on recreation  
34 activities that might affect this natural community. Priority would be given to use of existing  
35 trails and roads, with some potential for new trails. Limited tree removal and limb trimming  
36 could also be involved.

37 The various operations and maintenance activities described above could alter acreage of  
38 valley/foothill riparian natural community in the study area through changes in flow patterns and  
39 resultant changes in water quality. Activities could also introduce sediment and herbicides that  
40 would reduce the value of this community to common and sensitive plant and wildlife species.  
41 Recreation activities could encroach on riparian areas and require occasional tree removal. Other  
42 periodic activities associated with the Plan, including management, protection and enhancement  
43 actions associated with *CM3 Natural Communities Protection and Restoration* and *CM11 Natural*  
44 *Communities Enhancement and Management*, would be undertaken to enhance the value of the  
45 community. While some of these activities could result in small changes in acreage, these changes  
46 would be greatly offset by restoration and protection activities planned as part of *CM7 Riparian*

1 *Natural Community Restoration* and *CM3 Natural Communities Protection and Restoration*, or  
2 minimized by implementation of AMM2, AMM4, AMM5, AMM10, AMM18, and AMM37. The  
3 management actions associated with levee repair, periodic dredging and control of invasive plant  
4 species would also result in a long-term benefit to the species associated with riparian habitats by  
5 improving water movement in adjacent waterways and by eliminating competitive, invasive species  
6 of plants.

7 **NEPA Effects:** Ongoing operation, maintenance and management activities associated with  
8 implementation of Alternative 4 would not result in a net permanent reduction in the valley/foothill  
9 riparian natural community within the study area. Therefore, there would be no adverse effect on  
10 this natural community.

11 **CEQA Conclusion:** The operation and maintenance activities associated with Alternative 4 would  
12 have the potential to create minor changes in total acreage of valley/foothill riparian natural  
13 community in the study area, and could create temporary increases in turbidity and sedimentation.  
14 The activities could also introduce herbicides periodically to control nonnative, invasive plants.  
15 Implementation of environmental commitments and AMM2, AMM4, AMM5, AMM10, and AMM18  
16 would minimize these impacts, and other operations and maintenance activities, including  
17 management, protection and enhancement actions associated with *CM3 Natural Communities  
18 Protection and Restoration* and *CM11 Natural Communities Enhancement and Management*, would  
19 create positive effects, including reduced competition from invasive, nonnative plants in these  
20 habitats. Long-term restoration and protection activities associated with *CM7 Riparian Natural  
21 Community Restoration* and *CM3 Natural Communities Protection and Restoration* would expand this  
22 natural community in the study area. Ongoing operation, maintenance and management activities  
23 would not result in a net permanent reduction in this sensitive natural community within the study  
24 area. Therefore, there would be a less-than-significant impact on the valley/foothill riparian natural  
25 community.

## 26 **Nontidal Perennial Aquatic**

27 Construction, operation, maintenance and management associated with the conservation  
28 components of Alternative 4 would have no long-term adverse effects on the habitats associated  
29 with the nontidal perennial aquatic natural community. Initial development and construction of  
30 CM1, CM2, CM4, CM5, and CM6 would result in both permanent and temporary removal of this  
31 community(see Table 12-4-5). Full implementation of Alternative 4 would also include the following  
32 conservation actions over the term of the BDCP to benefit the nontidal perennial aquatic natural  
33 community.

- 34 • Create at least 1,200 acres of nontidal marsh consisting of a mosaic of nontidal perennial aquatic  
35 and nontidal freshwater perennial emergent wetland natural communities (Objective  
36 NFEW/NPANC1.1, associated with CM10).

37 There is a variety of other, less specific conservation goals and objectives in BDCP Chapter 3, Section  
38 3.3 that would improve the value of nontidal perennial aquatic natural community for terrestrial  
39 species. As explained below, with the restoration and enhancement of these amounts of habitat, in  
40 addition to implementation of AMMs, impacts on this natural community would not be adverse for  
41 NEPA purposes and would be less than significant for CEQA purposes.

1 **Table 12-4-5. Changes in Nontidal Perennial Aquatic Natural Community Associated with**  
2 **Alternative 4 (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Permanent		Temporary		Periodic <sup>d</sup>	
	NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	57	57	7	7	0	0
CM2	24	24	12	12	50-77	0
CM4	34	189	0	0	0	0
CM5	0	28	0	16	0	25
CM6	Unk.	Unk.	Unk.	Unk.	0	0
<b>TOTAL IMPACTS</b>	<b>115</b>	<b>298</b>	<b>19</b>	<b>35</b>	<b>50-77</b>	<b>25</b>

<sup>a</sup> See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

Unk. = unknown

3

4 **Impact BIO-12: Changes in Nontidal Perennial Aquatic Natural Community as a Result of**  
5 **Implementing BDCP Conservation Measures**

6 Construction and land grading activities that would accompany the implementation of CM1, CM2,  
7 CM4, CM5, and CM6 would permanently eliminate an estimated 298 acres and temporarily remove  
8 35 acres of nontidal perennial aquatic natural community in the study area. These modifications  
9 represent approximately 6% of the 5,567 acres of the community that is mapped in the study area.  
10 Approximately 45% (134 acres) of the permanent and temporary losses would occur during the first  
11 10 years of Alternative 4 implementation, as water conveyance facilities are constructed and habitat  
12 restoration is initiated. Natural communities restoration would add 400 acres (CM10) of nontidal  
13 marsh during the same period which would expand the area of that habitat and offset the losses. The  
14 nontidal marsh restoration would include a mosaic of nontidal perennial aquatic and nontidal  
15 freshwater perennial emergent wetland natural communities, as specified in Objective  
16 NFEW/NPANC1.1. The BDCP beneficial effects analysis (BDCP Chapter 5, Section 5.4.6.2) indicates  
17 that implementation of Alternative 4 would result in the restoration of 1,200 acres of nontidal  
18 marsh, and that the restoration would occur in blocks that are contiguous with the Plan's larger  
19 reserve system. The nontidal marsh would be restored in the vicinity of giant garter snake  
20 subpopulations identified in the recovery plan for this species (U.S. Fish and Wildlife Service 1998).

21 The individual effects of each relevant conservation measure are addressed below. A summary  
22 statement of the combined impacts and NEPA and CEQA conclusions follows the individual  
23 conservation measure discussions.

- 1       • *CM1 Water Facilities and Operation*: Construction of the Alternative 4 water conveyance facilities  
2       would permanently remove 57 acres and temporarily remove 7 acres of nontidal perennial  
3       aquatic community. Most of the permanent loss would occur at reusable tunnel material storage  
4       sites on southern Mandeville Island and in the linear ponds associated with the proposed  
5       peripheral canal north and south of Twin Cities Road just west of Interstate 5 (see Terrestrial  
6       Biology Mapbook). Most of the temporary loss would occur where transmission line  
7       construction would cross Mandeville Island. These wetlands are linear ponds or small, isolated  
8       areas surrounded by agricultural land. These losses would take place during the near-term  
9       construction period.
- 10       • *CM2 Yolo Bypass Fisheries Enhancement*: Implementation of CM2 involves a number of  
11       construction activities within the Yolo and Sacramento Bypasses, including Fremont Weir and  
12       stilling basin improvements, west side channels modifications, Putah Creek realignment  
13       activities, and Sacramento Weir and Tule Canal improvements. All of these activities could  
14       involve excavation and grading in nontidal perennial aquatic areas to improve passage of fish  
15       through the bypass. Based on hypothetical construction footprints, a total of 24 acres could be  
16       permanently lost and another 12 acres could be temporarily removed. This activity would occur  
17       primarily in the near-term timeframe.
- 18       • *CM4 Tidal Natural Communities Restoration*: Based on the use of hypothetical restoration  
19       footprints, implementation of CM4 would permanently change to tidally influenced inundation  
20       or remove 189 acres of nontidal perennial aquatic community. These losses would be expected  
21       to occur primarily in the Cache Slough and Cosumnes/Mokelumne ROAs (see Figure 12-1). An  
22       estimated 1,200 acres of nontidal marsh would be restored. Approximately 400 acres of the  
23       restoration (CM10) would happen during the first 10 years of Alternative 4 implementation,  
24       which would coincide with the timeframe of water conveyance facilities construction and early  
25       restoration activities. The remaining restoration would be spread over the following 30 years.  
26       Nontidal natural communities restoration is expected to be focused in the CZs 2, 4 and/or 5 in  
27       Figure 12-1.
- 28       • *CM5 Seasonally Inundated Floodplain Restoration*: Based on theoretical footprints, floodplain  
29       restoration levee construction would permanently remove 28 acres and temporarily remove 16  
30       acres of nontidal perennial aquatic habitat. The construction-related losses would be considered  
31       a permanent removal of the nontidal perennial aquatic habitats. It is expected that floodplain  
32       restoration would be focused on the south part of the Plan Area, in CZ 7. Floodplain restoration  
33       along the southern Delta rivers would improve connectivity for a variety of species that rely on  
34       aquatic and riparian habitats. The regional and Plan Area landscape linkages along the San  
35       Joaquin River, Middle River and Old River are included in Figure 12-2. This activity is scheduled  
36       to start following construction of water conveyance facilities, which is expected to take 10 years.
- 37       • *CM6 Channel Margin Enhancement*: Channel margin habitat enhancement could result in filling  
38       of small amounts of nontidal perennial aquatic habitat along 20 miles of river and sloughs. The  
39       extent of this loss cannot be quantified at this time, but the majority of the enhancement activity  
40       would occur on the edges of tidal perennial aquatic habitat, including levees and channel banks.  
41       Nontidal marsh adjacent to these tidal areas could be affected. The improvements would be  
42       undertaken within the study area on sections of the Sacramento, San Joaquin and Mokelumne  
43       Rivers, and along Steamboat and Sutter Sloughs.
- 44       • *CM10 Nontidal Marsh Restoration*: CM10 would entail restoration of 1,200 acres of nontidal  
45       marsh in CZs 2, 4 and/or 5. The restoration would create a mosaic of nontidal perennial aquatic

1 and nontidal freshwater perennial emergent natural communities. This marsh restoration  
2 would occur in 25-acre or larger patches in or near giant garter snake occupied habitat and  
3 would be accompanied by adjacent grassland restoration or protection.

4 The following paragraphs summarize the combined effects discussed above and describe other  
5 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA impact conclusions are  
6 also included.

#### 7 ***Near-Term Timeframe***

8 During the near-term timeframe (the first 10 years of BDCP implementation), Alternative 4 would  
9 affect the nontidal perennial aquatic community through CM1 construction losses (57 acres  
10 permanent and 7 acres temporary) and the CM2 construction losses (24 acres permanent and 12  
11 acres temporary). These losses would occur primarily at linear ponds near Twin Cities Road, on  
12 southern Bouldin Island, and along the transmission corridor as it crosses Mandeville Island.  
13 Approximately 34 acres of the inundation and construction-related losses from CM4 would occur in  
14 the near-term throughout several of the ROAs mapped in Figure 12-1.

15 The construction losses of this special-status natural community would represent an adverse effect  
16 if they were not offset by avoidance and minimization measures and restoration actions associated  
17 with BDCP conservation components. Loss of nontidal perennial aquatic natural community would  
18 be considered both a loss in acreage of a sensitive natural community and a loss of waters of the  
19 United States as defined by Section 404 of the CWA. However, creating 400 acres of nontidal marsh  
20 as part of CM10 during the first 10 years of Alternative 4 implementation would offset this near-  
21 term loss, avoiding any adverse effect. Typical project-level mitigation ratios (1:1 for restoration and  
22 1:1 for protection) would indicate 134 acres of restoration and 134 acres of protection would be  
23 needed to offset (i.e., mitigate) the 134 acres of loss. While the Plan does not include protection of  
24 nontidal perennial aquatic habitat, it includes well in excess of the typical 1:1 restoration acreage  
25 (which includes protection in perpetuity), and therefore compensates for the lack of protection.

26 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
27 *Construction Best Management Practices and Monitoring*, *AMM6 Disposal and Reuse of Spoils*,  
28 *Reusable Tunnel Material*, and *Dredged Material*, *AMM7 Barge Operations Plan*, and *AMM10*  
29 *Restoration of Temporarily Affected Natural Communities*. All of these AMMs include elements that  
30 avoid or minimize the risk of affecting habitats at work areas and storage sites. The AMMs are  
31 described in detail in BDCP Appendix 3.C.

#### 32 ***Late Long-Term Timeframe***

33 Implementation of Alternative 4 as a whole would result in relatively minor (6%) losses of nontidal  
34 perennial aquatic community in the study area. These losses (298 acres of permanent and 35 acres  
35 of temporary loss) would be largely associated with construction of the water conveyance facilities  
36 (CM1), construction of Yolo Bypass fish improvements (CM2), change to tidally influenced  
37 inundation during tidal marsh restoration (CM4), and floodplain restoration (CM5). The changes to  
38 tidally influenced inundation would occur during the course of the CM4 restoration activities at  
39 various tidal restoration sites throughout the study area. By the end of the Plan timeframe, a total of  
40 1,200 acres of nontidal marsh would be restored. The restoration would occur over a wide region of  
41 the study area, including within the Cosumnes/Mokelumne, Yolo Bypass, South Delta and East Delta  
42 ROAs (see Figure 12-1).

1 **NEPA Effects:** During the first 10 years of implementing Alternative 4, creating 400 acres of nontidal  
2 marsh as part of CM10 would offset the construction-related and inundation losses of 134 acres of  
3 nontidal perennial aquatic natural community. There would be no adverse effect. During the full  
4 duration of Plan implementation, Alternative 4 would not result in a net reduction in the acreage of  
5 a sensitive natural community; there would be an expansion of nontidal marsh and the effect would  
6 be beneficial.

7 **CEQA Conclusion:**

8 **Near-Term Timeframe**

9 Alternative 4 would result in the loss of approximately 134 acres of nontidal perennial aquatic  
10 natural community due to construction of the water conveyance facilities (CM1) and fish passage  
11 improvements (CM2), and change to tidally influenced inundation during tidal marsh restoration  
12 (CM4). The construction losses would occur primarily at reusable tunnel material storage sites near  
13 Twin Cities Road and on Bouldin Island, and along the transmission corridor where it crosses  
14 Mandeville Island. The losses would be spread across a 10-year near-term timeframe. These losses  
15 would be offset by planned restoration of 400 acres of nontidal marsh scheduled for the first 10  
16 years of Alternative 4 implementation (CM10). Also, AMM1, AMM2, AMM6, AMM7, and AMM10  
17 would be implemented to minimize impacts. Because of these offsetting near-term restoration  
18 activities and AMMs, impacts would be less than significant. Typical project-level mitigation ratios  
19 (1:1 for restoration and 1:1 for protection) would indicate that 134 acres of restoration and 134  
20 acres of protection would be needed to offset (i.e., mitigate) the 134 acres of loss. While the Plan  
21 does not include protection in the near-term, it includes well in excess of the typical 1:1 restoration  
22 acreage (which includes protection in perpetuity), and therefore compensates for the lack of  
23 protection. The restoration would be initiated at the beginning of Alternative 4 implementation to  
24 minimize any time lag in the availability of this habitat to special-status species, and would result in  
25 a net gain in acreage of this sensitive natural community.

26 **Late Long-Term Timeframe**

27 At the end of the Plan period, 333 acres of the natural community would be removed and 1,200  
28 acres of nontidal marsh would be restored. The nontidal marsh would consist of a mosaic of nontidal  
29 perennial aquatic and nontidal freshwater perennial emergent wetland natural communities. There  
30 would be no net permanent reduction in the acreage of this sensitive natural community within the  
31 study area. Therefore, Alternative 4 would not have a substantial adverse effect on the nontidal  
32 perennial aquatic natural community; the impact would be beneficial.

33 **Impact BIO-13: Increased Frequency, Magnitude and Duration of Periodic Inundation of**  
34 **Nontidal Perennial Aquatic Natural Community**

35 Two Alternative 4 conservation measures would modify the inundation/flooding regimes of both  
36 natural and man-made waterways in the study area. CM2, which is designed to improve fish passage  
37 and shallow flooded habitat for Delta fishes in the Yolo Bypass, would increase periodic inundation  
38 of nontidal perennial aquatic natural community on small acreages, while CM5 would expose this  
39 community to additional flooding as channel margins are modified and levees are set back to  
40 improve fish habitat along some of the major rivers and waterways throughout the study area.

- 41 • **CM2 Yolo Bypass Fisheries Enhancement:** Operation of the Yolo Bypass under Alternative 4 would  
42 result in an increase in the frequency, magnitude and duration of inundation of 50–77 acres of

1 nontidal perennial aquatic natural community. The methods used to estimate these inundation  
2 acreages are described in BDCP Appendix 5.J, *Effects on Natural Communities, Wildlife, and*  
3 *Plants*. The area more frequently affected by inundation would vary with the flow volume that  
4 would pass through the newly constructed notch in the Fremont Weir. The 50-acre increase in  
5 inundation would be associated with a notch flow of 3,000 cubic feet per second (cfs), and the  
6 77-acre increase would result from a notch flow of 6,000 cfs. Plan-related increases in flow  
7 through Fremont Weir would be expected in 30% of the years. This community occurs in small  
8 stringers and patches throughout the bypass, including along the Tule Canal/Toe Drain, the  
9 western channels north of Interstate 80, and below the Fremont and Sacramento Weirs. The  
10 anticipated change in management of flows in the Yolo Bypass includes more frequent releases  
11 in flows into the bypass from the Fremont and Sacramento Weirs, and in some years, later  
12 releases into the bypass in spring months (April and May). The modification of periodic  
13 inundation events would not adversely affect the ecological function of this natural community  
14 and would not substantially modify its value for special-status or common wildlife species.  
15 Nontidal perennial aquatic habitats in the Yolo Bypass have developed under a long-term  
16 regime of periodic inundation events. The extended inundation would be designed to expand  
17 foraging and spawning habitat for Delta fishes. The effects of this inundation on wildlife and  
18 plant species are described in detail in later sections of this chapter.

- 19 ● *CM5 Seasonally Inundated Floodplain Restoration*: Floodplain restoration would result in an  
20 increase in the frequency and duration of inundation of an estimated 25 acres of nontidal  
21 perennial aquatic habitat. Specific locations for this restoration activity have not been identified,  
22 but they would likely be focused in the south Delta area, along the major rivers and Delta  
23 channels. The reconnection of these wetlands to stream flooding events would be beneficial to  
24 the ecological function of nontidal perennial aquatic habitats as they relate to BDCP target  
25 aquatic species. The periodic flooding may also encourage germination of nontidal marsh  
26 vegetation.

27 In summary, 75-102 acres of nontidal perennial aquatic community in the study area would be  
28 subjected to more frequent inundation as a result of implementing two Alternative 4 conservation  
29 measures (CM2 and CM5). Nontidal perennial aquatic community in the Yolo Bypass has developed  
30 under a long-term regime of periodic inundation events and inundation along expanded river  
31 floodplains would be infrequent.

32 **NEPA Effects:** The increased inundation of nontidal perennial aquatic natural community in the Yolo  
33 Bypass and along south Delta waterways would not reduce the acreage of this natural community  
34 and could encourage germination of aquatic vegetation. This increased inundation would not be  
35 adverse.

36 **CEQA Conclusion:** An estimated 75–102 acres of nontidal perennial aquatic community in the study  
37 area would be subjected to more frequent inundation as a result of implementing CM2 and CM5  
38 under Alternative 4. The nontidal perennial aquatic community would not be significantly impacted  
39 because its habitats in the Yolo Bypass have developed under a long-term regime of periodic  
40 inundation events and inundation along expanded river floodplains would be infrequent. The  
41 periodic inundation would not result in a net permanent reduction in the acreage of this community  
42 in the study area. Therefore, there would be no substantial adverse effect on the community. The  
43 impact would be less than significant.

1 **Impact BIO-14: Modification of Nontidal Perennial Aquatic Natural Community from Ongoing**  
2 **Operation, Maintenance and Management Activities**

3 Once the physical facilities associated with Alternative 4 are constructed and the stream flow regime  
4 associated with changed water management is in effect, there would be new ongoing and periodic  
5 actions associated with operation, maintenance and management of the BDCP facilities and  
6 conservation lands that could affect nontidal perennial aquatic natural community in the study area.  
7 The ongoing actions include modified operation of upstream reservoirs, the diversion of Sacramento  
8 River flows in the north Delta, and reduced diversions from south Delta channels. These actions  
9 would be associated with CM1 (see Impact BIO-13 for effects associated with CM2). The periodic  
10 actions would involve access road and conveyance facility repair, vegetation management at the  
11 various water conveyance facilities and habitat restoration sites (CM11), levee repair and  
12 replacement of levee armoring, channel dredging, and habitat enhancement in accordance with  
13 natural community management plans. The potential effects of these actions are described below.

- 14 • *Modified releases and water levels in upstream reservoirs.* Modified releases and water levels at  
15 Shasta Lake, Lake Oroville, Whiskeytown Lake, Lewiston Lake, and Folsom Lake would affect  
16 nontidal perennial aquatic natural community, in the form of the reservoir pools. The  
17 Alternative 4 operations scheme would alter the surface elevations of these reservoir pools as  
18 described in Chapter 6, *Surface Water*. These fluctuations would occur within historic ranges  
19 and would not adversely affect the natural community. Changes in releases that would influence  
20 downstream river flows are discussed below.
- 21 • *Modified river flows upstream of and within the study area and reduced diversions from south*  
22 *Delta channels.* Changes in releases from reservoirs upstream of the study area, increased  
23 diversion of Sacramento River flows in the north Delta, and reduced diversion from south Delta  
24 channels (associated with Operational Scenario H) would not result in the permanent reduction  
25 in acreage of the nontidal perennial aquatic natural community in the study area. Flow levels in  
26 the upstream rivers would not change such that the acreage of nontidal perennial aquatic  
27 community would be reduced on a permanent basis. Some minor increases and some decreases  
28 would be expected to occur along the major rivers during some seasons and in some water-year  
29 types, but there would be no permanent loss. Similarly, increased diversions of Sacramento  
30 River flows in the north Delta would not result in a permanent reduction in nontidal perennial  
31 aquatic community downstream of these diversions. Nontidal wetlands below the diversions are  
32 not directly connected to the rivers, as this reach of the river is tidally influenced. Reduced  
33 diversions from south Delta channels would not create a reduction in this natural community.
- 34 • *Access road, water conveyance facility and levee repair.* Periodic repair of access roads, water  
35 conveyance facilities and levees associated with the BDCP actions have the potential to require  
36 removal of adjacent vegetation and could entail earth and rock work in nontidal perennial  
37 aquatic habitats. This activity could lead to increased soil erosion, turbidity and runoff entering  
38 nontidal perennial aquatic habitats. These activities would be subject to normal erosion,  
39 turbidity and runoff control management practices, including those developed as part of *AMM2*  
40 *Construction Best Management Practices and Monitoring* and *AMM4 Erosion and Sediment*  
41 *Control Plan*. Any vegetation removal or earthwork adjacent to or within aquatic habitats would  
42 require use of sediment and turbidity barriers, soil stabilization and revegetation of disturbed  
43 surfaces. Proper implementation of these measures would avoid permanent adverse effects on  
44 this community.

1       • *Vegetation management.* Vegetation management, in the form of physical removal and chemical  
2 treatment, would be a periodic activity associated with the long-term maintenance of water  
3 conveyance facilities and restoration sites (*CM11 Natural Communities Enhancement and*  
4 *Management*). Vegetation management is also the principal activity associated with *CM13*  
5 *Invasive Aquatic Vegetation Control*. Use of herbicides to control nuisance vegetation could pose  
6 a long-term hazard to nontidal perennial aquatic natural community at or adjacent to treated  
7 areas. The hazard could be created by uncontrolled drift of herbicides, uncontrolled runoff of  
8 contaminated stormwater onto the natural community, or direct discharge of herbicides to  
9 nontidal perennial aquatic areas being treated for invasive species removal. Environmental  
10 commitments and *AMM5 Spill Prevention, Containment, and Countermeasure Plan* have been  
11 made part of the BDCP to reduce hazards to humans and the environment from use of various  
12 chemicals during maintenance activities, including the use of herbicides. These commitments  
13 are described in Appendix 3B, including the commitment to prepare and implement spill  
14 prevention, containment, and countermeasure plans and stormwater pollution prevention  
15 plans. Best management practices, including control of drift and runoff from treated areas, and  
16 use of herbicides approved for use in aquatic environments would also reduce the risk of  
17 affecting natural communities adjacent to water conveyance features and levees associated with  
18 restoration activities.

19       Herbicides to remove aquatic invasive species as part of *CM13* would be used to restore the  
20 normal ecological function of tidal and nontidal aquatic habitats in planned restoration areas.  
21 The treatment activities would be conducted in concert with the California Department of  
22 Boating and Waterways' invasive species removal program. Eliminating large stands of water  
23 hyacinth and Brazilian waterweed would improve habitat conditions for some aquatic species  
24 by removing cover for nonnative predators, improving water flow and removing barriers to  
25 movement (see Chapter 11, *Fish and Aquatic Resources*). These habitat changes should also  
26 benefit terrestrial species that use tidal and nontidal perennial aquatic natural community for  
27 movement corridors and for foraging. Vegetation management effects on individual species are  
28 discussed in the species sections on following pages.

29       • *Habitat enhancement.* The BDCP includes a long-term management element for the natural  
30 communities within the Plan Area (*CM11*). For nontidal perennial aquatic natural community, a  
31 management plan would be prepared that specifies actions to improve the value of the habitats  
32 for covered species. Actions would include control of invasive nonnative plant and animal  
33 species, fire management, restrictions on vector control and application of herbicides, and  
34 maintenance of infrastructure that would allow for movement through the community. The  
35 enhancement efforts would improve the long-term value of this community for both special-  
36 status and common species.

37       The various operations and maintenance activities described above could alter acreage of nontidal  
38 perennial aquatic natural community in the study area through changes in flow patterns and  
39 changes in periodic inundation of this community. Activities could also introduce sediment and  
40 herbicides that would reduce the value of this community to common and sensitive plant and  
41 wildlife species. Other periodic activities associated with the Plan, including management,  
42 protection and enhancement actions associated with *CM3 Natural Communities Protection and*  
43 *Restoration* and *CM11 Natural Communities Enhancement and Management*, would be undertaken to  
44 enhance the value of the community. While some of these activities could result in small changes in  
45 acreage, these changes would be greatly offset by restoration activities planned as part of *CM4 Tidal*  
46 *Natural Communities Restoration* and protection actions associated with *CM3 Natural Communities*

1 *Protection and Restoration.* The management actions associated with levee repair and control of  
2 invasive plant species would also result in a long-term benefit to the species associated with  
3 nontidal perennial aquatic habitats by improving water movement.

4 **NEPA Effects:** Ongoing operation, maintenance and management activities would not result in a net  
5 permanent reduction in the nontidal perennial aquatic natural community within the study area.  
6 Therefore, there would be no adverse effect on this natural community.

7 **CEQA Conclusion:** The operation and maintenance activities associated with Alternative 4 would  
8 have the potential to create minor changes in total acreage of nontidal perennial aquatic natural  
9 community in the study area, and could create temporary increases in turbidity and sedimentation.  
10 The activities could also introduce herbicides periodically to control nonnative, invasive plants.  
11 Implementation of environmental commitments and AMM2, AMM4, and AMM5 would minimize  
12 these impacts, and other operations and maintenance activities, including management, protection  
13 and enhancement actions associated with *CM3 Natural Communities Protection and Restoration* and  
14 *CM11 Natural Communities Enhancement and Management*, would create positive effects, including  
15 improved water movement in these habitats. Long-term restoration activities associated with *CM10*  
16 *Nontidal Marsh Restoration* and protection actions associated with *CM3 Natural Communities*  
17 *Protection and Restoration* would expand this natural community in the study area. Ongoing  
18 operation, maintenance and management activities would not result in a net permanent reduction in  
19 this sensitive natural community within the study area. Therefore, there would be a less-than-  
20 significant impact on the nontidal perennial aquatic natural community.

#### 21 **Nontidal Freshwater Perennial Emergent Wetland**

22 Construction, operation, maintenance and management associated with the conservation  
23 components of Alternative 4 would have no long-term adverse effects on the habitats associated  
24 with the nontidal freshwater perennial emergent wetland natural community. Initial development  
25 and construction of CM1, CM2, CM4, and CM6 would result in both permanent and temporary  
26 removal of this community(see Table 12-4-6). Full implementation of Alternative 4 would also  
27 include the following conservation actions over the term of the BDCP to benefit the nontidal  
28 freshwater perennial emergent wetland natural community.

- 29 ● Create at least 1,200 acres of nontidal marsh consisting of a mosaic of nontidal perennial aquatic  
30 and nontidal freshwater perennial emergent wetland natural communities (Objective  
31 NFEW/NPANC1.1, associated with CM10).
- 32 ● Protect and manage 50 acres of occupied or recently occupied tricolored blackbird nesting  
33 habitat located within 5 miles of high-value foraging habitat in Conservation Zones 1, 2, 8 or 11.  
34 Nesting habitat will be managed to provide young, lush stands of bulrush/cattail emergent  
35 vegetation (Objective TRBL1.1).

36 There is a variety of other, less specific conservation goals and objectives in BDCP Chapter 3, Section  
37 3.3 that would improve the value of nontidal freshwater perennial emergent wetland natural  
38 community for terrestrial species. As explained below, with the restoration and enhancement of  
39 these amounts of habitat, in addition to implementation of AMMs, impacts on this natural  
40 community would not be adverse for NEPA purposes and would be less than significant for CEQA  
41 purposes.

42

1 **Table 12-4-6. Changes in Nontidal Freshwater Perennial Emergent Wetland Natural Community**  
 2 **Associated with Alternative 4 (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Permanent		Temporary		Periodic <sup>d</sup>	
	NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	2	2	5	5	0	0
CM2	25	25	1	1	6-8	0
CM4	40	99	0	0	0	0
CM5	0	0	0	0	0	8
CM6	Unk.	Unk.	Unk.	Unk.	0	0
<b>TOTAL IMPACTS</b>	<b>67</b>	<b>126</b>	<b>6</b>	<b>6</b>	<b>6-8</b>	<b>8</b>

<sup>a</sup> See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

Unk. = unknown

3

4 **Impact BIO-15: Changes in Nontidal Freshwater Perennial Emergent Wetland Natural**  
 5 **Community as a Result of Implementing BDCP Conservation Measures**

6 Construction and land grading activities that would accompany the implementation of CM1, CM2,  
 7 CM4, and CM6 would permanently eliminate an estimated 126 acres and temporarily remove 6  
 8 acres of nontidal freshwater perennial emergent wetland natural community in the study area.  
 9 These modifications represent approximately 9% of the 1,509 acres of the community that is  
 10 mapped in the study area. Approximately 58% (73 acres) of the permanent and temporary losses  
 11 would happen during the first 10 years of Alternative 4 implementation, as water conveyance  
 12 facilities are constructed and habitat restoration is initiated. Natural communities restoration  
 13 (CM10) would add 1,200 acres of nontidal marsh, consistent with BDCP Objective NFEW/NPANC1.1,  
 14 and natural communities protection (CM3) would protect 50 acres of nontidal marsh, consistent  
 15 with Objective TRBL1.1. These actions would be taken over the course of BDCP marsh restoration  
 16 activities, which would expand the area of that habitat and offset the losses. The nontidal marsh  
 17 restoration would include a mosaic of nontidal perennial aquatic and nontidal freshwater perennial  
 18 emergent wetland natural communities, as specified in Objective NFEW/NPANC1.1 (Table 3.3-2 in  
 19 BDCP Chapter 3, *Conservation Strategy*). The nontidal marsh protection would be designed to  
 20 support tricolored blackbird populations in the study area. The BDCP beneficial effects analysis  
 21 (BDCP Chapter 5, Section 5.4.6.2) indicates that implementation of Alternative 4 would result in the  
 22 restoration of 1,200 acres of nontidal marsh. The restoration would occur in blocks that are  
 23 contiguous with the alternative's larger reserve system. The nontidal marsh would be restored in

1 the vicinity of giant garter snake subpopulations identified in the recovery plan for this species (U.S.  
2 Fish and Wildlife Service 1998).

3 The individual effects of each relevant conservation measure are addressed below. A summary  
4 statement of the combined impacts and NEPA and CEQA conclusions follows the individual  
5 conservation measure discussions.

- 6 • *CM1 Water Facilities and Operation:* Construction of the Alternative 4 water conveyance facilities  
7 would permanently remove 2 acres and temporarily remove 5 acres of tidal freshwater  
8 perennial emergent wetland community. The permanent loss would occur at the Clifton Court  
9 Forebay construction site (see Terrestrial Biology Mapbook). The temporary loss would occur  
10 where powerlines would be constructed across Mandeville Island. These wetlands are  
11 extremely small and remote water bodies, surrounded by agricultural operations. These losses  
12 would take place during the near-term construction period.
- 13 • *CM2 Yolo Bypass Fisheries Enhancement:* Implementation of CM2 involves a number of  
14 construction activities within the Yolo and Sacramento Bypasses, including Fremont Weir and  
15 stilling basin improvements, west side channels and Tule Canal modifications, Putah Creek  
16 realignment activities, Lisbon Weir modification and Sacramento Weir improvements. Some of  
17 these activities could involve excavation and grading in nontidal freshwater perennial emergent  
18 wetland areas to improve passage of fish through the bypasses. Based on hypothetical  
19 construction footprints, a total of 25 acres could be permanently lost and 1 acre could be  
20 temporarily removed. These losses would most likely occur in the Tule Canal and west side  
21 channels at the north end of the bypass. The habitat here includes narrow bands within these  
22 side channels of the bypass and is isolated from other marsh or open water habitats. The narrow  
23 bands are bordered by riparian habitats, primarily willows and cottonwoods. This activity  
24 would occur in the near-term timeframe.
- 25 • *CM4 Tidal Natural Communities Restoration:* Based on the use of hypothetical restoration  
26 footprints, implementation of CM4 would permanently inundate or remove 99 acres of nontidal  
27 freshwater perennial emergent wetland community, primarily in the Cache Slough ROA (see  
28 Figure 12-1). An estimated 1,200 acres of nontidal marsh would be restored (CM10) and 50  
29 acres would be protected (CM3) during nontidal habitat conservation actions. Approximately  
30 400 acres of the restoration and 25 acres of the protection would happen during the first 10  
31 years of Alternative 4 implementation, which would coincide with the timeframe of water  
32 conveyance facilities construction and early tidal marsh restoration. The remaining restoration  
33 would be spread over the following 30 years. Nontidal marsh natural communities restoration is  
34 expected to be focused in the vicinity of giant garter snake populations in the eastern Delta and  
35 near the Yolo Bypass.
- 36 • *CM5 Seasonally Inundated Floodplain Restoration:* Based on theoretical footprints, floodplain  
37 restoration levee construction would not affect nontidal freshwater perennial emergent wetland  
38 natural community.
- 39 • *CM6 Channel Margin Enhancement:* Channel margin habitat enhancement could result in filling  
40 of small amounts of nontidal freshwater perennial emergent wetland habitat along 20 miles of  
41 river and sloughs. The extent of this loss cannot be quantified at this time, but the majority of the  
42 enhancement activity would occur on the edges of tidal perennial aquatic habitat, including  
43 levees and channel banks. Nontidal marsh adjacent to these tidal areas could be affected. The  
44 improvements would occur within the study area on sections of the Sacramento, San Joaquin  
45 and Mokelumne Rivers, and along Steamboat and Sutter Sloughs.

- *CM10 Nontidal Marsh Restoration*: CM10 would entail restoration of 1,200 acres of nontidal marsh in CZs 2, 4 and/or 5. The restoration would create a mosaic of nontidal perennial aquatic and nontidal freshwater perennial emergent natural communities. This marsh restoration would occur in 25-acre or larger patches in or near giant garter snake occupied habitat and would be accompanied by adjacent grassland restoration or protection.

The following paragraphs summarize the combined effects discussed above and describe other BDCP conservation actions that offset or avoid these effects. NEPA and CEQA impact conclusions are also included.

### ***Near-Term Timeframe***

During the near-term timeframe (the first 10 years of BDCP implementation), Alternative 4 would affect the nontidal freshwater perennial emergent wetland community through CM1 construction losses (2 acres permanent and 5 acres temporary) and the CM2 construction losses (25 acres permanent and 1 acre temporary). These losses would occur at the southern forebay, along powerlines across Mandeville Island, and in the Yolo Bypass. Approximately 40 acres of the inundation and construction-related losses from CM4 would occur in the near-term. These losses would occur primarily in the Cache Slough ROA mapped in Figure 12-1.

The construction losses of this special-status natural community would represent an adverse effect if they were not offset by avoidance and minimization measures and restoration actions associated with BDCP conservation components. Loss of nontidal freshwater perennial emergent wetland natural community would be considered both a loss in acreage of a sensitive natural community and a loss of wetland as defined by Section 404 of the CWA. However, the combination of creating 400 acres and protecting 25 acres of nontidal perennial marsh as part of CM3 and CM10 during the first 10 years of Alternative 4 implementation would offset this near-term loss, avoiding any adverse effect. Typical project-level mitigation ratios (1:1 for restoration and 1:1 for protection) would indicate 73 acres of restoration and 73 acres of protection would be needed to offset (i.e., mitigate) the 73 acres of loss. While the Plan includes just 25 acres of protection in the near-term, it includes well in excess of the typical 1:1 restoration acreage (which includes protection in perpetuity), and therefore compensates for the shortfall in protection.

The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2 Construction Best Management Practices and Monitoring*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged Material*, *AMM7 Barge Operations Plan* and *AMM10 Restoration of Temporarily Affected Natural Communities*. All of these AMMs include elements that avoid or minimize the risk of affecting habitats at work areas and storage sites. The AMMs are described in detail in BDCP Appendix 3.C.

### ***Late Long-Term Timeframe***

Implementation of Alternative 4 as a whole would result in small (9%) losses of nontidal freshwater perennial emergent wetland community in the study area. These losses (126 acres of permanent and 6 acres of temporary loss) would be largely associated with construction of the water conveyance facilities (CM1), construction of Yolo Bypass fish improvements (CM2), and inundation during tidal marsh restoration (CM4). Inundation losses would occur during the course of the CM4 restoration activities primarily at the Cache Slough ROA. By the end of the Plan timeframe, a total of 1,200 acres of nontidal marsh would be restored and 50 acres would be protected. The restoration would occur near giant garter snake occupied habitat in the eastern Delta and near Yolo Bypass, in

1 CZs 2, 4 and 5. The 50 acres of protection would occur in CZ 1, 2, 8 or 11 to provide nesting habitat  
2 for tri-colored blackbird (see Figure 12-1).

3 **NEPA Effects:** In the near-term, the combination of creating 400 acres and protecting 25 acres of  
4 nontidal perennial marsh as part of CM3 and CM10 would offset the near-term losses associated  
5 with construction of CM1, CM2 and CM4 facilities, avoiding any adverse effect. With 1,200 acres of  
6 nontidal marsh restoration (BDCP Objective NFEW/NPANC1.1) and 50 acres of protection (BDCP  
7 Objective TRBL1.1) included with full implementation of the Plan, Alternative 4 would not result in a  
8 net long-term reduction in the acreage of a sensitive natural community; the effect would be  
9 beneficial.

10 **CEQA Conclusion:**

11 **Near-Term Timeframe**

12 Alternative 4 would result in the loss of approximately 33 acres of nontidal freshwater perennial  
13 emergent wetland natural community due to construction of the water conveyance facilities (CM1)  
14 and fish passage improvements (CM2). The construction losses would occur near Clifton Court  
15 Forebay, along transmission line construction areas on Mandeville Island, and in the Yolo Bypass.  
16 Approximately 40 acres of the inundation and construction-related losses from CM4 would occur in  
17 the near-term. These losses would occur primarily in the Cache Slough ROA (see Figure 12-1). The  
18 losses would be spread across a 10-year near-term timeframe. These losses would be offset by  
19 planned restoration of 400 acres and protection of 25 acres of nontidal marsh scheduled for the first  
20 10 years of Alternative 4 implementation (CM3 and CM10). AMM1, AMM2, AMM6, AMM7, and  
21 AMM10 would also be implemented to minimize impacts. Because of these offsetting near-term  
22 restoration activities and AMMs, impacts would be less than significant. Typical project-level  
23 mitigation ratios (1:1 for restoration and 1:1 for protection) would indicate that 73 acres of  
24 restoration and 73 acres of protection would be needed to offset (i.e., mitigate) the 73 acres of loss.  
25 While the Plan includes just 25 acres of protection in the near-term, it includes well in excess of the  
26 typical 1:1 restoration acreage (which includes protection in perpetuity), and therefore  
27 compensates for the shortfall in protection. The restoration and protection would be initiated at the  
28 beginning of Alternative 4 implementation to minimize any time lag in the availability of this habitat  
29 to special-status species, and would result in a net gain in acreage of this sensitive natural  
30 community.

31 **Late Long-Term Timeframe**

32 At the end of the Plan period, 132 acres of the natural community would be removed, 1,200 acres of  
33 nontidal marsh would be restored (BDCP Objective NFEW/NPANC1.1) and 50 acres of nontidal  
34 marsh would be protected (BDCP Objective TRBL1.1). There would be no net permanent reduction  
35 in the acreage of this sensitive natural community within the study area. Therefore, Alternative 4  
36 would not have a substantial adverse effect on the nontidal freshwater perennial emergent wetland  
37 natural community; the impact would be beneficial.

38 **Impact BIO-16: Increased Frequency, Magnitude and Duration of Periodic Inundation of**  
39 **Nontidal Freshwater Perennial Emergent Wetland Natural Community**

40 Two Alternative 4 conservation measures would modify the inundation/flooding regimes of both  
41 natural and man-made waterways in the study area. CM2, which is designed to improve fish passage  
42 and shallow flooded habitat for Delta fishes in the Yolo Bypass, would increase periodic inundation

1 of nontidal freshwater perennial emergent wetland natural community on small acreages, while  
2 CM5 would expose this community to additional flooding as channel margins are modified and  
3 levees are set back to improve fish habitat along some of the major rivers and waterways  
4 throughout the study area.

- 5 • *CM2 Yolo Bypass Fisheries Enhancement*: Operation of the Yolo Bypass under Alternative 4 would  
6 result in an increase in the frequency and duration of inundation of 6-8 acres of nontidal  
7 freshwater perennial emergent wetland natural community. The methods used to estimate  
8 these inundation acreages are described in BDCP Appendix 5.J, *Effects on Natural Communities,*  
9 *Wildlife, and Plants*. The area more frequently affected by inundation would vary with the flow  
10 volume that would pass through the newly constructed notch in the Fremont Weir. The 6-acre  
11 increase in inundation would be associated with a notch flow of 1,000 cubic feet per second  
12 (cfs), and the 8-acre increase would result from a notch flow of 6,000 cfs. Plan-related increases  
13 in flow through Fremont Weir would be expected in 30% of the years. This community occurs in  
14 small stringers and isolated patches along the Tule Canal and western channel in the north end  
15 of the bypass. These areas are not connected to other adjacent marsh and open water habitats;  
16 they are surrounded by riparian habitat, scoured grassland and agricultural lands. The  
17 anticipated change in management of flows in the Yolo Bypass includes more frequent releases  
18 in flows into the bypass from the Fremont and Sacramento Weirs, and in some years, later  
19 releases into the bypass in spring months (April and May). The modification of periodic  
20 inundation events would not adversely affect the ecological function of this natural community  
21 and would not substantially modify its value for special-status or common wildlife species.  
22 Nontidal freshwater perennial emergent wetland plant species in the Yolo Bypass have  
23 developed under a long-term regime of periodic inundation events. The extended inundation  
24 would be designed to expand foraging and spawning habitat for Delta fishes. The effects of this  
25 increased inundation on terrestrial wildlife and plant species are described in detail in later  
26 sections of this chapter.
- 27 • *CM5 Seasonally Inundated Floodplain Restoration*: Floodplain restoration would result in an  
28 increase in the frequency and duration of inundation of an estimated 8 acres of nontidal  
29 freshwater perennial emergent wetland habitat. Specific locations for this restoration activity  
30 have not been identified, but they would likely be focused in the south Delta area, along the  
31 major rivers and Delta channels. The reconnection of these wetlands to stream flooding events  
32 would be beneficial to the ecological function of nontidal freshwater perennial emergent  
33 wetland habitats as they relate to BDCP target aquatic species. The added exposure to  
34 inundation could also encourage germination of nontidal marsh plant species. Foraging activity  
35 and refuge sites would be expanded into areas currently unavailable or infrequently available to  
36 some aquatic species.

37 In summary, from 14-16 acres of nontidal freshwater perennial emergent wetland community in the  
38 study area would be subjected to more frequent inundation as a result of implementing two  
39 Alternative 4 conservation measures (CM2 and CM5). This community would not be adversely  
40 affected because its habitats in the Yolo Bypass have developed under a long-term regime of  
41 periodic inundation events and inundation along expanded river floodplains would be infrequent.

42 **NEPA Effects:** The increased inundation of nontidal freshwater perennial emergent wetland natural  
43 community in the Yolo Bypass and in the southern Delta would not reduce the acreage of this  
44 natural community and could encourage germination of emergent wetland vegetation. The  
45 increased inundation would not be an adverse effect.

1 **CEQA Conclusion:** An estimated 16-18 acres of nontidal freshwater perennial emergent wetland  
2 community in the study area would be subjected to more frequent inundation as a result of  
3 implementing CM2 and CM5 under Alternative 4. This community would not be significantly  
4 impacted because its habitats in the Yolo Bypass have developed under a long-term regime of  
5 periodic inundation events and inundation along expanded river floodplains would be infrequent.  
6 The periodic inundation would not result in a net permanent reduction in the acreage of this  
7 community in the study area. Therefore, there would be no substantial adverse effect on the  
8 community. The impact would be less than significant on the nontidal freshwater perennial  
9 emergent wetland natural community.

10 **Impact BIO-17: Modification of Nontidal Freshwater Perennial Emergent Wetland Natural**  
11 **Community from Ongoing Operation, Maintenance and Management Activities**

12 Once the physical facilities associated with Alternative 4 are constructed and the stream flow regime  
13 associated with changed water management is in effect, there would be new ongoing and periodic  
14 actions associated with operation, maintenance and management of the BDCP facilities and  
15 conservation lands that could affect nontidal freshwater perennial emergent wetland natural  
16 community in the study area. The ongoing actions include modified operation of upstream  
17 reservoirs, the diversion of Sacramento River flows in the north Delta, and reduced diversions from  
18 south Delta channels. These actions are associated with CM1 (see Impact BIO-16 for effects  
19 associated with CM2). The periodic actions would involve access road and conveyance facility  
20 repair, vegetation management at the various water conveyance facilities and habitat restoration  
21 sites (CM11), levee repair and replacement of levee armoring, channel dredging, and habitat  
22 enhancement in accordance with natural community management plans. The potential effects of  
23 these actions are described below.

- 24 • *Modified releases and water levels in upstream reservoirs.* Modified releases and water levels at  
25 Shasta Lake, Lake Oroville, Whiskeytown Lake, Lewiston Lake, and Folsom Lake would not affect  
26 the nontidal freshwater perennial emergent wetland natural community. These reservoirs do  
27 not support significant stands of freshwater emergent wetlands. Changes in releases that would  
28 influence downstream river flows are discussed below.
- 29 • *Modified river flows upstream of and within the study area and reduced diversions from south*  
30 *Delta channels.* Changes in releases from reservoirs upstream of the study area, increased  
31 diversion of Sacramento River flows in the north Delta, and reduced diversions from south Delta  
32 channels (associated with Operational Scenario H) would not result in the permanent reduction  
33 in acreage of the nontidal freshwater perennial emergent wetland natural community in the  
34 study area. The majority of this wetland type exists outside of the levees of the larger rivers and  
35 would not be affected by flow changes in river or Delta channels. Similarly, increased diversions  
36 of Sacramento River flows in the north Delta would not result in a permanent reduction in  
37 nontidal freshwater perennial emergent wetland community downstream of these diversions.  
38 Nontidal wetlands below the diversions are not directly connected to the rivers, as this reach of  
39 the river is tidally influenced. Reduced diversions from south Delta channels would not create a  
40 reduction in this natural community.
- 41 • *Access road, water conveyance facility and levee repair.* Periodic repair of access roads, water  
42 conveyance facilities and levees associated with the BDCP actions have the potential to require  
43 removal of adjacent vegetation and could entail earth and rock work in nontidal freshwater  
44 perennial emergent wetland habitats. This activity could lead to increased soil erosion, turbidity  
45 and runoff entering nontidal freshwater perennial habitats. These activities would be subject to

1 normal erosion, turbidity and runoff control management practices, including those developed  
2 as part of *AMM2 Construction Best Management Practices and Monitoring* and *AMM4 Erosion and*  
3 *Sediment Control Plan*. Any vegetation removal or earthwork adjacent to or within aquatic  
4 habitats would require use of sediment and turbidity barriers, soil stabilization and revegetation  
5 of disturbed surfaces. Proper implementation of these measures would avoid permanent  
6 adverse effects on this community.

- 7 • *Vegetation management*. Vegetation management, in the form of physical removal and chemical  
8 treatment, would be a periodic activity associated with the long-term maintenance of water  
9 conveyance facilities and restoration sites (*CM11 Natural Communities Enhancement and*  
10 *Management*). Use of herbicides to control nuisance vegetation could pose a long-term hazard to  
11 nontidal freshwater perennial emergent wetland natural community at or adjacent to treated  
12 areas. The hazard could be created by uncontrolled drift of herbicides, uncontrolled runoff of  
13 contaminated stormwater onto the natural community, or direct discharge of herbicides to  
14 nontidal perennial wetland areas being treated for invasive species removal. Environmental  
15 commitments and *AMM5 Spill Prevention, Containment, and Countermeasure Plan* have been  
16 made part of the BDCP to reduce hazards to humans and the environment from use of various  
17 chemicals during maintenance activities, including the use of herbicides. These commitments  
18 are described in Appendix 3B, including the commitment to prepare and implement spill  
19 prevention, containment, and countermeasure plans and stormwater pollution prevention  
20 plans. Best management practices, including control of drift and runoff from treated areas, and  
21 use of herbicides approved for use in aquatic environments would also reduce the risk of  
22 affecting natural communities adjacent to water conveyance features and levees associated with  
23 restoration activities.

24 Herbicides to remove aquatic invasive species as part of CM13 would be used to restore the  
25 normal ecological function of tidal and nontidal aquatic habitats in planned restoration areas.  
26 The treatment activities would be conducted in concert with the California Department of  
27 Boating and Waterways' invasive species removal program. Eliminating large stands of water  
28 hyacinth and Brazilian waterweed would improve habitat conditions for some aquatic species  
29 by removing cover for nonnative predators, improving water flow and removing barriers to  
30 movement (see Chapter 11, *Fish and Aquatic Resources*). These habitat changes should also  
31 benefit terrestrial species that use tidal and nontidal freshwater perennial emergent wetland  
32 natural community for movement corridors and for foraging. Vegetation management effects on  
33 individual species are discussed in the species sections on following pages.

- 34 • *Habitat enhancement*. The BDCP includes a long-term management element for the natural  
35 communities within the Plan Area (CM11). For nontidal freshwater perennial emergent wetland  
36 natural community, a management plan would be prepared that specifies actions to improve the  
37 value of the habitats for covered species. Actions would include control of invasive nonnative  
38 plant and animal species, fire management, restrictions on vector control and application of  
39 herbicides, and maintenance of infrastructure that would allow for movement through the  
40 community. The enhancement efforts would improve the long-term value of this community for  
41 both special-status and common species.

42 The various operations and maintenance activities described above could alter acreage of nontidal  
43 freshwater perennial emergent wetland natural community in the study area through changes in  
44 flow patterns and changes in periodic inundation of this community. Activities could also introduce  
45 sediment and herbicides that would reduce the value of this community to common and sensitive  
46 plant and wildlife species. Other periodic activities associated with the Plan, including management,

1 protection and enhancement actions associated with *CM3 Natural Communities Protection and*  
2 *Restoration* and *CM11 Natural Communities Enhancement and Management*, would be undertaken to  
3 enhance the value of the community. While some of these activities could result in small changes in  
4 acreage, these changes would be greatly offset by restoration activities planned as part of *CM10*  
5 *Nontidal Marsh Restoration* and protection actions associated with *CM3 Natural Communities*  
6 *Protection and Restoration*. The management actions associated with levee repair and control of  
7 invasive plant species would also result in a long-term benefit to the species associated with  
8 nontidal freshwater perennial emergent wetland habitats by improving water movement.

9 **NEPA Effects:** Ongoing operation, maintenance and management activities associated with  
10 Alternative 4 would not result in a net permanent reduction in the nontidal freshwater perennial  
11 emergent wetland natural community within the study area. Therefore, there would be no adverse  
12 effect on this natural community.

13 **CEQA Conclusion:** The operation and maintenance activities associated with Alternative 4 would  
14 have the potential to create minor changes in total acreage of nontidal freshwater perennial  
15 emergent wetland natural community in the study area, and could create temporary increases in  
16 turbidity and sedimentation. The activities could also introduce herbicides periodically to control  
17 nonnative, invasive plants. Implementation of environmental commitments and AMM2, AMM4, and  
18 AMM5 would minimize these impacts, and other operations and maintenance activities, including  
19 management, protection and enhancement actions associated with *CM3 Natural Communities*  
20 *Protection and Restoration* and *CM11 Natural Communities Enhancement and Management*, would  
21 create positive effects, including improved water movement in and adjacent to these habitats. Long-  
22 term restoration activities associated with *CM10 Nontidal Marsh Restoration* and protection actions  
23 associated with *CM3 Natural Communities Protection and Restoration* would expand this natural  
24 community in the study area. Ongoing operation, maintenance and management activities would not  
25 result in a net permanent reduction in this sensitive natural community within the study area.  
26 Therefore, there would be a less-than-significant impact on the nontidal freshwater perennial  
27 emergent wetland natural community.

### 28 **Alkali Seasonal Wetland Complex**

29 Construction, operation, maintenance and management associated with the conservation  
30 components of Alternative 4 would have no long-term adverse effects on the habitats associated  
31 with the alkali seasonal wetland complex natural community. Initial development and construction  
32 of CM1, CM2 and CM4 would result in both permanent and temporary removal of this  
33 community(see Table 12-4-7). Full implementation of Alternative 4 would also include the following  
34 conservation actions over the term of the BDCP to benefit the alkali seasonal wetland natural  
35 community.

- 36 ● Protect 150 acres of alkali seasonal wetland in Conservation Zones 1, 8 and/or 11 among a  
37 mosaic of protected grasslands and vernal pool complex (Objective ASWNC1.1, associated with  
38 CM3).
- 39 ● Restore or create alkali seasonal wetlands in Conservation Zones 1, 8, and/or 11 to achieve no  
40 net loss of wetted acres (up to 72 acres of alkali seasonal wetland complex restoration)  
41 (Objective ASWNC1.2, associated with CM3 and CM9).
- 42 ● Provide appropriate seasonal flooding characteristics for supporting and sustaining alkali  
43 seasonal wetland species (Objective ASWNC2.1, associated with CM3 and CM11).

1 There is a variety of other, less specific conservation goals and objectives in BDCP Chapter 3, Section  
 2 3.3 that would improve the value of alkali seasonal wetland natural community for terrestrial  
 3 species. As explained below, with the protection, restoration, and enhancement of the amounts of  
 4 habitat listed in the BDCP objectives, in addition to implementation of AMMs, impacts on this natural  
 5 community would not be adverse for NEPA purposes and would be less than significant for CEQA  
 6 purposes.

7 **Table 12-4-7. Changes in Alkali Seasonal Wetland Complex Natural Community Associated with**  
 8 **Alternative 4 (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Permanent		Temporary		Periodic <sup>d</sup>	
	NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	0	0	2	2	0	0
CM2	45	45	0	0	264-744	0
CM4	13	27	0	0	0	0
CM5	0	0	0	0	0	0
CM6	Unk.	Unk.	Unk.	Unk.	0	0
<b>TOTAL IMPACTS</b>	<b>58</b>	<b>72</b>	<b>2</b>	<b>2</b>	<b>264-744</b>	<b>0</b>

<sup>a</sup> See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. They represent the total loss of habitat that would occur over the 50-year life of the Plan. The LLT totals do not reflect the increases in habitat that would result from restoration and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

Unk. = unknown

9

10 **Impact BIO-18: Changes in Alkali Seasonal Wetland Complex Natural Community as a Result**  
 11 **of Implementing BDCP Conservation Measures**

12 Construction, land grading and habitat restoration activities that would accompany the  
 13 implementation of CM1, CM2 and CM4 under Alternative 4 would permanently eliminate an  
 14 estimated 72 acres and temporarily remove an estimated 2 acres of alkali seasonal wetland complex  
 15 natural community in the study area. These modifications represent approximately 2% of the 3,723  
 16 acres of the community that is mapped in the study area. Most of the losses (60 acres or 83%) would  
 17 happen during the first 10 years of Alternative 4 implementation, as the water conveyance facility is  
 18 constructed, the Yolo Bypass improvements are initiated, and habitat restoration is initiated. Alkali  
 19 seasonal wetland complex protection (120 acres) and restoration (an estimated 58 acres, but  
 20 determined by actual level of effect) would be initiated during the same period; when combined,  
 21 these actions would offset the losses. By the end of the Plan period, 150 acres of this natural  
 22 community would be protected and up to 72 acres would be restored. The BDCP beneficial effects  
 23 analysis for this community (BDCP Chapter 5, Section 5.4.7.2) states that Alternative 4 would  
 24 protect 150 acres of alkali seasonal wetland in Conservation Zones 1, 8, or 11, in a mosaic of

1 protected grasslands and vernal pool complex. This would protect currently unprotected high-value  
2 alkali seasonal wetland complex in the Plan Area.

3 The individual effects of each relevant conservation measure are addressed below. A summary  
4 statement of the combined impacts and NEPA and CEQA conclusions follows the individual  
5 conservation measure discussions.

- 6 • *CM1 Water Facilities and Operation*: Construction of the Alternative 4 temporary transmission  
7 lines immediately west of Clifton Court Forebay would temporarily affect 2 acres of alkali  
8 seasonal wetland complex natural community (see Terrestrial Biology Mapbook). The alkali  
9 seasonal wetland complex at this location is scattered and significantly degraded by past  
10 agricultural and water development-related activities. It is surrounded by or adjacent to vernal  
11 pool complex natural community.

12 The construction activity associated with CM1 also has the potential to lead to increased  
13 nitrogen deposition in alkali seasonal wetland habitats in the vicinity of Clifton Court Forebay. A  
14 significant number of cars, trucks, and land grading equipment involved in construction would  
15 emit small amounts of atmospheric nitrogen from fuel combustion; this material could be  
16 deposited in sensitive alkali seasonal wetland areas that are located west of the major  
17 construction areas at Clifton Court Forebay. Nitrogen deposition can pose a risk of adding a  
18 fertilizer to nitrogen-limited soils and their associated plants. Nonnative invasive species can be  
19 encouraged by the added nitrogen available. BDCP Appendix 5.J, Attachment 5J.A, *Construction-  
20 Related Nitrogen Deposition on BDCP Natural Communities*, addresses this issue in detail. It has  
21 been concluded that this potential deposition would pose a low risk of changing the alkali  
22 seasonal wetland complex in the construction area because the construction would occur  
23 primarily downwind of the natural community and the construction would contribute a  
24 negligible amount of nitrogen to regional projected emissions. No adverse effect is expected.

- 25 • *CM2 Yolo Bypass Fisheries Enhancement*: Implementation of CM2 involves a number of  
26 construction activities within the Yolo and Sacramento Bypasses, including Fremont Weir and  
27 stilling basin improvements, Putah Creek realignment activities, Lisbon Weir modification and  
28 Sacramento Weir improvements. Realignment of Putah Creek could involve excavation and  
29 grading in alkali seasonal wetland complex as a new channel is constructed. Based on  
30 hypothetical construction footprints, a total of 45 acres could be permanently lost. This complex  
31 is located immediately south of the existing Putah Creek channel within the bypass, and is a  
32 relatively large, moderate to high value, contiguous expanse of this community. This loss would  
33 occur in the near-term timeframe.
- 34 • *CM3 Natural Communities Protection and Restoration*: CM3 proposes to protect at least 150 acres  
35 of alkali seasonal wetland complex in CZ 1, CZ 8, and CZ 11 (Objective ASWNC1.1). The  
36 protection would occur in areas containing a mosaic of grassland and vernal pool complex in  
37 unfragmented natural landscapes supporting a diversity of native plant and wildlife species.  
38 These areas would be both protected and enhanced to increase the cover of alkali seasonal  
39 wetland plants relative to nonnative species.
- 40 • *CM4 Tidal Natural Communities Restoration*: Based on the use of hypothetical restoration  
41 footprints, implementation of CM4 would permanently inundate or remove 13 acres of alkali  
42 seasonal wetland complex in the near-term and inundate or remove 27 acres by the end of the  
43 Plan timeframe. The losses would be expected to occur in the Cache Slough and Suisun Marsh  
44 ROAs established for tidal restoration (see Figure 12-1). The largest losses would likely occur in  
45 the Lindsay Slough area and on the northern fringes of Suisun Marsh, north of the Potrero Hills.

1 These losses would not fragment the alkali seasonal wetland communities adjacent to these  
2 sloughs because the losses would occur on the edges of the existing habitat.

- 3 • *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*: CM9 includes both vernal  
4 pool complex and alkali seasonal wetland complex restoration goals. The intent of the  
5 conservation measure is to match the acreage of restoration with the actual acreage lost to other  
6 conservation measures (primarily CM2 and CM4). The current estimate for alkali seasonal  
7 wetland complex restoration is 58 acres in the near-term and a total of 72 acres by the end of  
8 the BDCP restoration period. The goal is for no net loss of this natural community, consistent  
9 with BDCP Objective ASWNC1.2. Restoration in the Lindsay Slough area of the Cache Slough ROA  
10 and the northern region of the Suisun Marsh ROA would be consistent with essential habitat  
11 connectivity goals mapped in Figure 12-2 and described in Table 3.2-2 of BDCP Chapter 3,  
12 *Conservation Strategy*.

13 The following paragraphs summarize the combined effects discussed above and describe other  
14 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA impact conclusions are  
15 also included.

### 16 ***Near-Term Timeframe***

17 During the near-term timeframe (the first 10 years of BDCP implementation), Alternative 4 would  
18 affect the alkali seasonal wetland complex natural community through CM1 and CM2 construction  
19 losses (45 acres permanent and 2 acres temporary). These losses would occur in the Yolo Bypass  
20 south of Putah Creek and on land immediately west of Clifton Court Forebay. Approximately 13  
21 acres of the inundation and construction-related losses in habitat from CM4 would occur in the  
22 near-term. These losses would occur primarily in the Cache Slough and Suisun Marsh ROAs mapped  
23 in Figure 12-1.

24 The construction losses of this special-status natural community would represent an adverse effect  
25 if they were not offset by avoidance and minimization measures and restoration actions associated  
26 with BDCP conservation components. Loss of alkali seasonal wetland complex natural community  
27 would be considered both a loss in acreage of a sensitive natural community and a loss of wetland as  
28 defined by Section 404 of the CWA. However, the protection of 120 acres of alkali seasonal wetland  
29 complex as part of CM3, the restoration of 58 acres of this community as part of CM9, and the  
30 implementation of *AMM30 Transmission Line Design and Alignment Guidelines* during the first 10  
31 years of Alternative 4 implementation would offset this near-term loss, avoiding any adverse effect.  
32 AMM30 would require that transmission line construction avoid any losses of alkali seasonal  
33 wetland complex natural community (see BDCP Appendix 3.C, *Avoidance and Minimization*  
34 *Measures*, for a full description of AMM30). Typical project-level mitigation ratios (2:1 for protection  
35 and 1:1 for restoration) would indicate 120 acres of protection and 60 acres of restoration would be  
36 needed to offset (i.e., mitigate) the 60 acres of loss.

37 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
38 *Construction Best Management Practices and Monitoring*, *AMM6 Disposal and Reuse of Spoils*,  
39 *Reusable Tunnel Material*, and *Dredged Material*, *AMM7 Barge Operations Plan*, and *AMM10*  
40 *Restoration of Temporarily Affected Natural Communities*. All of these AMMs include elements that  
41 avoid or minimize the risk of affecting habitats at work areas. The AMMs are described in detail in  
42 BDCP Appendix 3.C.

1 **Late Long-Term Timeframe**

2 Implementation of Alternative 4 as a whole would result in relatively minor (2%) losses of alkali  
3 seasonal wetland natural community in the study area. These losses (74 acres) would be largely  
4 associated with construction of Yolo Bypass fish improvements (CM2) and inundation during tidal  
5 marsh restoration (CM4). Inundation losses would occur during the course of BDCP restoration  
6 activities, primarily in the Cache Slough and Suisun Marsh ROAs.

7 **NEPA Effects:** In the first 10 years of implementing Alternative 4 conservation measures, 120 acres  
8 of alkali seasonal wetland complex would be protected as part of CM3 and 58 acres of this  
9 community would be restored as part of CM9. These conservation actions would offset the near-  
10 term loss of this community associated with CM1, CM2 and CM4, avoiding any adverse effect. By the  
11 end of the Plan timeframe, Alternative 4 would protect a total of 150 acres of alkali seasonal wetland  
12 natural community (CM3) and would restore up to 72 acres (CM9). The protection and restoration  
13 would occur primarily in CZ 1, CZ 8 and/or CZ 11, in the Cache Slough, Suisun Marsh and Clifton  
14 Court Forebay areas. Therefore, Alternative 4 would not have an adverse effect on the alkali  
15 seasonal wetland complex natural community.

16 **CEQA Conclusion:**

17 **Near-Term Timeframe**

18 Alternative 4 would result in the permanent loss of approximately 58 acres of alkali seasonal  
19 wetland complex natural community due to construction of fish passage improvements (CM2) and  
20 inundation during tidal marsh restoration (CM4). Two acres would be lost temporarily to water  
21 conveyance facility construction (CM1). The construction losses would occur primarily in the area  
22 just south of Putah Creek in the Yolo Bypass and adjacent to Clifton Court Forebay, while inundation  
23 losses would occur in the Cache Slough and Suisun Marsh ROAs. The losses would be spread across a  
24 10-year near-term timeframe.

25 The construction losses of this special-status natural community would represent an adverse effect  
26 if they were not offset by avoidance and minimization measures and other actions associated with  
27 BDCP conservation components. Loss of alkali seasonal wetland complex natural community would  
28 be considered both a loss in acreage of a sensitive natural community and a loss of wetland as  
29 defined by Section 404 of the CWA. However, the protection of 120 acres of alkali seasonal wetland  
30 complex as part of CM3, the restoration of 58 acres of this community as part of CM9, and the  
31 implementation of *AMM30 Transmission Line Design and Alignment Guidelines* during the first 10  
32 years of Alternative 4 implementation would offset this near-term loss, avoiding any significant  
33 impact. Typical project-level mitigation ratios (2:1 for protection and 1:1 for restoration) would  
34 indicate 120 acres of protection and 60 acres or restoration would be needed to offset (i.e., mitigate)  
35 the 60 acres of loss. AMM1, AMM2, AMM3, AMM4, and AMM10 would also be implemented to  
36 minimize impacts. Because of the offsetting protection and restoration activities and AMMs, impacts  
37 would be less than significant.

38 **Late Long-Term Timeframe**

39 At the end of the Plan period, 72 acres of alkali seasonal wetland complex natural community would  
40 be permanently removed by conservation actions, 150 acres would be protected and up to 72 acres  
41 would be restored. The restoration acres actually developed would depend on the number of acres  
42 affected during Alternative 4 implementation. There would be no net permanent reduction in the

1 acreage of this natural community within the study area. Therefore, Alternative 4 would have a less-  
2 than-significant impact on the alkali seasonal wetland complex natural community.

3 **Impact BIO-19: Increased Frequency, Magnitude and Duration of Periodic Inundation of**  
4 **Alkali Seasonal Wetland Complex Natural Community**

5 *CM2 Yolo Bypass Fisheries Enhancement* would modify the inundation regime of the Yolo Bypass, a  
6 man-made waterway. CM2, which is designed to improve fish passage and shallow flooded habitat  
7 for Delta fishes in the Yolo Bypass, would increase periodic inundation of alkali seasonal wetland  
8 complex natural community at scattered locations in the central and southern sections of the  
9 bypass.

10 Operation of the Yolo Bypass under Alternative 4 would result in an increase in the frequency and  
11 duration of inundation on an estimated 264–744 acres of alkali seasonal wetland complex natural  
12 community. The methods used to estimate these inundation acreages are described in BDCP  
13 Appendix 5.J, *Effects on Natural Communities, Wildlife, and Plants*. The area more frequently affected  
14 by inundation would vary with the flow volume that would pass through the newly constructed  
15 notch in the Fremont Weir. The 264-acre increase in inundation would be associated with a notch  
16 flow of 1,000 cubic feet per second (cfs), and the 744-acre increase would result from a notch flow of  
17 4,000 cfs. Plan-related increases in flow through Fremont Weir would be expected in 30% of the  
18 years. The alkali seasonal wetland complex natural community occurs primarily in the central and  
19 southern reaches of the bypass, south of Putah Creek. The stands in this location are relatively large,  
20 with moderate to high value for associated plant and wildlife species. The anticipated change in  
21 management of flows in the Yolo Bypass includes more frequent releases in flows into the bypass  
22 from the Fremont and Sacramento Weirs, and in some years, later releases into the bypass in spring  
23 months (April and May).

24 **NEPA Effects:** The modification of periodic inundation events in the Yolo Bypass associated with  
25 Alternative 4 would not adversely affect alkali seasonal wetland complex habitats, as they have  
26 persisted under similar high flows and extended inundation periods. There is the potential for some  
27 change in plant species composition as a result of longer inundation periods, but the natural  
28 community would persist.

29 **CEQA Conclusion:** An estimated 264–744 acres of alkali seasonal wetland complex natural  
30 community in the Yolo Bypass would be subjected to more frequent inundation as a result of  
31 implementing CM2 under Alternative 4. This natural community is conditioned to periodic  
32 inundation; the slight increase in periodic inundation would not result in a net permanent reduction  
33 in the acreage of this community in the study area, although some change in plant species  
34 composition could occur. Increasing periodic inundation of alkali seasonal wetland complex natural  
35 community in the Yolo Bypass would have a less-than-significant impact on this natural community.  
36 The effects of this inundation on wildlife and plant species are described in detail in later sections of  
37 this chapter.

38 **Impact BIO-20: Modification of Alkali Seasonal Wetland Complex Natural Community from**  
39 **Ongoing Operation, Maintenance and Management Activities**

40 Once the physical facilities associated with Alternative 4 were constructed and the stream flow  
41 regime associated with changed water management was in effect, there would be new ongoing and  
42 periodic actions associated with operation, maintenance and management of the BDCP facilities and  
43 conservation lands that could affect alkali seasonal wetland complex natural community in the study

1 area. The ongoing actions include modified operation of upstream reservoirs, the diversion of  
2 Sacramento River flows in the north Delta, reduced diversions from south Delta channels, and  
3 recreation in and adjacent to Plan reserves. These actions are associated with CM1 and CM11 (see  
4 Impact BIO-19 for effects associated with CM2). The periodic actions would involve access road and  
5 conveyance facility repair, vegetation management at the various water conveyance facilities and  
6 habitat restoration sites (CM11), levee repair and replacement of levee armoring, channel dredging,  
7 and habitat enhancement in accordance with natural community management plans. The potential  
8 effects of these actions are described below.

- 9 • *Modified river flows upstream of and within the study area and reduced diversions from south*  
10 *Delta channels.* Changes in releases from reservoirs upstream of the study area, increased  
11 diversion of Sacramento River flows in the north Delta, and reduced diversions from south Delta  
12 channels (associated with Operational Scenario H) would not affect alkali seasonal wetland  
13 natural community. This natural community does not exist within or adjacent to the active  
14 Sacramento River system channels and Delta waterways that would be affected by modified  
15 flow levels.
- 16 • *Access road, water conveyance facility and levee repair.* Periodic repair of access roads, water  
17 conveyance facilities and levees associated with the BDCP actions have the potential to require  
18 removal of adjacent vegetation and could entail earth and rock work in or adjacent to alkali  
19 seasonal wetland complex habitats. This activity could lead to increased soil erosion and runoff  
20 entering these habitats. These activities would be subject to normal erosion and runoff control  
21 management practices, including those developed as part of *AMM2 Construction Best*  
22 *Management Practices and Monitoring* and *AMM4 Erosion and Sediment Control Plan*. Any  
23 vegetation removal or earthwork adjacent to or within alkali seasonal wetland complex habitats  
24 would require use of sediment barriers, soil stabilization and revegetation of disturbed surfaces  
25 as required by *AMM10 Restoration of Temporarily Affected Natural Communities*. Proper  
26 implementation of these measures would avoid permanent adverse effects on this community.
- 27 • *Vegetation management.* Vegetation management, in the form of physical removal and chemical  
28 treatment, would be a periodic activity associated with the long-term maintenance of water  
29 conveyance facilities and restoration sites (*CM11 Natural Communities Enhancement and*  
30 *Management*). Use of herbicides to control nuisance vegetation could pose a long-term hazard to  
31 alkali seasonal wetland complex natural community at or adjacent to treated areas. The hazard  
32 could be created by uncontrolled drift of herbicides, uncontrolled runoff of contaminated  
33 stormwater onto the natural community, or direct discharge of herbicides to alkali seasonal  
34 wetland complex areas being treated for invasive species removal. Environmental commitments  
35 and *AMM5 Spill Prevention, Containment, and Countermeasure Plan* have been made part of the  
36 BDCP to reduce hazards to humans and the environment from use of various chemicals during  
37 maintenance activities, including the use of herbicides. These commitments are described in  
38 Appendix 3B, including the commitment to prepare and implement spill prevention,  
39 containment, and countermeasure plans and stormwater pollution prevention plans. Best  
40 management practices, including control of drift and runoff from treated areas, and use of  
41 herbicides approved for use in terrestrial environments would also reduce the risk of affecting  
42 natural communities adjacent to water conveyance features and levees associated with  
43 restoration activities.
- 44 • *Habitat enhancement.* The BDCP includes a long-term management element for the natural  
45 communities within the Plan Area (CM11). For the alkali seasonal wetland complex natural  
46 community, a management plan would be prepared that specifies actions to improve the value

1 of the habitats for covered species. Actions would include control of invasive nonnative plant  
2 and animal species, fire management, restrictions on vector control and application of  
3 herbicides, and maintenance of infrastructure that would allow for movement through the  
4 community. The enhancement efforts would improve the long-term value of this community for  
5 both special-status and common species.

- 6 • *Recreation.* The BDCP would allow for certain types of recreation in and adjacent to alkali  
7 seasonal wetland natural community in the reserve system. The activities could include wildlife  
8 and plant viewing and hiking. *CM11 Natural Communities Enhancement and Management* (BDCP  
9 Chapter 3, Section 3.4.11) describes this program and identifies applicable restrictions on  
10 recreation that might adversely affect alkali seasonal wetland habitat. BDCP also includes an  
11 avoidance and minimization measure (AMM37) that further dictates limits on recreation  
12 activities that might affect this natural community. Most recreation would be docent-led wildlife  
13 and botanical tours, using existing trails and roads in the vicinity of the reserves. No new trails  
14 would be constructed.

15 The various operations and maintenance activities described above could alter acreage of alkali  
16 seasonal wetland complex natural community in the study area. Activities could introduce sediment  
17 and herbicides that would reduce the value of this community to common and sensitive plant and  
18 wildlife species. Other periodic activities associated with the Plan, including management,  
19 protection and enhancement actions associated with *CM3 Natural Communities Protection and*  
20 *Restoration* and *CM11 Natural Communities Enhancement and Management*, would be undertaken to  
21 enhance the value of the community. While some of these activities could result in small changes in  
22 acreage, these changes would be offset by protection and restoration activities planned as part of  
23 *CM3 Natural Communities Protection and Restoration* and *CM9 Vernal Pool and Alkali Seasonal*  
24 *Wetland Complex Restoration*, or minimized by implementation of AMM2, AMM4, AMM5, AMM10  
25 and AMM37. The management actions associated with control of invasive plant species would also  
26 result in a long-term benefit to the species associated with alkali seasonal wetland complex habitats  
27 by eliminating competitive, invasive species of plants.

28 **NEPA Effects:** Ongoing operation, maintenance and management activities associated with  
29 Alternative 4 would not result in a net permanent reduction in this natural community within the  
30 study area. Therefore, there would be no adverse effect on the alkali seasonal wetland complex  
31 natural community.

32 **CEQA Conclusion:** The operation and maintenance activities associated with Alternative 4 would  
33 have the potential to create minor changes in total acreage of alkali seasonal wetland complex  
34 natural community in the study area, and could create temporary increases sedimentation. The  
35 activities could also introduce herbicides periodically to control nonnative, invasive plants.  
36 Implementation of environmental commitments and AMM2, AMM4, AMM5, AMM10 and AMM37  
37 would minimize these impacts, and other operations and maintenance activities, including  
38 management, protection and enhancement actions associated with *CM3 Natural Communities*  
39 *Protection and Restoration* and *CM11 Natural Communities Enhancement and Management*, would  
40 create positive effects, including reduced competition from invasive, nonnative plants in these  
41 habitats. Long-term restoration activities associated with *CM9 Vernal Pool and Alkali Seasonal*  
42 *Wetland Complex Restoration* and protection actions associated with *CM3 Natural Communities*  
43 *Protection and Restoration* would ensure that the acreage of this natural community would not  
44 decrease in the study area. Ongoing operation, maintenance and management activities would not  
45 result in a net permanent reduction in this natural community within the study area. Therefore,

1 there would be a less-than-significant impact on the alkali seasonal wetland complex natural  
2 community.

3 **Vernal Pool Complex**

4 Construction, operation, maintenance and management associated with the conservation  
5 components of Alternative 4 would have no long-term adverse effects on the habitats associated  
6 with the vernal pool complex natural community. Initial development and construction of CM1 and  
7 CM4 would result in permanent removal of 216 acres of this community (see Table 12-4-8). Full  
8 implementation of Alternative 4 would also include the following conservation actions over the term  
9 of the BDCP to benefit the vernal pool complex natural community.

- 10 • Protect 600 acres of existing vernal pool complex in Conservation Zones 1, 8, and 11, primarily  
11 in core vernal pool recovery areas (Objective VPNC1.1, associated with CM3).
- 12 • Restore vernal pool complex in Conservation Zones 1, 8, and/or 11 to achieve no net loss of  
13 vernal pool acreage (up to 67 acres of vernal pool complex restoration, assuming that all  
14 anticipated impacts [10 wetted acres] occur and that the restored vernal pool complex has 15%  
15 density of vernal pools) (Objective VPNC1.2, associated with CM3 and CM9).

16 There is a variety of other, less specific conservation goals and objectives in BDCP Chapter 3, Section  
17 3.3 that would improve the value of vernal pool complex natural community for terrestrial species.  
18 As explained below, with the protection, restoration and enhancement of the amounts of habitat  
19 listed in the BDCP objectives, in addition to implementation of AMMs, impacts on this natural  
20 community would not be adverse for NEPA purposes and would be less than significant for CEQA  
21 purposes.

22 **Table 12-4-8. Changes in Vernal Pool Complex Natural Community Associated with Alternative 4**  
23 **(acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Permanent		Temporary		Periodic <sup>d</sup>	
	NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	15	15	16	16	0	0
CM2	0	0	0	0	0-4	0
CM4	201	372	0	0	0	0
CM5	0	0	0	0	0	0
CM6	Unk.	Unk.	Unk.	Unk.	0	0
<b>TOTAL IMPACTS</b>	<b>216</b>	<b>387</b>	<b>16</b>	<b>16</b>	<b>0-4</b>	<b>0</b>

<sup>a</sup> See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

Unk. = unknown

1 **Impact BIO-21: Changes in Vernal Pool Complex Natural Community as a Result of**  
2 **Implementing BDCP Conservation Measures**

3 Construction, land grading and habitat restoration activities that would accompany the  
4 implementation of CM1 and CM4 could permanently eliminate an estimated 387 acres and  
5 temporarily remove 16 acres of vernal pool complex natural community in the study area. These  
6 acreages are based on the proposed location of the CM1 construction footprint and a theoretical  
7 footprint for CM4 tidal marsh restoration activities. The loss of this combined 403 acres would  
8 represent approximately 3% of the 12,133 acres of the community that is mapped in the study area.  
9 An estimated 232 acres of the loss could occur during the first 10 years of Alternative 4  
10 implementation, as the water conveyance facility is constructed and tidal marsh restoration is  
11 initiated. Vernal pool complex protection (400 acres) and restoration (an estimated 40 acres, with  
12 actual restoration based on level of effect) would be initiated during the first 10 years of Alternative  
13 4 implementation to counteract the loss of habitat. By the end of the Plan period, 600 acres of this  
14 natural community would be protected and up to 67 acres would be restored. Because of the high  
15 sensitivity of this natural community and its shrinking presence in the Plan Area, avoidance and  
16 minimization measures have been built into the BDCP to eliminate the majority of this potential loss.  
17 The BDCP beneficial effect analysis (BDCP Chapter 5, Section 5.4.8.2) indicates that implementation  
18 of Alternative 4 would protect at least 600 acres of vernal pool complex in Conservation Zones 1, 8,  
19 and 11 and additional vernal pool complex would be restored to achieve no net loss of this  
20 community.

21 The individual effects of the relevant conservation measure are addressed below. A summary  
22 statement of the combined impacts and NEPA and CEQA conclusions follows the individual  
23 conservation measure discussions.

- 24 • *CM1 Water Facilities and Operation:* Construction of the Alternative 4 water conveyance facilities  
25 would directly affect 31 acres of vernal pool complex natural community, including 15 acres  
26 permanently affected and 16 acres temporarily affected. The permanent loss would occur along  
27 the southern edge of Clifton Court Forebay, where the forebay would be expanded to provide  
28 greater storage capacity. The temporary losses would occur along transmission lines that would  
29 be constructed immediately west of Clifton Court Forebay (see Figure 12-1 and the Terrestrial  
30 Biology Mapbook).

31 Because of the close proximity of construction activity to adjacent vernal pool complex, both  
32 near Clifton Court Forebay and Stone Lakes National Wildlife Refuge, there is also the potential  
33 for indirect loss or damage to vernal pools from changes in pool hydrology or deposition of  
34 construction-related sediment. These potential indirect effects are discussed in detail in the  
35 vernal pool crustaceans impact analysis later in this chapter.

36 The construction activity associated with CM1 also has the potential to lead to increased  
37 nitrogen deposition in vernal pool complex habitats in the vicinity of Clifton Court Forebay and  
38 Stone Lakes National Wildlife Refuge. A significant number of cars, trucks, and land grading  
39 equipment involved in construction would emit small amounts of atmospheric nitrogen from  
40 fuel combustion; this material could be deposited in sensitive vernal pool areas that are located  
41 west of the major construction areas at Clifton Court Forebay and east of the construction areas  
42 adjacent to Stone Lakes NWR. Nitrogen deposition can pose a risk of adding a fertilizer to  
43 nitrogen-limited soils and their associated plants. Nonnative invasive species can be encouraged  
44 by the added nitrogen available. BDCP Appendix 5.J, Attachment 5J.A, *Construction-Related*  
45 *Nitrogen Deposition on BDCP Natural Communities*, addresses this issue in detail. It has been

1 concluded that this potential deposition would pose a low risk of changing the vernal pool  
2 complex in the construction areas because the construction would contribute a negligible  
3 amount of nitrogen to regional projected emissions. Also, the construction at Clifton Court  
4 Forebay would occur primarily downwind of the natural community. At Stone Lakes National  
5 Wildlife Refuge, the USFWS refuge management undertakes active invasive species control,  
6 including use of grazing. No adverse effect is expected.

- 7 ● *CM3 Natural Communities Protection and Restoration:* CM3 proposes to protect at least 600 acres  
8 of vernal pool complex in CZ 1, CZ 8, and CZ 11 (BDCP Objective VPNC1.1). The protection would  
9 occur in areas containing a mosaic of grassland and vernal pool complex in unfragmented  
10 natural landscapes supporting a diversity of native plant and wildlife species. These areas would  
11 be both protected and enhanced to increase the cover of vernal pool complex plants relative to  
12 nonnative species.
- 13 ● *CM4 Tidal Natural Communities Restoration:* Based on the use of hypothetical restoration  
14 footprints, implementation of CM4 tidal marsh restoration in CZs 1 and 11 (Cache Slough and  
15 Suisun Marsh ROAs; see Figure 12-1) could permanently inundate or remove 201 acres of vernal  
16 pool complex in the near-term timeframe. By the end of the Plan period, a total of 372 acres  
17 could be affected. The principal areas likely to be affected include the Cache Slough drainage just  
18 west of the Yolo Bypass and the Nurse Slough drainage just east of the Potrero Hills.
- 19 ● *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration:* CM9 includes both vernal  
20 pool complex and alkali seasonal wetland complex restoration goals. The current estimate for  
21 vernal pool complex restoration is 40 acres in the near-term and a total of 67 acres by the end of  
22 the BDCP restoration period. This restoration conservation measure includes a “no net loss”  
23 policy normally applied to this natural community (BDCP Objective VPNC1.2).

24 The following paragraphs summarize the combined effects discussed above and describe other  
25 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA impact conclusions are  
26 also included.

### 27 ***Near-Term Timeframe***

28 During the near-term timeframe (the first 10 years of BDCP implementation), Alternative 4 could  
29 directly affect 232 acres of vernal pool complex natural community through inundation or  
30 construction-related losses in habitat from CM1 and CM4 activities. This loss would likely occur in  
31 the Cache Slough or Suisun Marsh ROAs mapped in Figure 12-1, and in the vicinity of Clifton Court  
32 Forebay (see the Terrestrial Biology Mapbook).

33 The construction or inundation loss of this special-status natural community would represent an  
34 adverse effect if it were not offset by avoidance and minimization measures and restoration actions  
35 associated with BDCP conservation components. Loss of vernal pool complex natural community  
36 would be considered both a loss in acreage of a sensitive natural community and a loss of wetland as  
37 defined by Section 404 of the CWA. The protection of 400 acres of vernal pool complex as part of  
38 CM3 and the restoration of up to 40 acres of this community (including a commitment to have  
39 restoration keep pace with losses; BDCP Chapter 3, Section 3.4.4.27) as part of CM9 during the first  
40 10 years of Alternative 4 implementation would partially offset this near-term loss. The Plan focuses  
41 this protection in the core vernal pool areas identified in the USFWS vernal pool recovery plan (U.S.  
42 Fish and Wildlife Service 2005). The core areas exist in CZ 1, CZ 8 and CZ 11 (see Figure 12-1).  
43 Typical project-level mitigation ratios (2:1 for protection and 1:1 for restoration) would indicate  
44 464 acres of protection and 232 acres of restoration would be needed to offset (i.e., mitigate) the

1 232 acres of loss. Without additional avoidance and minimization measures to reduce the potential  
2 effect, the proposed protection and restoration would not meet the typical mitigation for vernal pool  
3 complex losses.

4 To avoid this adverse effect, the BDCP includes commitments to implement *AMM1 Worker*  
5 *Awareness Training*, *AMM2 Construction Best Management Practices and Monitoring*, *AMM3*  
6 *Stormwater Pollution Prevention Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM10 Restoration*  
7 *of Temporarily Affected Natural Communities*, *AMM12 Vernal Pool Crustaceans*, and *AMM30*  
8 *Transmission Line Design and Alignment Guidelines*. All of these AMMs include elements that avoid or  
9 minimize the risk of affecting habitats at work areas. AMM12 limits the direct removal of vernal pool  
10 crustacean habitat to no more than 10 wetted acres and the indirect effect to no more than 20  
11 wetted acres through the life of the Plan. This is equivalent to approximately 67 acres of direct loss  
12 and 134 acres of indirect loss of vernal pool complex natural community. The AMMs are described in  
13 detail in BDCP Appendix 3.C. With these AMMs in place, Alternative 4 would not adversely affect  
14 vernal pool complex natural community in the near-term.

### 15 ***Late Long-Term Timeframe***

16 The late long-term effect on vernal pool complex natural community would be 387 acres of  
17 permanent and 16 acres of temporary loss. These losses would be associated with the construction  
18 of CM1 facilities in the vicinity of Clifton Court Forebay and the ongoing restoration of tidal wetland  
19 in the Cache Slough and Suisun Marsh ROAs. However, 600 acres would be protected (CM3) and up  
20 to 67 acres would be restored (CM9) through the course of Alternative 4 implementation. In  
21 addition, the avoidance and minimization measures listed above would reduce the actual loss of this  
22 community to no more than 10 wetted acres of vernal pool crustacean habitat from direct activities  
23 and 20 acres of habitat from indirect effects.

24 ***NEPA Effects:*** The conservation measures associated with Alternative 4 include protection of 400  
25 acres (CM3) and restoration of an estimated 40 acres (CM9) of vernal pool complex in the near-term  
26 time frame. The Plan focuses the protection in the core vernal pool areas identified in the USFWS  
27 vernal pool recovery plan (U.S. Fish and Wildlife Service 2005). The core areas exist in CZ 1, CZ 8 and  
28 CZ 11 (see Figure 12-1). In addition, Alternative 4 includes AMM12, which limits the removal of  
29 vernal pool crustacean habitat to no more than 10 wetted acres and the indirect effect to no more  
30 than 20 wetted acres through the life of the Plan. With this and other AMMs in place, the Alternative  
31 4 not adversely affect vernal pool complex natural community in the near-term. With these  
32 conservation measures and AMMs in effect through the entire Plan period, Alternative 4 would not  
33 have an adverse effect on the vernal pool complex natural community in the long term.

### 34 ***CEQA Conclusion:***

#### 35 ***Near-Term Timeframe***

36 During the 10-year near-term time frame, Alternative 4 could result in the direct loss of  
37 approximately 232 acres of vernal pool complex natural community due to inundation during tidal  
38 marsh restoration (CM4) and construction of the water conveyance facility (CM1). The losses would  
39 likely occur in the Cache Slough or Suisun Marsh ROAs, and immediately adjacent to Clifton Court  
40 Forebay.

41 The construction- and inundation-related loss of this special-status natural community would  
42 represent a significant impact if it were not offset by avoidance and minimization measures and

1 other actions associated with BDCP conservation components. Loss of vernal pool complex natural  
2 community would be considered both a loss in acreage of a sensitive natural community and a loss  
3 of wetland as defined by Section 404 of the CWA. The protection of 400 acres of vernal pool complex  
4 as part of CM3 and the restoration of an estimated 40 acres of this community (including a  
5 commitment to have restoration keep pace with losses; BDCP Chapter 3, Section 3.4.4.27) as part of  
6 CM9 during the first 10 years of Alternative 4 implementation would partially offset this near-term  
7 loss. Typical project-level mitigation ratios (2:1 for protection and 1:1 for restoration) would  
8 indicate 464 acres of protection and 232 acres of restoration would be needed to offset (i.e.,  
9 mitigate) the 232 acres of loss. Without additional avoidance and minimization measures to reduce  
10 the potential impact, the proposed protection and restoration would not meet the typical mitigation  
11 for vernal pool complex losses. However, Alternative 4 also includes AMM1, AMM2, AMM3, AMM4,  
12 AMM10, AMM12 and AMM30 to minimize impacts. AMM12 places a strict limit on the acres of  
13 wetted vernal pool crustacean habitat that can be lost to conservation actions (10 acres of direct and  
14 20 acres of indirect loss). Because of the offsetting protection and restoration activities and  
15 implementation of AMMs, impacts would be less than significant.

### 16 ***Late Long-Term Timeframe***

17 At the end of the Plan period, 387 acres of vernal pool complex natural community could be  
18 permanently removed and 16 acres could be temporarily removed. Through CMs 3 and 9, 600 acres  
19 of vernal pool complex natural community would be protected and up to 67 acres would be  
20 restored. In addition, AMM12 would limit the acres of wetted vernal pool crustacean habitat loss to  
21 10 acres from direct actions and 20 acres from indirect actions. This is equivalent to the direct loss  
22 of 67 acres and the indirect loss of 134 acres of vernal pool complex natural community. There  
23 would be no net permanent reduction in the acreage of this natural community within the study  
24 area. Alternative 4 would have a less-than-significant impact on this natural community.

### 25 **Impact BIO-22: Increased Frequency, Magnitude and Duration of Periodic Inundation of** 26 **Vernal Pool Complex Natural Community**

27 *CM2 Yolo Bypass Fisheries Enhancement* would modify the inundation/flooding regime of the Yolo  
28 Bypass, a man-made waterway. CM2, which is designed to improve fish passage and shallow flooded  
29 habitat for Delta fishes in the Yolo Bypass, could increase periodic inundation of a small acreage of  
30 vernal pool complex natural community in the southern section of the bypass, south of Putah Creek.

31 Operation of the Yolo Bypass under Alternative 4 would result in an increase in the frequency,  
32 magnitude and duration of inundation on an estimated 0–4 acres of vernal pool complex natural  
33 community. The methods used to estimate this inundation acreage are described in BDCP Appendix  
34 5.J, *Effects on Natural Communities, Wildlife, and Plants*. The area more frequently affected by  
35 inundation would vary with the flow volume that would pass through the newly constructed notch  
36 in the Fremont Weir. The 4-acre increase in inundation would only occur at the highest modeled  
37 flow regime, 8,000 cfs. Plan-related increases in flow through Fremont Weir would be expected in  
38 30% of the years.

39 The vernal pool complex natural community that would likely be affected occurs in the southern  
40 reaches of the bypass, south of Putah Creek. There are several relatively large, contiguous areas of  
41 vernal pools on the western edge of the bypass in this area. The anticipated change in management  
42 of flows in the Yolo Bypass includes more frequent releases in flows into the bypass from the  
43 Fremont and Sacramento Weirs, and in some years, later releases into the bypass in spring months  
44 (April and May).

1 **NEPA Effects:** The modification of periodic inundation events in the Yolo Bypass associated with  
2 Alternative 4 water operations would not adversely affect vernal pool complex habitats, as they  
3 have persisted under similar high flows and extended inundation periods. There is the potential,  
4 however, for some change in plant species composition as a result of longer inundation periods.

5 **CEQA Conclusion:** An estimated 0–4 acres of vernal pool complex natural community in the Yolo  
6 Bypass would be subjected to more frequent inundation as a result of implementing CM2 under  
7 Alternative 4. This natural community is conditioned to periodic inundation; the slight increase in  
8 periodic inundation would not result in a net permanent reduction in the acreage of this community  
9 in the study area, although some change in plant species composition could occur. Increasing  
10 periodic inundation of vernal pool complex natural community in the Yolo Bypass would have a less-  
11 than-significant impact on the community.

### 12 **Impact BIO-23: Modification of Vernal Pool Complex Natural Community from Ongoing** 13 **Operation, Maintenance and Management Activities**

14 Once the physical facilities associated with Alternative 4 are constructed and the stream flow regime  
15 associated with changed water management is in effect, there would be new ongoing and periodic  
16 actions associated with operation, maintenance and management of the BDCP facilities and  
17 conservation lands that could affect vernal pool complex natural community in the study area. The  
18 ongoing actions include modified operation of upstream reservoirs, the diversion of Sacramento  
19 River flows in the north Delta, reduced diversions from south Delta channels, and recreation  
20 activities in Plan preserves. These actions are associated with CM1 and CM11 (see Impact BIO-22 for  
21 effects associated with CM2). The periodic actions would involve access road and conveyance facility  
22 repair, vegetation management at the various water conveyance facilities and habitat restoration  
23 sites (CM11), levee repair and replacement of levee armoring, channel dredging, and habitat  
24 enhancement in accordance with natural community management plans. The potential effects of  
25 these actions are described below.

- 26 • *Modified river flows upstream of and within the study area and reduced diversions from south*  
27 *Delta channels.* Changes in releases from reservoirs upstream of the study area, increased  
28 diversion of Sacramento River flows in the north Delta, and reduced diversions from south Delta  
29 channels (associated with Operational Scenario H) would not affect vernal pool complex natural  
30 community. This natural community does not exist within or adjacent to the major Sacramento  
31 River system and Delta waterways.
- 32 • *Access road, water conveyance facility and levee repair.* Periodic repair of access roads, water  
33 conveyance facilities and levees associated with the BDCP actions have the potential to require  
34 removal of adjacent vegetation and could entail earth and rock work adjacent to vernal pool  
35 complex habitats. This activity could lead to increased soil erosion and runoff entering these  
36 habitats. These activities would be subject to normal erosion and runoff control management  
37 practices, including those developed as part of *AMM2 Construction Best Management Practices*  
38 *and Monitoring* and *AMM4 Erosion and Sediment Control Plan*. Any vegetation removal or  
39 earthwork adjacent to vernal pool complex habitats would require use of sediment barriers, soil  
40 stabilization and revegetation of disturbed surfaces as part of *AMM10 Restoration of Temporarily*  
41 *Affected Natural Communities*. Proper implementation of these measures would avoid  
42 permanent adverse effects on this community.
- 43 • *Vegetation management.* Vegetation management, in the form of physical removal and chemical  
44 treatment, would be a periodic activity associated with the long-term maintenance of water

1 conveyance facilities and restoration sites (*CM11 Natural Communities Enhancement and*  
2 *Management*). Use of herbicides to control nuisance vegetation could pose a long-term hazard to  
3 vernal pool complex natural community at or adjacent to treated areas. The hazard could be  
4 created by uncontrolled drift of herbicides, uncontrolled runoff of contaminated stormwater  
5 onto the natural community, or direct discharge of herbicides to vernal pool complex areas  
6 being treated for invasive species removal. Environmental commitments and *AMM5 Spill*  
7 *Prevention, Containment, and Countermeasure Plan* have been made part of the BDCP to reduce  
8 hazards to humans and the environment from use of various chemicals during maintenance  
9 activities, including the use of herbicides. These commitments are described in Appendix 3B,  
10 including the commitment to prepare and implement spill prevention, containment, and  
11 countermeasure plans and stormwater pollution prevention plans. Best management practices,  
12 including control of drift and runoff from treated areas, and use of herbicides approved for use  
13 in terrestrial or aquatic environments would also reduce the risk of affecting natural  
14 communities adjacent to water conveyance features and levees associated with restoration  
15 activities.

- 16 ● *Habitat enhancement.* The BDCP includes a long-term management element for the natural  
17 communities within the Plan Area (CM11). For the vernal pool complex natural community, a  
18 management plan would be prepared that specifies actions to improve the value of the habitats  
19 for covered species. Actions would include control of invasive nonnative plant and animal  
20 species, fire management, restrictions on vector control and application of herbicides, and  
21 maintenance of infrastructure that would allow for movement through the community. The  
22 enhancement efforts would improve the long-term value of this community for both special-  
23 status and common species.
- 24 ● *Recreation.* The BDCP would allow for certain types of recreation in and adjacent to vernal pool  
25 complexes in the reserve system. The activities could include wildlife and plant viewing and  
26 hiking. *CM11 Natural Communities Enhancement and Management* (BDCP Chapter 3, Section  
27 3.4.11) describes this program and identifies applicable restrictions on recreation that might  
28 adversely affect vernal pool habitat. BDCP also includes an avoidance and minimization measure  
29 (AMM37) that further dictates limits on recreation activities that might affect vernal pools.  
30 Recreational trails would be limited to existing trails and roads. New trail construction would be  
31 prohibited within the vernal pool complex reserves. It is expected that most activities would be  
32 docent-led tours of reserves, minimizing adverse effects.

33 The various operations and maintenance activities described above could alter acreage of vernal  
34 pool complex natural community in the study area. Activities could introduce sediment and  
35 herbicides that would reduce the value of this community to common and sensitive plant and  
36 wildlife species. Other periodic activities associated with the Plan, including management,  
37 protection and enhancement actions associated with *CM3 Natural Communities Protection and*  
38 *Restoration* and *CM11 Natural Communities Enhancement and Management*, would be undertaken to  
39 enhance the value of the community. While some of these activities could result in small changes in  
40 acreage, these changes would be greatly offset by restoration activities planned as part of *CM9*  
41 *Vernal Pool and Alkali Seasonal Wetland Complex Restoration*, or minimized by implementation of  
42 AMM2, AMM4, AMM5, AMM10, AMM12, AMM37 and AMM30. The management actions associated  
43 with control of invasive plant species would also result in a long-term benefit to the species  
44 associated with vernal pool complex habitats by eliminating competitive, invasive species of plants.

1 **NEPA Effects:** Ongoing operation, maintenance and management activities associated with  
2 Alternative 4 would not result in a net permanent reduction in the vernal pool complex natural  
3 community within the study area. Therefore, there would be no adverse effect on this natural  
4 community.

5 **CEQA Conclusion:** The operation and maintenance activities associated with Alternative 4 would  
6 have the potential to create minor changes in total acreage of vernal pool complex natural  
7 community in the study area, and could create temporary increases in sedimentation or damage  
8 from recreational activity. The activities could also introduce herbicides periodically to control  
9 nonnative, invasive plants. Implementation of environmental commitments and AMM2, AMM4,  
10 AMM5, AMM10, AMM12, AMM37 and AMM30 would minimize these impacts, and other operations  
11 and maintenance activities, including management, protection and enhancement actions associated  
12 with *CM3 Natural Communities Protection and Restoration* and *CM11 Natural Communities*  
13 *Enhancement and Management*, would create positive effects, including reduced competition from  
14 invasive, nonnative plants in these habitats. Long-term restoration activities associated with *CM9*  
15 *Vernal Pool and Alkali Seasonal Wetland Complex Restoration* and protection actions associated with  
16 *CM3 Natural Communities Protection and Restoration* would ensure that the acreage of this natural  
17 community would not decrease in the study area. Ongoing operation, maintenance and management  
18 activities would not result in a net permanent reduction in this natural community within the study  
19 area. Therefore, there would be a less-than-significant impact on the vernal pool complex natural  
20 community.

## 21 **Managed Wetland**

22 The conservation components of Alternative 4 would reduce the acreage of managed wetland  
23 currently found in the study area. Initial development and construction of CM1, CM2, CM4, and CM6  
24 would result in both permanent and temporary removal of this community (see Table 12-4-9). Full  
25 implementation of Alternative 4 would also include the following conservation action over the term  
26 of the BDCP to benefit the managed wetland natural community.

- 27 ● Protect and enhance 8,100 acres of managed wetland, at least 1,500 acres of which are in the  
28 Grizzly Island Marsh Complex (Objective MWNC1.1, associated with CM3).
- 29 ● Create 320 acres of managed wetlands consisting of greater sandhill crane roosting habitat in  
30 minimum patch sizes of 40 acres within the Greater Sandhill Crane Winter Use Area in  
31 Conservation Zones 3, 4, 5, or 6, with consideration of sea level rise and local seasonal flood  
32 events (Objective GSHC1.3, associated with CM10).
- 33 ● Create two wetland complexes within the Stone Lakes NWR refuge boundary. Each complex will  
34 consist of at least three wetlands totaling 90 acres of greater sandhill crane roosting habitat. One  
35 of the wetland complexes may be replaced by 180 acres of cultivated lands that are flooded  
36 following harvest for crane roosting and foraging habitat (Objective GSHC1.4, associated with  
37 CM10).

38 In addition to this conservation action, creation of similar habitat values by restoring tidal brackish  
39 emergent wetland and tidal freshwater emergent wetland as part of CM4 would further offset the  
40 losses of managed wetland. The net effect would be a substantial decrease in the amount of  
41 managed wetland, but an increase in similar habitat value for special-status and common species as  
42 the managed wetland is converted to tidal marsh. Impacts on this natural community would not be  
43 adverse for NEPA purposes and would be less than significant for CEQA purposes. Refer to Impacts  
44 BIO-178 through BIO-183 in the *Shorebirds and Waterfowl* discussion at the end of this section

1 (Section 12.3.3.9) for further consideration of the effects of removing managed wetland natural  
2 community.

3 **Table 12-4-9. Changes in Managed Wetland Associated with Alternative 4 (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Permanent		Temporary		Periodic <sup>d</sup>	
	NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	7	7	28	28	0	0
CM2	24	24	44	44	931-2,612	0
CM4	5,718	13,746	0	0	0	0
CM5	0	0	0	0	0	6
CM6	Unk.	Unk.	Unk.	Unk.	0	0
<b>TOTAL IMPACTS</b>	<b>5,749</b>	<b>13,777</b>	<b>72</b>	<b>72</b>	<b>931-2,612</b>	<b>6</b>

<sup>a</sup> See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

Unk. = unknown

4

5 **Impact BIO-24: Changes in Managed Wetland Natural Community as a Result of Implementing**  
6 **BDCP Conservation Measures**

7 Construction, land grading and habitat restoration activities that would accompany the  
8 implementation of CM1, CM2, CM4, and CM6 would permanently eliminate an estimated 13,777  
9 acres of managed wetland in the study area. This modification represents approximately 19% of the  
10 70,798 acres of managed wetland that is mapped in the study area. This loss would occur over the  
11 course of BDCP restoration activity, as construction and tidal marsh restoration proceed. Managed  
12 wetland protection (8,100 acres) and restoration (500 acres) would take place over the same  
13 period, but would not replace the acreage lost. The BDCP beneficial effects analysis for Alternative 4  
14 (BDCP Chapter 5, Section 5.4.9.2) states that at least 8,100 acres of managed wetlands would be  
15 protected, of which at least 1,500 acres would be located within the Grizzly Island marsh complex,  
16 consistent with the U.S. Fish and Wildlife Service salt marsh harvest mouse recovery plan. Although  
17 the primary purpose of the 1,500 acres of protection is to protect and enhance habitat for the salt  
18 marsh harvest mouse, it is also expected to benefit the managed wetland natural community and the  
19 diversity of species that use it, including migratory waterfowl and the western pond turtle.

20 The individual effects of the relevant conservation measure are addressed below. A summary  
21 statement of the combined impacts and NEPA and CEQA conclusions follows the individual  
22 conservation measure discussions.

- 1       ● *CM1 Water Facilities and Operation*: Construction of the Alternative 4 water conveyance facilities  
2       would permanently remove 7 acres and temporarily remove 28 acres of managed wetland  
3       community. The permanent and temporary losses would occur primarily on the northeastern  
4       end of Mandeville Island, adjacent to the San Joaquin River. A permanent access road and tunnel  
5       shaft at that site would create the permanent impact (see Terrestrial Biology Mapbook). A large  
6       temporary loss would also occur at this site, from a shaft work area. Smaller losses would occur  
7       from construction of the permanent and temporary transmission lines that parallel the tunnel  
8       alignment northwest of the intermediate forebay, at the Mokelumne River adjacent to Dead  
9       Horse Island, and across the length of Mandeville Island. These losses would take place during  
10      the near-term construction period.
- 11      ● *CM2 Yolo Bypass Fisheries Enhancement*: Implementation of CM2 involves a number of  
12      construction activities that could permanently or temporarily remove managed wetland,  
13      including west side channels modifications, Putah Creek realignment activities, Lisbon Weir  
14      modification and Sacramento Weir improvements. All of these activities could involve  
15      excavation and grading in managed wetland areas to improve passage of fish through the  
16      bypasses. Based on hypothetical construction footprints, a total of 24 acres could be  
17      permanently removed and 44 acres could be temporarily removed. This activity would occur  
18      primarily in the near-term timeframe.
- 19      ● *CM4 Tidal Natural Communities Restoration*: Based on the use of hypothetical restoration  
20      footprints, implementation of CM4 would permanently inundate or remove 13,746 acres of  
21      managed wetland community. These losses would be expected to occur primarily in the Suisun  
22      Marsh ROA, but could also occur in the Cache Slough and West Delta ROAs (see Figure 12-1).  
23      These acres of managed wetland would be converted to natural wetland, including large  
24      acreages of tidal brackish emergent wetland and tidal freshwater emergent wetland. These  
25      natural wetlands provide comparable or improved habitat for the special-status species that  
26      occupy managed wetland. The newly created tidal marsh would not create a barrier or result in  
27      fragmentation of managed wetland, as most species are capable of utilizing both communities.  
28      An estimated 500 acres of managed wetland would be restored and 8,100 acres would be  
29      enhanced and protected through *CM3 Natural Communities Protection and Restoration*, as  
30      established by BDCP Objective MWNC1.1 All of the restoration and 4,800 acres of the protection  
31      would happen during the first 10 years of Alternative 4 implementation, which would coincide  
32      with the timeframe of water conveyance facilities construction and early implementation of  
33      CM4. The remaining restoration would be spread over the following 30 years. Managed wetland  
34      restoration is expected to include at least 320 acres in CZ 3, CZ 4, CZ 5, and CZ 6 (Figure 12-1) to  
35      benefit sandhill crane, as stated in BDCP Objective GSHC1.3. The enhancement and protection  
36      would be focused in Suisun Marsh, but could also occur in CZs with existing managed wetland  
37      (CZ 1, CZ 2, CZ 4, CZ 5, CZ 6, and CZ 7).
- 38      ● *CM6 Channel Margin Enhancement*: Channel margin habitat enhancement could result in filling  
39      of small amounts of managed wetland habitat along 20 miles of river and sloughs. The extent of  
40      this loss cannot be quantified at this time, but the majority of the enhancement activity would  
41      occur on the edges of tidal perennial aquatic habitat, including levees and channel banks.  
42      Managed wetland adjacent to these tidal areas could be affected. The improvements would  
43      occur within the study area on sections of the Sacramento, San Joaquin and Mokelumne Rivers,  
44      and along Steamboat and Sutter Sloughs.

1 The following paragraphs summarize the combined effects discussed above and describe other  
2 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA impact conclusions are  
3 also included.

#### 4 ***Near-Term Timeframe***

5 During the near-term timeframe (the first 10 years of BDCP implementation), Alternative 4 would  
6 permanently remove 5,749 acres and temporarily remove 72 acres of managed wetland through  
7 inundation or construction-related losses in habitat from CM1, CM2, and CM4 activities. Seven acres  
8 of the permanent loss and 28 acres of the temporary loss would be associated with construction of  
9 the water conveyance facilities (CM1). These near-term losses would occur in various locations, but  
10 the majority would occur in Suisun Marsh and the lower Yolo Bypass as tidal marsh is restored.

11 The construction or inundation loss of this special-status natural community would represent an  
12 adverse effect if it were not offset by other conservation actions. Loss of managed wetland natural  
13 community would be considered both a loss in acreage of a sensitive natural community and  
14 potentially a loss of wetland as defined by Section 404 of the CWA. Many managed wetland areas are  
15 interspersed with small natural wetlands that would be regulated under Section 404. The  
16 restoration of 500 acres (CM10) and protection and enhancement of 4,800 acres (CM3) of managed  
17 wetland during the first 10 years of Alternative 4 implementation would fully offset the losses  
18 associated with CM1, but would only partially offset the total near-term loss. Typical project-level  
19 mitigation ratios (1:1 for protection) would indicate 7 acres of protection would be needed to offset  
20 the 7 acres of loss associated with CM1; a total of 5,821 acres of protection would be needed to  
21 offset (i.e., mitigate) the 5,821 acres of permanent and temporary loss from all near-term actions.  
22 The combined protection and restoration proposed for managed wetland in the near-term would  
23 fall 521 acres short of full replacement. However, the CM4 marsh restoration activities that would be  
24 creating this loss would be simultaneously creating 2,000 acres of tidal brackish emergent wetland  
25 and 8,850 acres of tidal freshwater emergent wetland in place of the managed wetland in the near-  
26 term. This acreage would significantly exceed the number of acres of managed wetland lost.  
27 Mitigation measures would also be undertaken to reduce the effects of managed wetland loss on  
28 waterfowl in Suisun Marsh (Mitigation Measure BIO-179a) and the Yolo/Delta basins (Mitigation  
29 Measure 179b) if the protection and enhancement actions of CM3 and CM10 were not sufficient to  
30 replace the value of managed wetlands for waterfowl in these basins. Refer to the *General Terrestrial*  
31 *Biology Effects* discussion later in this section.

32 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
33 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
34 *Plan*, *AMM4 Erosion and Sediment Control Plan*, and *AMM10 Restoration of Temporarily Affected*  
35 *Natural Communities*. All of these AMMs include elements that avoid or minimize the risk of affecting  
36 habitats at work areas. The AMMs are described in detail in BDCP Appendix 3.C.

37 In spite of the managed wetland protection, restoration and avoidance measures contained in  
38 Alternative 4, there would be a net reduction in the acreage of this special-status natural community  
39 in the near-term. This would be an adverse effect when judged by the significance criteria listed  
40 earlier in this chapter. However, the conversion of these managed habitats to natural tidal wetland  
41 types that support similar ecological functions (2,000 acres of tidal brackish emergent wetland and  
42 8,850 acres of tidal freshwater emergent wetland) would offset this adverse effect. Also, there are  
43 other conservation actions contained in the BDCP (CM3 and CM11) that would improve  
44 management and enhance existing habitat values, further offsetting the effects of managed wetland

1 loss on covered and noncovered special-status terrestrial species and on common species that rely  
2 on this natural community for some life phase. As a result, there would be no adverse effect.

3 **Late Long-Term Timeframe**

4 At the end of the Plan period, 13,777 acres of managed wetland natural community would be  
5 permanently removed by conservation actions, 8,100 acres would be protected and 500 acres would  
6 be restored. There would be a net permanent reduction in the acreage of this special-status natural  
7 community within the study area. Simultaneously, there would be the creation of 6,000 acres of tidal  
8 brackish emergent wetland and 24,000 acres of tidal freshwater emergent wetland in place of this  
9 managed wetland.

10 **NEPA Effects:** Alternative 4 would result in a loss 13,777 acres of managed wetland within the study  
11 area; however, it would also protect and enhance 8,100 acres and restore 500 acres of this habitat.  
12 In addition, Alternative 4 would restore 6,000 acres of tidal brackish emergent wetland and 24,000  
13 acres of tidal freshwater emergent wetland that support similar ecological functions to those of  
14 managed wetland. Therefore, there would be no adverse effect on managed wetland natural  
15 community.

16 **CEQA Conclusion:**

17 **Near-Term Timeframe**

18 During the near-term timeframe (the first 10 years of BDCP implementation), Alternative 4 would  
19 permanently remove 5,749 acres and temporarily remove 72 acres of managed wetland through  
20 inundation or construction-related losses in habitat from CM1, CM2, and CM4 activities. Seven acres  
21 of permanent loss and 28 acres of temporary loss would be associated with construction of the  
22 water conveyance facilities (CM1) in various locations. The majority of the near-term loss would be  
23 in Suisun Marsh and the lower Yolo Bypass as tidal marsh is restored.

24 The construction or inundation loss of this special-status natural community would represent a  
25 significant impact if it were not offset by other conservation actions. Loss of managed wetland  
26 natural community would be considered both a loss in acreage of a sensitive natural community and  
27 potentially a loss of wetland as defined by Section 404 of the CWA. The restoration of 500 acres and  
28 protection and enhancement of 4,800 acres of managed wetland as part of CM3 and CM10 during  
29 the first 10 years of Alternative 4 implementation would fully offset the losses associated with CM1,  
30 but would only partially offset the total near-term loss. Typical project-level mitigation ratios (1:1  
31 for protection) would indicate 7 acres of protection would be needed to offset the 7 acres of loss  
32 associated with CM1; a total of 5,821 acres of protection would be needed to offset (i.e., mitigate) the  
33 5,821 acres of permanent and temporary loss from all near-term actions. The combined protection  
34 and restoration proposed for managed wetland in the near-term would fall 521 acres short of full  
35 replacement. However, the CM4 marsh restoration activities that would be creating this loss would  
36 be simultaneously creating 2,000 acres of tidal brackish emergent wetland and 8,850 acres of tidal  
37 freshwater emergent wetland in place of the managed wetland in the near-term. This acreage would  
38 significantly exceed the number of acres of managed wetland lost. Mitigation measures would also  
39 be undertaken to reduce the effects of managed wetland loss on waterfowl in Suisun Marsh  
40 (Mitigation Measure BIO-179a) and the Yolo/Delta basins (Mitigation Measure 179b) if the  
41 protection and enhancement actions of CM3 and CM10 were not sufficient to replace the value of  
42 managed wetlands for waterfowl in these basins. Refer to the *General Terrestrial Biology Effects*  
43 discussion later in this section (Section 12.3.3.9).

1 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
2 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
3 *Plan*, *AMM4 Erosion and Sediment Control Plan*, and *AMM10 Restoration of Temporarily Affected*  
4 *Natural Communities*. All of these AMMs include elements that avoid or minimize the risk of affecting  
5 habitats at work areas. The AMMs are described in detail in BDCP Appendix 3.C.

6 In spite of the managed wetland protection, restoration and avoidance measures contained in  
7 Alternative 4, there would be a net reduction in the acreage of this special-status natural community  
8 in the near-term. This would be a significant impact when judged by the significance criteria listed  
9 earlier in this chapter. However, the conversion of these managed habitats to natural tidal wetland  
10 types that support similar ecological functions (2,000 acres of tidal brackish emergent wetland and  
11 8,850 acres of tidal freshwater emergent wetland) would offset this significant impact. Also, there  
12 are other conservation actions contained in the BDCP (CM3 and CM11) that would improve  
13 management and enhance existing habitat values, further offsetting the impacts of managed wetland  
14 loss on covered and noncovered special-status terrestrial species and on common species that rely  
15 on this natural community for some life phase. As a result, there would be a less-than-significant  
16 impact.

### 17 **Late Long-Term Timeframe**

18 At the end of the Plan period, 13,777 acres of managed wetland natural community would be  
19 permanently removed by conservation actions, 8,100 acres would be protected and 500 acres would  
20 be restored. There would be a net permanent reduction in the acreage of this special-status natural  
21 community within the study area. Simultaneously, there would be the creation of 6,000 acres of tidal  
22 brackish emergent wetland and 24,000 acres of tidal freshwater emergent wetland in place of this  
23 managed wetland. Because these natural wetlands support similar ecological functions to those of  
24 managed wetland, there would be a less-than-significant impact.

### 25 **Impact BIO-25: Increased Frequency, Magnitude and Duration of Periodic Inundation of** 26 **Managed Wetland Natural Community**

27 Two Alternative 4 conservation measures would modify the inundation/flooding regimes of both  
28 natural and man-made waterways in the study area. CM2, which is designed to improve fish passage  
29 and shallow flooded habitat for Delta fishes in the Yolo Bypass, would increase periodic inundation  
30 of managed wetland on wildlife management areas and duck clubs scattered up and down the  
31 central and southern bypass. CM5 would expose this community to additional flooding as channel  
32 margins are modified and levees are set back to improve fish habitat along some of the major rivers  
33 and waterways in the south Delta.

- 34 • *CM2 Yolo Bypass Fisheries Enhancement*: Operation of the Yolo Bypass under Alternative 4 would  
35 result in an increase in the frequency, magnitude and duration of inundation of 931-2,612 acres  
36 of managed wetland natural community. The methods used to estimate these inundation  
37 acreages are described in BDCP Appendix 5.J, *Effects on Natural Communities, Wildlife, and*  
38 *Plants*. The area more frequently affected by inundation would vary with the flow volume that  
39 would pass through the newly constructed notch in the Fremont Weir. The 931-acre increase in  
40 inundation would be associated with a notch flow of 8,000 cubic feet per second (cfs), and the  
41 2,612-acre increase would result from a notch flow of 4,000 cfs. Plan-related increases in flow  
42 through Fremont Weir would be expected in 30% of the years. Based on the theoretical  
43 modeling that has been completed to-date, the largest acreages would be associated with the  
44 Sacramento Bypass Wildlife Area, the Yolo Bypass Wildlife Area, and private managed wetlands

1 south of Putah Creek. The anticipated change in management of flows in the Yolo Bypass  
2 includes more frequent releases in flows into the bypass from the Fremont and Sacramento  
3 Weirs, and in some years, later releases into the bypass in spring months (April and May). With  
4 larger flows, the water depths may also increase over Existing Conditions. While the managed  
5 wetlands of the Yolo Bypass are conditioned to periodic inundation events, the more frequent  
6 and extended inundation periods may make it more difficult to actively manage the areas for  
7 maximum food production for certain species (waterfowl primarily) and may alter the plant  
8 assemblages in some years. The effects of this periodic inundation on birds and other terrestrial  
9 species are discussed later in this chapter. The additional inundation would not be expected to  
10 reduce the acreage of managed wetland on a permanent basis. The extended inundation would  
11 be designed to expand foraging and spawning habitat for Delta fishes.

- 12 • *CM5 Seasonally Inundated Floodplain Restoration*: Floodplain restoration would result in an  
13 increase in the frequency, magnitude and duration of inundation of an estimated 6 acres of  
14 managed wetland. Specific locations for this restoration activity have not been identified, but  
15 they would likely be focused in the south Delta area, along the major rivers and Delta channels.  
16 The connection of these wetlands to stream flooding events would be beneficial to the ecological  
17 function of managed wetlands, especially as they relate to BDCP target aquatic species. Foraging  
18 activity and refuge sites would be expanded into areas currently unavailable or infrequently  
19 available to some aquatic species. The more frequent flooding would periodically interfere with  
20 management activities associated with terrestrial species (primarily waterfowl) and may result  
21 in changes in plant composition and management strategies over time.

22 In summary, 937–2,6181 acres of managed wetland community in the study area would be  
23 subjected to more frequent inundation as a result of implementing two Alternative 4 conservation  
24 measures (CM2 and CM5).

25 **NEPA Effects:** Managed wetland community would not be adversely affected because much of the  
26 acreage affected is conditioned to periodic inundation. The more frequent inundation could create  
27 management problems associated with certain species, especially waterfowl, and result in changes  
28 over time in plant species composition. The total acreage of managed wetland would not be  
29 expected to change permanently as a result of the periodic inundation.

30 **CEQA Conclusion:** An estimated 937–2,618 acres of managed wetland community in the study area  
31 would be subjected to more frequent inundation as a result of implementing CM2 and CM5 under  
32 Alternative 4. Managed wetland community would not be significantly impacted because periodic  
33 inundation is already experienced by most of the land that would be affected. There could be  
34 increased management problems and a long-term shift in plant species composition. The periodic  
35 inundation would not be expected to result in a net permanent reduction in the acreage of this  
36 community in the study area. Therefore, there would be a less-than-significant impact on the  
37 community.

### 38 **Impact BIO-26: Modification of Managed Wetland Natural Community from Ongoing** 39 **Operation, Maintenance and Management Activities**

40 Once the physical facilities associated with Alternative 4 are constructed and the stream flow regime  
41 associated with changed water management is in effect, there would be new ongoing and periodic  
42 actions associated with operation, maintenance and management of the BDCP facilities and  
43 conservation lands that could affect managed wetland natural community in the study area. The  
44 ongoing actions include changes in operation of upstream reservoirs, the diversion of Sacramento

1 River flows in the north Delta, reduced diversions from south Delta channels, and recreational use of  
2 reserve areas. These actions are associated with CM1 and CM11 (see the impact discussion above for  
3 effects associated with CM2). The periodic actions would involve access road and conveyance facility  
4 repair, vegetation management at the various water conveyance facilities and habitat restoration  
5 sites (CM11), levee repair and replacement of levee armoring, channel dredging, and habitat  
6 enhancement in accordance with natural community management plans. The potential effects of  
7 these actions are described below.

- 8 • *Modified river flows upstream of and within the study area and reduced diversions from south*  
9 *Delta channels.* Changes in releases from reservoirs upstream of the study area, increased  
10 diversion of Sacramento River flows in the north Delta, and reduced diversions from south Delta  
11 channels (associated with Operational Scenario H) would not result in the reduction in acreage  
12 of the managed wetland natural community in the study area. Flow levels in the upstream rivers  
13 would not change to the degree that water levels in adjacent managed wetlands would be  
14 altered. Similarly, increased diversions of Sacramento River flows in the north Delta would not  
15 result in a permanent reduction in the managed wetland community downstream of these  
16 diversions. The majority of the managed wetlands below the diversions is not directly connected  
17 to the rivers. Reduced diversions from the south Delta channels would not create a reduction in  
18 this natural community.
- 19 • *Access road, water conveyance facility and levee repair.* Periodic repair of access roads, water  
20 conveyance facilities and levees associated with the BDCP actions have the potential to require  
21 removal of adjacent vegetation and could entail earth and rock work in managed wetland  
22 habitats. This activity could lead to increased soil erosion, turbidity and runoff entering  
23 managed wetlands. These activities would be subject to normal erosion, turbidity and runoff  
24 control management practices, including those developed as part of *AMM2 Construction Best*  
25 *Management Practices and Monitoring* and *AMM4 Erosion and Sediment Control Plan*. Any  
26 vegetation removal or earthwork adjacent to or within managed wetland habitats would require  
27 use of sediment and turbidity barriers, soil stabilization and revegetation of disturbed surfaces.  
28 Proper implementation of these measures would avoid permanent adverse effects on this  
29 community.
- 30 • *Vegetation management.* Vegetation management, in the form of physical removal and chemical  
31 treatment, would be a periodic activity associated with the long-term maintenance of water  
32 conveyance facilities and restoration sites (*CM11 Natural Communities Enhancement and*  
33 *Management*). Use of herbicides to control nuisance vegetation could pose a long-term hazard to  
34 managed wetland natural community at or adjacent to treated areas. The hazard could be  
35 created by uncontrolled drift of herbicides, uncontrolled runoff of contaminated stormwater  
36 onto the community, or direct discharge of herbicides to managed wetland areas being treated  
37 for invasive species removal. Environmental commitments and *AMM5 Spill Prevention,*  
38 *Containment, and Countermeasure Plan* have been made part of the BDCP to reduce hazards to  
39 humans and the environment from use of various chemicals during maintenance activities,  
40 including the use of herbicides. These commitments are described in Appendix 3B, including the  
41 commitment to prepare and implement spill prevention, containment, and countermeasure  
42 plans and stormwater pollution prevention plans. Best management practices, including control  
43 of drift and runoff from treated areas, and use of herbicides approved for use in aquatic and  
44 terrestrial environments would also reduce the risk of affecting natural communities adjacent to  
45 water conveyance features and levees associated with restoration activities.

1 Herbicides to remove aquatic invasive species as part of CM13 would be used to restore the  
2 normal ecological function of tidal and nontidal aquatic habitats in planned restoration areas.  
3 The treatment activities would be conducted in concert with the California Department of  
4 Boating and Waterways' invasive species removal program. Eliminating large stands of water  
5 hyacinth and Brazilian waterweed would improve habitat conditions for some aquatic species  
6 by removing cover for nonnative predators, improving water flow and removing barriers to  
7 movement (see Chapter 11, *Fish and Aquatic Resources*). These habitat changes should also  
8 benefit terrestrial species that use managed wetland natural community for movement  
9 corridors and for foraging. Vegetation management effects on individual species are discussed in  
10 the species sections on following pages.

- 11 • *Habitat enhancement.* The BDCP includes a long-term management element for the natural  
12 communities within the Plan Area (CM11). For the managed wetland natural community, a  
13 management plan would be prepared that specifies actions to improve the value of the habitats  
14 for covered species. Actions would include control of invasive nonnative plant and animal  
15 species, fire management, restrictions on vector control and application of herbicides, and  
16 maintenance of infrastructure that would allow for movement through the community. The  
17 enhancement efforts would improve the long-term value of this community for both special-  
18 status and common species.
- 19 • *Recreation.* The BDCP would allow hunting, fishing and hiking in managed wetland reserve  
20 areas. *CM11 Natural Communities Enhancement and Management* (BDCP Chapter 3, Section  
21 3.4.11) describes this program and identifies applicable restrictions on recreation that might  
22 adversely affect managed wetland habitat. BDCP also includes an avoidance and minimization  
23 measure (AMM37) that further dictates limits on recreation activities that might affect this  
24 natural community. Hunting would be the dominant activity in fall and winter months, while  
25 fishing and hiking would be allowed in non-hunting months.

26 The various operations and maintenance activities described above could alter acreage of managed  
27 wetland natural community in the study area through facilities maintenance, vegetation  
28 management, and recreation. Activities could also introduce sediment and herbicides that would  
29 reduce the value of this community to common and sensitive plant and wildlife species. Other  
30 periodic activities associated with the Plan, including management, protection and enhancement  
31 actions associated with *CM3 Natural Communities Protection and Restoration* and *CM11 Natural  
32 Communities Enhancement and Management*, would be undertaken to enhance the value of the  
33 community. While some of these activities could result in small changes in acreage, these changes  
34 would be offset by restoration activities planned as part of *CM10 Nontidal Marsh Restoration*, *CM4  
35 Tidal Natural Communities Restoration*, and protection and restoration actions associated with *CM3  
36 Natural Communities Protection and Restoration*. Recreation activity effects would be minimized by  
37 AMM37 (BDCP Appendix 3.C). The management actions associated with levee repair and control of  
38 invasive plant species would also result in a long-term benefit to the species associated with  
39 managed wetland habitats by improving water movement.

40 **NEPA Effects:** Ongoing operation, maintenance and management activities associated with  
41 Alternative 4 would not result in a net permanent reduction in acreage of managed wetland natural  
42 community within the study area. Therefore, there would be no adverse effect on this natural  
43 community.

44 **CEQA Conclusion:** The operation and maintenance activities associated with Alternative 4 would  
45 have the potential to create minor changes in total acreage of managed wetland natural community

1 in the study area, and could create temporary increases in turbidity and sedimentation. The  
2 activities could also introduce herbicides periodically to control nonnative, invasive plants. Hunting  
3 could intermittently reduce the availability of this community to special-status and common wildlife  
4 species. Implementation of environmental commitments and AMM2, AMM4, AMM5, and AMM37  
5 would minimize these impacts, and other operations and maintenance activities, including  
6 management, protection and enhancement actions associated with *CM3 Natural Communities*  
7 *Protection and Restoration* and *CM11 Natural Communities Enhancement and Management*, would  
8 create positive effects, including improved water movement in and adjacent to these habitats. Long-  
9 term restoration activities associated with *CM10 Nontidal Marsh Restoration* and *CM4 Tidal Natural*  
10 *Communities Restoration*, and protection and restoration actions associated with *CM3 Natural*  
11 *Communities Protection and Restoration* would greatly expand the ecological functions of this natural  
12 community in the study area. Ongoing operation, maintenance and management activities would not  
13 result in a net permanent reduction in this sensitive natural community within the study area.  
14 Therefore, there would be a less-than-significant impact on the managed wetland natural  
15 community.

#### 16 **Other Natural Seasonal Wetland**

17 The other natural seasonal wetlands natural community encompasses all the remaining natural (not  
18 managed) seasonal wetland communities other than vernal pools and alkali seasonal wetlands.  
19 These areas mapped by CDFW (Hickson and Keeler-Wolf 2007) and ICF biologists (the western area  
20 of additional analysis; see Figure 12-1) consist of seasonally ponded, flooded, or saturated soils  
21 dominated by grasses, sedges, or rushes. The largest segments of this community in the study area  
22 are located along the Cosumnes River northeast of Thornton, and in the western extension of the  
23 study area northwest of Rio Vista. Most of the smaller mapped areas are located in the Suisun Marsh  
24 ROA on the western edge of the Montezuma Hills and in the interior of the Potrero Hills. There are  
25 also other natural seasonal wetlands mapped along Old River and Middle River in CZ 7 (Figure  
26 12-1). The only BDCP conservation component that would potentially affect this natural community  
27 is the seasonally inundated floodplain restoration conservation measure (CM5) (see Table 12-4-10).

1 **Table 12-4-10. Changes in Other Natural Seasonal Wetland Associated with Alternative 4 (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Permanent		Temporary		Periodic <sup>d</sup>	
	NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	0	0	0	0	0	0
CM2	0	0	0	0	0	0
CM4	0	0	0	0	0	0
CM5	0	0	0	0	0	2
CM6	Unk.	Unk.	Unk.	Unk.	0	0
<b>TOTAL IMPACTS</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>2</b>

<sup>a</sup> See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only.

NT = near-term

LLT = late long-term

NA = not applicable

Unk. = unknown

2

3 **Impact BIO-27: Modification of Other Natural Seasonal Wetland Natural Community as a**  
4 **Result of Implementing BDCP Conservation Measures**

5 Based on theoretical footprints for this activity, *CM5 Seasonally Inundated Floodplain Restoration*  
6 could expose 2 acres of other natural seasonal wetland community to additional flooding as channel  
7 margins are modified and levees are set back to improve fish habitat along some of the major rivers  
8 and waterways throughout the study area. Specific locations for this restoration activity have not  
9 been identified, but they would likely be focused in the south Delta area, along the major rivers and  
10 Delta channels, including the channels of Old River and Middle River. Several small patches of other  
11 natural seasonal wetland natural community are mapped along these waterways. The exposure of  
12 these seasonal wetlands to increased but infrequent episodes of stream flooding would not alter  
13 their ecological function or species composition. Their value to special-status and common plants  
14 and wildlife in the study area would not be affected. The effects of this inundation on wildlife and  
15 plant species are described in detail in later sections of this chapter.

16 **NEPA Effects:** Alternative 4 conservation actions would not adversely affect other natural seasonal  
17 wetland natural community because the small increase in periodic flooding of up to 2 acres would  
18 not alter its function or general species makeup.

19 **CEQA Conclusion:** An estimated 2 acres of other natural seasonal wetland community in the study  
20 area would be subjected to more frequent inundation from flood flows as a result of implementing  
21 CM5 under Alternative 4. This community would not be significantly impacted because a small  
22 increase in periodic flooding would not alter its ecological function or species composition. The  
23 periodic inundation would not result in a net permanent reduction in the acreage of this community

1 in the study area. Therefore, there would be no substantial adverse effect on the community. The  
2 impact would be less than significant.

3 **Impact BIO-28: Modification of Other Natural Seasonal Wetland Natural Community from**  
4 **Ongoing Operation, Maintenance and Management Activities**

5 Once the physical facilities associated with Alternative 4 are constructed and the stream flow regime  
6 associated with changed water management is in effect, there would be new ongoing and periodic  
7 actions associated with operation, maintenance and management of the BDCP facilities and  
8 conservation lands that could affect other natural seasonal wetland natural community in the study  
9 area. The ongoing actions include modified operation of upstream reservoirs, the diversion of  
10 Sacramento River flows in the north Delta, and reduced diversions from south Delta channels. These  
11 actions are associated with CM1. The periodic actions would involve access road and conveyance  
12 facility repair, vegetation management at the various water conveyance facilities and habitat  
13 restoration sites (CM11), levee repair and replacement of levee armoring, channel dredging, and  
14 habitat enhancement in accordance with natural community management plans. The potential  
15 effects of these actions are described below.

- 16 • *Modified river flows upstream of and within the study area and reduced diversions from south*  
17 *Delta channels.* Changes in releases from reservoirs upstream of the study area, increased  
18 diversion of Sacramento River flows in the north Delta, and reduced diversions from south Delta  
19 channels (associated with Operational Scenario H) would not affect other natural seasonal  
20 wetland natural community. The small areas mapped in the study area are not in or adjacent to  
21 streams that would experience changes in water levels as a result of these operations.
- 22 • *Access road, water conveyance facility and levee repair.* Periodic repair of access roads, water  
23 conveyance facilities and levees associated with the BDCP actions have the potential to require  
24 removal of adjacent vegetation and could entail earth and rock work in other natural seasonal  
25 wetland habitats. This activity could lead to increased soil erosion and runoff entering these  
26 habitats. These activities would be subject to normal erosion and runoff control management  
27 practices, including those developed as part of *AMM2 Construction Best Management Practices*  
28 *and Monitoring* and *AMM4 Erosion and Sediment Control Plan*. Any vegetation removal or  
29 earthwork adjacent to or within other natural seasonal wetland habitats would require use of  
30 sediment barriers, soil stabilization and revegetation of disturbed surfaces as required by  
31 *AMM10 Restoration of Temporarily Affected Natural Communities*. Proper implementation of  
32 these measures would avoid permanent adverse effects on this community.
- 33 • *Vegetation management.* Vegetation management, in the form of physical removal and chemical  
34 treatment, would be a periodic activity associated with the long-term maintenance of water  
35 conveyance facilities and restoration sites (*CM11 Natural Communities Enhancement and*  
36 *Management*). Use of herbicides to control nuisance vegetation could pose a long-term hazard to  
37 the other natural seasonal wetland natural community at or adjacent to treated areas. The  
38 hazard could be created by uncontrolled drift of herbicides, uncontrolled runoff of contaminated  
39 stormwater onto the natural community, or direct discharge of herbicides to wetland areas  
40 being treated for invasive species removal. Environmental commitments and *AMM5 Spill*  
41 *Prevention, Containment, and Countermeasure Plan* have been made part of the BDCP to reduce  
42 hazards to humans and the environment from use of various chemicals during maintenance  
43 activities, including the use of herbicides. These commitments are described in Appendix 3B,  
44 including the commitment to prepare and implement spill prevention, containment, and  
45 countermeasure plans and stormwater pollution prevention plans. Best management practices,

1 including control of drift and runoff from treated areas, and use of herbicides approved for use  
2 in terrestrial or aquatic environments would also reduce the risk of affecting natural  
3 communities adjacent to water conveyance features and levees associated with restoration  
4 activities.

- 5 • *Habitat enhancement.* The BDCP includes a long-term management element for the natural  
6 communities within the Plan Area (CM11). For the other natural seasonal wetland natural  
7 community, a management plan would be prepared that specifies actions to improve the value  
8 of the habitats for covered species. Actions would include control of invasive nonnative plant  
9 and animal species, fire management, restrictions on vector control and application of  
10 herbicides, and maintenance of infrastructure that would allow for movement through the  
11 community. The enhancement efforts would improve the long-term value of this community for  
12 both special-status and common species.

13 The various operations and maintenance activities described above could alter acreage of other  
14 natural seasonal wetland natural community in the study area. Activities could introduce sediment  
15 and herbicides that would reduce the value of this community to common and sensitive plant and  
16 wildlife species. Other periodic activities associated with the Plan, including management,  
17 protection and enhancement actions associated with *CM3 Natural Communities Protection and*  
18 *Restoration* and *CM11 Natural Communities Enhancement and Management*, would be undertaken to  
19 enhance the value of the community. While some of these activities could result in small changes in  
20 acreage, these changes would be minor when compared to the restoration activities planned as part  
21 of *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*, or minimized by  
22 implementation of AMM2, AMM4, AMM5, and AMM10. The vernal pool complex conservation  
23 measure includes restoration of 139 acres of seasonal wetlands with similar ecological values as the  
24 other natural seasonal wetland community. The management actions associated with control of  
25 invasive plant species would also result in a long-term benefit to the species associated with other  
26 natural seasonal wetland habitats by eliminating competitive, invasive species of plants.

27 **NEPA Effects:** Ongoing operation, maintenance and management activities associated with  
28 Alternative 4 would not result in a net permanent reduction in this natural community within the  
29 study area. Therefore, there would be no adverse effect on the other natural seasonal wetland  
30 natural community.

31 **CEQA Conclusion:** The operation and maintenance activities associated with Alternative 4 would  
32 have the potential to create minor changes in total acreage of other natural seasonal wetland natural  
33 community in the study area, and could create temporary increases in sedimentation. The activities  
34 could also introduce herbicides periodically to control nonnative, invasive plants. Implementation of  
35 environmental commitments and AMM2, AMM4, AMM5, and AMM10 would minimize these impacts,  
36 and other operations and maintenance activities, including management, protection and  
37 enhancement actions associated with *CM3 Natural Communities Protection and Restoration* and  
38 *CM11 Natural Communities Enhancement and Management*, would create positive effects, including  
39 reduced competition from invasive, nonnative plants in these habitats. Long-term restoration  
40 activities associated with *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration* and  
41 protection actions associated with *CM3 Natural Communities Protection and Restoration* would  
42 ensure that the ecological values provided by this small natural community would not decrease in  
43 the study area. Ongoing operation, maintenance and management activities would not result in a net  
44 permanent reduction in this natural community within the study area. Therefore, there would be a  
45 less-than-significant impact on the other natural seasonal wetland natural community.

1       **Grassland**

2       Construction, operation, maintenance and management associated with the conservation  
3       components of Alternative 4 would have no long-term adverse effects on the habitats associated  
4       with the grassland natural community. Initial development and construction of CM1, CM2, CM4,  
5       CM5, CM6, CM7, CM11 and CM18 would result in both permanent and temporary removal of this  
6       community (see Table 12-4-11). Full implementation of Alternative 4 would also include the  
7       following conservation actions over the term of the BDCP to benefit the grassland natural  
8       community.

- 9       ● Protect 8,000 acres of grassland with at least 2,000 acres protected in Conservation Zone 1, at  
10       at least 1,000 acres protected in Conservation Zone 8, and at least 2,000 acres protected in  
11       Conservation Zone 11 (Objective GNC1.1, associated with CM3).
- 12       ● Restore 2,000 acres of grasslands to connect fragmented patches of protected grassland and to  
13       provide upland habitat adjacent to riparian, tidal, and nontidal natural communities for wildlife  
14       foraging and upland refugia (Objective GNC1.2, associated with CM3 and CM8).
- 15       ● Of the 8,000 acres of grassland protected and at least 2,000 acres of grassland restored, protect  
16       or restore grasslands adjacent to restored tidal brackish emergent wetlands to provide 200 feet  
17       of adjacent grasslands beyond the sea level rise accommodation (Objective GNC1.4, associated  
18       with CM3 and CM8).

19       There is a variety of other, less specific conservation goals and objectives in BDCP Chapter 3, Section  
20       3.3 that would improve the value of grassland natural community for terrestrial species. As  
21       explained below, with the protection, restoration and enhancement of the amounts of habitat listed  
22       in the BDCP objectives, in addition to implementation of AMMs, impacts on this natural community  
23       would not be adverse for NEPA purposes and would be less than significant for CEQA purposes.

1 **Table 12-4-11. Changes in Grassland Natural Community Associated with Alternative 4 (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Permanent		Temporary		Periodic <sup>d</sup>	
	NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	460	460	158	158	0	0
CM2	388	388	239	239	385–1,277	0
CM4	448	1,122	0	0	0	0
CM5	0	51	0	34	0	514
CM6	Unk.	Unk.	Unk.	Unk.	0	0
CM7	4	410	0	0	0	0
CM11	13	50	0	0	0	0
CM18	35	35	0	0	0	0
<b>TOTAL IMPACTS</b>	<b>1,348</b>	<b>2,516</b>	<b>397</b>	<b>431</b>	<b>385–1,277</b>	<b>514</b>

<sup>a</sup> See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

Unk. = unknown

2

3 **Impact BIO-29: Changes in Grassland Natural Community as a Result of Implementing BDCP**  
4 **Conservation Measures**

5 Construction, land grading and habitat restoration activities that would accompany the  
6 implementation of CM1, CM2, CM4, CM5, CM6, CM7, CM11 and CM18 would permanently eliminate  
7 an estimated 2,516 acres and temporarily remove 431 acres of grassland natural community in the  
8 study area. These modifications represent approximately 4% of the 78,047 acres of the community  
9 that is mapped in the study area. Approximately 59% (1,745 acres) of the permanent and temporary  
10 losses would happen during the first 10 years of Alternative 4 implementation, as water conveyance  
11 facilities are constructed and habitat restoration is initiated. Grassland protection (2,000 acres),  
12 restoration (1,140 acres) and enhancement would be initiated during the same period. By the end of  
13 the Plan period, 2,000 acres of this natural community would be restored and 8,000 acres would be  
14 protected. The BDCP beneficial effects analysis for grassland (BDCP Chapter 5, Section 5.4.11.2)  
15 indicates that 8,000 acres of grasslands would be protected in Conservation Zones 1, 2, 4, 5, 7, 8, and  
16 11, and 2,000 acres of grassland would be restored. Grassland protection and restoration would  
17 improve connectivity among habitat areas in and adjacent to the Plan Area, improve genetic  
18 interchange among native species' populations, and contribute to the long-term conservation of  
19 grassland-associated covered species.

1 The individual effects of each relevant conservation measure are addressed below. A summary  
2 statement of the combined impacts and NEPA and CEQA conclusions follows the individual  
3 conservation measure discussions.

- 4 • *CM1 Water Facilities and Operation*: Construction of the Alternative 4 water conveyance facilities  
5 would permanently remove 460 acres and temporarily remove 158 acres of grassland natural  
6 community. The permanent losses would occur where Intakes 2, 3, and 5 encroach on the  
7 Sacramento River's east bank between Clarksburg and Courtland; along the permanent  
8 transmission line corridor adjacent to Lambert Road; at a permanent pipeline shaft access road  
9 on the east side of Bacon Island; and at various permanent facility sites south and west of Clifton  
10 Court Forebay, including a reusable tunnel material storage site, new canal connections from  
11 Clifton Court Forebay to the two aqueducts, and in the forebay expansion area on the south side  
12 of the existing forebay. Most of the permanent losses would be of ruderal and herbaceous  
13 grassland areas that exist in very narrow bands adjacent to waterways, levees and roads (see  
14 Terrestrial Biology Mapbook). Some of the grassland lost at the sites of new canals south of  
15 Clifton Court Forebay is composed of larger stands of ruderal and herbaceous vegetation and  
16 California annual grassland. The temporary losses would be associated with construction of the  
17 pump stations and temporary access roads along the Sacramento River; at work areas and barge  
18 offloading facility construction sites at the south end of Bouldin Island, at the north end of Bacon  
19 Island and at the northwest corner of Victoria Island; at temporary access road sites on the  
20 north end of Staten Island and the northwest corner of Victoria Island; at temporary work areas  
21 on Mandeville and Bacon Islands; and at the operable barrier construction site at the head of Old  
22 River. These losses would take place during the near-term construction period.

23 The construction activity associated with CM1 also has the potential to lead to increased  
24 nitrogen deposition in grassland habitats in the vicinity of Clifton Court Forebay. A significant  
25 number of cars, trucks, and land grading equipment involved in construction in and around the  
26 forebay would emit small amounts of atmospheric nitrogen from fuel combustion; this material  
27 could be deposited in sensitive grassland areas that are located west of the major construction  
28 areas at Clifton Court Forebay. Nitrogen deposition can pose a risk of adding a fertilizer to  
29 nitrogen-limited soils and their associated plants. Nonnative invasive species can be encouraged  
30 by the added nitrogen available. BDCP Appendix 5.J, Attachment 5J.A, *Construction-Related  
31 Nitrogen Deposition on BDCP Natural Communities*, addresses this issue in detail. It has been  
32 concluded that this potential deposition would pose a low risk of changing the grassland in and  
33 adjacent to the construction areas because the construction would contribute a negligible  
34 amount of nitrogen to regional projected emissions and the existing grassland is dominated by  
35 nonnative invasive species of plants. Also, the construction at Clifton Court Forebay would occur  
36 primarily downwind of the natural community. No adverse effect is expected.

- 37 • *CM2 Yolo Bypass Fisheries Enhancement*: Implementation of CM2 would involve a number of  
38 construction activities within the Yolo and Sacramento Bypasses, including Fremont Weir and  
39 stilling basin improvements, Putah Creek realignment activities, Toe Drain/Tule Canal and  
40 Lisbon Weir modification and Sacramento Weir improvements. All of these activities could  
41 involve excavation and grading in grassland areas to improve passage of fish through the  
42 bypasses. Based on hypothetical construction footprints, a total of 388 acres could be  
43 permanently lost and another 239 acres could be temporarily removed. Most of the grassland  
44 losses would occur at the north end of the bypass below Fremont Weir where a large expanse of  
45 grassland is present, along the Toe Drain/Tule Canal, and along the west side channels. These  
46 grasslands are composed primarily of upland annual grassland and forbs. Some of this grassland

1 removal along the side channels of the bypass could pose barriers to grassland species moving  
2 within the bypass. These losses would occur primarily in the near-term timeframe.

- 3 ● *CM4 Tidal Natural Communities Restoration*: Based on the use of hypothetical restoration  
4 footprints, implementation of CM4 would permanently inundate or remove 448 acres of  
5 grassland in the near-term and inundate or remove 1,122 acres of grassland by the end of the  
6 Plan timeframe. The losses would occur in a number of ROAs established for tidal restoration  
7 (see Figure 12-1). The largest losses would likely occur in the vicinity of Cache Slough, on  
8 Decker Island in the West Delta ROA, on the upslope fringes of Suisun Marsh, and along narrow  
9 bands adjacent to waterways in the South Delta ROA. Most of this grassland is ruderal and  
10 herbaceous vegetation with low habitat value; some of the larger patches of grassland in the  
11 Cache Slough ROA are annual grassland with higher values.
- 12 ● *CM5 Seasonally Inundated Floodplain Restoration*: Floodplain restoration levee construction  
13 would permanently remove 51 acres and temporarily remove 34 acres of grassland natural  
14 community. The construction-related losses would be considered a permanent removal of the  
15 habitats directly affected. These losses would be expected to occur along the San Joaquin River  
16 and other major waterways in CZ 7 (see Figure 12-1). The grassland in this area is primarily  
17 composed of narrow bands and small patches of ruderal herbaceous grasses and forbs. This  
18 activity is scheduled to start following construction of water conveyance facilities, which is  
19 expected to take 10 years.
- 20 ● *CM6 Channel Margin Enhancement*: Channel margin habitat enhancement could result in  
21 removal of small amounts of grassland natural community along 20 miles of river and sloughs.  
22 The extent of this loss cannot be quantified at this time, but the majority of the enhancement  
23 activity would occur along waterway margins where grassland habitat stringers exist, including  
24 along levees and channel banks. The improvements would occur within the study area on  
25 sections of the Sacramento, San Joaquin and Mokelumne Rivers, and along Steamboat and Sutter  
26 Sloughs.
- 27 ● *CM7 Riparian Natural Community Restoration*: Riparian natural community restoration would  
28 occur in a variety of settings in the Plan Area, with an emphasis on improving connectivity of  
29 existing riparian areas and stream/river corridors, to benefit the movement and interchange of  
30 special-status and common species that use these areas. Large tracts would be restored in  
31 concert with floodplain restoration (CM5), while narrower bands would be developed as part of  
32 channel margin enhancement (CM6) and tidal marsh restoration (CM4). In the process of  
33 expanding woody riparian habitat, existing nonnative grassland would be removed. While  
34 specific locations for these restoration activities have not been fully developed, use of  
35 theoretical footprints for this activity indicate that up to 410 acres of grassland could be lost  
36 through the course of Plan implementation. A majority of this activity would occur in the South  
37 Delta and Cosumnes/Mokelumne ROAs (see Figure 12-1).
- 38 ● *CM8 Grassland Natural Community Restoration*: The grassland natural community would be  
39 restored primarily on the fringes of the Delta, where upland areas merge with Delta wetland and  
40 agricultural lands. Restoration would focus on CZ 1, CZ 8, and CZ 11, as proposed by BDCP  
41 Objective GNC1.1 (Figure 12-1), with a goal of improving habitat connectivity and increasing the  
42 diversity of grassland species (Objective GNC1.2). Some of the planned 2,000 acres of  
43 restoration would occur around existing populations of giant garter snake in the east Delta and  
44 the Yolo Bypass area.

- 1 • *CM11 Natural Communities Enhancement and Management*: Natural communities enhancement  
2 and management would include a wide range of activities designed to improve habitat  
3 conditions in restored and protected lands associated with the BDCP. This measure also  
4 promotes sound use of pesticides, vector control activities, invasive species control and fire  
5 management in preserve areas. To improve the public's ability to participate in recreational  
6 activities in and adjacent to restored and protected habitats, a system of trails is proposed. The  
7 location and extent of this system are not yet known, so the analysis of this activity is  
8 programmatic. At the current level of planning, it is assumed that the trail system would be  
9 located entirely in grassland habitats and would include up to 50 acres of habitat loss.
- 10 • *CM18. Conservation Hatcheries*: The BDCP includes a proposal to design and construct a  
11 conservation hatchery to maintain populations of delta smelt and longfin smelt. The location of  
12 this facility is not yet firmly established, but for planning purposes it has been assumed that it  
13 would be constructed in the vicinity of Rio Vista and would be located in grassland habitat. The  
14 grassland in the Rio Vista area includes both California annual grassland and ruderal herbaceous  
15 grasses and forbs. The current estimate of the land needed for this facility is 35 acres.

16 The following paragraphs summarize the combined effects discussed above and describe other  
17 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA impact conclusions are  
18 also included.

### 19 ***Near-Term Timeframe***

20 During the near-term timeframe (the first 10 years of BDCP implementation), Alternative 4 would  
21 affect the grassland natural community through CM1 construction losses (460 acres permanent and  
22 158 acres temporary), CM2 construction losses (388 acres permanent and 239 acres temporary),  
23 CM11 recreational trail construction (13 acres permanent), CM18 fish hatchery construction (35  
24 acres permanent), and CM7 riparian habitat restoration (4 acres permanent). These losses would  
25 occur along the eastern bank of the Sacramento River at intake sites, adjacent to Clifton Court  
26 Forebay associated with forebay expansion, at various permanent and temporary construction sites  
27 for barge unloading facilities and tunnel shaft sites through the central Delta, at currently  
28 unspecified sites for hatchery and recreational trail construction and riparian restoration, at fish  
29 passage construction sites in the northern Yolo Bypass, and along the east and west channels within  
30 the Yolo Bypass. Approximately 448 acres of the inundation and construction-related losses in  
31 habitat from CM4 would occur in the near-term. These tidal restoration losses would occur  
32 throughout the ROAs mapped in Figure 12-1.

33 The construction losses of this natural community would not represent an adverse effect based on  
34 the significance criteria used for this chapter because grassland is not considered a special-status or  
35 sensitive natural community. Most Central Valley grasslands are dominated by nonnative annual  
36 grasses and herbs. However, the importance of grassland as a habitat that supports life stages of  
37 numerous special-status plants and wildlife is well documented (see BDCP Chapter 3, *Conservation  
38 Strategy*). The significance of losses in grassland habitat is, therefore, discussed in more detail in  
39 species analyses later in this chapter. The combination of restoring 1,140 acres (CM8) and  
40 protecting 2,000 acres (CM3) of grassland natural community during the first 10 years of BDCP  
41 implementation, and the commitment to restore temporarily affected grassland (397 acres) to its  
42 pre-project condition within one year of completing construction as required by *AMM10 Restoration  
43 of Temporarily Affected Natural Communities*, would offset this near-term loss, avoiding any loss in  
44 the value of this habitat for special-status species. The restoration of grassland would include  
45 protection in perpetuity, and the protected and restored habitat would be managed and enhanced to

1 benefit special-status and common wildlife species (CM3 and CM11). Typical project-level mitigation  
2 ratios (2:1 for protection) would indicate that 3,490 acres of protection would be needed to offset  
3 (i.e., mitigate) the 1,745 acres of combined permanent and temporary loss. The combination of  
4 restoration and protection, along with the enhancement and management associated with CM3 and  
5 CM11 contained in the BDCP, is designed to avoid a temporal lag in the value of grassland habitat  
6 available to sensitive species.

7 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
8 *Construction Best Management Practices and Monitoring*, *AMM6 Disposal and Reuse of Spoils*,  
9 *Reusable Tunnel Material*, and *Dredged Material*, and *AMM7 Barge Operations Plan*. All of these  
10 AMMs include elements that avoid or minimize the risk of affecting habitats at work areas and  
11 storage sites. The AMMs are described in detail in BDCP Appendix 3.C.

### 12 **Late Long-Term Timeframe**

13 Implementation of Alternative 4 as a whole would result in less than 4% losses of grassland natural  
14 community in the study area. These losses (2,516 acres of permanent and 431 acres of temporary  
15 loss) would be largely associated with construction of the water conveyance facilities (CM1),  
16 construction of Yolo Bypass fish improvements (CM2), inundation during tidal marsh restoration  
17 (CM4), and riparian habitat restoration (CM7). Inundation losses would occur through the course of  
18 BDCP restoration activities at various tidal restoration sites throughout the study area.

19 **NEPA Effects:** By the end of the Plan timeframe, a total of 2,000 acres of this natural community  
20 would be restored (CM8) and 8,000 acres would be protected (CM3). The restoration would occur  
21 primarily in CZ 1, CZ 8, and CZ 11, in the Cache Slough, Suisun Marsh and Clifton Court Forebay  
22 areas. Temporarily affected grassland would also be restored following construction activity. The  
23 2,000 acres of restoration associated with CM8, and the restoration of temporarily affected  
24 grassland required by AMM10 (431 acres for Alternative 4) would not totally replace the grassland  
25 acres lost through the Plan timeframe (2,947 acres). There would be a permanent loss of 516 acres  
26 of grassland in the study area. However, the combination of restoration, protection and  
27 enhancement of grassland associated with Alternative 4 would improve the habitat value of this  
28 community in the study area; there would not be an adverse effect on the grassland natural  
29 community.

### 30 **CEQA Conclusion:**

#### 31 **Near-Term Timeframe**

32 Alternative 4 would result in the loss of approximately 1,745 acres of grassland natural community  
33 due to construction of the water conveyance facilities (CM1), fish passage improvements (CM2),  
34 riparian habitat restoration (CM7), recreational trail development (CM11), fish hatchery  
35 construction (CM18), and inundation during tidal marsh restoration (CM4). The construction losses  
36 would occur along the eastern bank of the Sacramento River at intake sites, adjacent to Clifton Court  
37 Forebay associated with forebay expansion, at various permanent and temporary construction sites  
38 for barge unloading facilities and tunnel shaft sites through the central Delta, at currently  
39 unspecified sites for hatchery and recreational trail construction and riparian habitat restoration, at  
40 fish passage improvement sites in the northern Yolo Bypass, and along the east and west channels  
41 within the Yolo Bypass. Inundation losses would occur at various tidal restoration sites throughout  
42 the study area. The construction losses would be spread across a 10-year near-term timeframe.

1 The construction losses of this natural community would not represent a significant impact based  
2 on the significance criteria used for this chapter because grassland is not considered a special-status  
3 or sensitive natural community. Nonetheless, these losses would be offset by planned restoration of  
4 1,140 acres and protection of 2,000 acres of grassland natural community scheduled for the first 10  
5 years of Alternative 4 implementation, and the restoration of temporarily affected grassland (397  
6 acres for Alternative 4) as dictated by AMM10. Also, AMM1, AMM2, AMM6, and AMM7 would be  
7 implemented to minimize impacts. Because of these offsetting near-term restoration and protection  
8 activities and AMMs, impacts would be less than significant. Typical project-level mitigation ratios  
9 (2:1 for protection) would indicate that 3,490 acres of protection would be needed to offset (i.e.,  
10 mitigate) the 1,745 acres of loss. The combination of two approaches (protection and restoration)  
11 contained in the BDCP conservation measures and avoidance and minimization measures is  
12 designed to avoid a temporal lag in the value of grassland habitat available to special-status species.  
13 The protection and restoration would be initiated at the beginning of Alternative 4 implementation  
14 to minimize any time lag in the availability of this habitat to special-status species.

### 15 **Late Long-Term Timeframe**

16 At the end of the Plan period, 2,947 acres of grassland natural community would be permanently or  
17 temporarily removed by conservation actions, 2,000 acres would be restored and 8,000 acres would  
18 be protected. Temporarily affected areas would also be restored (431 acres for Alternative 4). While  
19 there would be a net permanent reduction in the acreage of this natural community within the study  
20 area (total loss of 516 acres), there would be an increase in the value of grassland for special-status  
21 and common species in the study area through the combination of conservation actions (CM3 and  
22 CM8) and avoidance and minimization measures (AMM1, AMM2, AMM6, AMM7, and AMM10).  
23 Therefore, Alternative 4 would have a less-than-significant impact on this natural community.

### 24 **Impact BIO-30: Increased Frequency, Magnitude and Duration of Periodic Inundation of** 25 **Grassland Natural Community**

26 Two Alternative 4 conservation measures would modify the inundation/flooding regimes of both  
27 natural and man-made waterways in the study area. CM2, which is designed to improve fish passage  
28 and shallow flooded habitat for Delta fishes in the Yolo Bypass, would increase periodic inundation  
29 of grassland natural community at scattered locations, while CM5 would expose this community to  
30 additional flooding as channel margins are modified and levees are set back to improve fish habitat  
31 along some of the major rivers and waterways of the study area.

- 32 • *CM2 Yolo Bypass Fisheries Enhancement*: Operation of the Yolo Bypass under Alternative 4 would  
33 result in an increase in the frequency, magnitude and duration of inundation of 385–1,277 acres  
34 of grassland natural community. The methods used to estimate this inundation acreage are  
35 described in BDCP Appendix 5.J, *Effects on Natural Communities, Wildlife, and Plants*. The area  
36 more frequently affected by inundation would vary with the flow volume that would pass  
37 through the newly constructed notch in the Fremont Weir. The 385-acre increase in inundation  
38 would occur at the 1,000 cfs flow regime, while the 1,277-acre increase would occur at the 4,000  
39 cfs flow regime. Plan-related increases in flow through Fremont Weir would be expected in 30%  
40 of the years. The grassland community occurs throughout the bypass, including a large acreage  
41 just below Fremont Weir in the north end of the bypass, in stringers along the internal  
42 waterways of the bypass and in larger patches in the lower bypass. The anticipated change in  
43 management of flows in the Yolo Bypass includes more frequent releases in flows into the  
44 bypass from the Fremont and Sacramento Weirs, and in some years, later releases into the

1 bypass in spring months (April and May). The modification of periodic inundation events would  
2 not adversely affect grassland habitats, as they have persisted under similar high flows and  
3 extended inundation periods. There is the potential for some change in grass species  
4 composition as a result of longer inundation periods. The effects of this inundation on wildlife  
5 and plant species are described in detail in later sections of this chapter.

- 6 • *CM5 Seasonally Inundated Floodplain Restoration*: Floodplain restoration would result in an  
7 increase in the frequency and duration of inundation of 514 acres of grassland habitats. Specific  
8 locations for this restoration activity have not been identified, but they would likely be focused  
9 in the south Delta area, along the major rivers and Delta channels in CZ 7 (see Figure 12-1). The  
10 increase in periodic stream flooding events would not adversely affect the habitat values and  
11 functions of grassland natural community.

12 In summary, 899–1,791 acres of grassland natural community in the study area would be subjected  
13 to more frequent inundation as a result of implementing two Alternative 4 conservation measures  
14 (CM2 and CM5).

15 **NEPA Effects:** The grasslands in the Yolo Bypass and along river floodplains in the south Delta are  
16 conditioned to periodic inundation from flood flows; therefore, periodic inundation would not result  
17 in a net permanent reduction in the acreage of this community in the study area. Increasing periodic  
18 inundation of grassland natural community in the Yolo Bypass and along south Delta waterways  
19 would not constitute an adverse effect.

20 **CEQA Conclusion:** An estimated 899–1,791 acres of grassland natural community in the study area  
21 would be subjected to more frequent inundation as a result of implementing CM2 and CM5 under  
22 Alternative 4. The grassland natural community is conditioned to periodic inundation; therefore,  
23 periodic inundation would not result in a net permanent reduction in the acreage of this community  
24 in the study area. Increasing periodic inundation of grassland natural community in the Yolo Bypass  
25 and along south Delta waterways would have a less-than-significant impact on the community.

### 26 **Impact BIO-31: Modification of Grassland Natural Community from Ongoing Operation,** 27 **Maintenance and Management Activities**

28 Once the physical facilities associated with Alternative 4 are constructed and the stream flow regime  
29 associated with changed water management is in effect, there would be new ongoing and periodic  
30 actions associated with operation, maintenance and management of the BDCP facilities and  
31 conservation lands that could affect grassland natural community in the study area. The ongoing  
32 actions include modified operation of upstream reservoirs, the diversion of Sacramento River flows  
33 in the north Delta, and reduced diversions from south Delta channels. These actions are associated  
34 with CM1 (see Impact BIO-30 for effects associated with CM2). The periodic actions would involve  
35 access road and conveyance facility repair, vegetation management at the various water conveyance  
36 facilities and habitat restoration sites (CM11), levee repair and replacement of levee armoring,  
37 channel dredging, and habitat enhancement in accordance with natural community management  
38 plans. The potential effects of these actions are described below.

- 39 • *Modified river flows upstream of and within the study area and reduced diversions from south*  
40 *Delta channels.* Changes in releases from reservoirs upstream of the study area, increased  
41 diversion of Sacramento River flows in the north Delta, and reduced diversions from south Delta  
42 channels (associated with Operational Scenario H) would not result in the permanent reduction  
43 in acreage of grassland natural community in the study area. Flow levels in the upstream rivers

1 would not change such that the acreage of this community would be reduced on a permanent  
2 basis. The grassland along rivers upstream of planned north Delta diversions is primarily  
3 ruderal vegetation on levee banks and is dependent on winter and spring rains for germination  
4 and growth rather than on river levels. Similarly, increased diversions of Sacramento River  
5 flows in the north Delta would not result in a permanent reduction in grassland natural  
6 community downstream of these diversions. The reductions in flows below the intakes would  
7 occur primarily in the wet months when the existing nonnative annual grasslands along river  
8 levees are dormant, and like upstream grassland, this community is dependent on winter and  
9 spring rains for germination and growth in the winter and spring months, not on river stage.  
10 Anticipated small changes in river salinity in the west Delta and Suisun Marsh would not create  
11 a substantial change in grassland acreage in these areas. Reduced diversions from south Delta  
12 channels would not create a reduction in this natural community.

- 13 ● *Access road, water conveyance facility and levee repair.* Periodic repair of access roads, water  
14 conveyance facilities and levees associated with the BDCP actions have the potential to require  
15 removal of adjacent vegetation and could entail earth and rock work in grassland habitats. This  
16 activity could lead to increased soil erosion and runoff entering these habitats. These activities  
17 would be subject to normal erosion and runoff control management practices, including those  
18 developed as part of *AMM2 Construction Best Management Practices and Monitoring* and *AMM4*  
19 *Erosion and Sediment Control Plan*. Any vegetation removal or earthwork adjacent to or within  
20 grassland habitats would require use of sediment barriers, soil stabilization and revegetation of  
21 disturbed surfaces (*AMM10 Restoration of Temporarily Affected Natural Communities*). Proper  
22 implementation of these measures would avoid permanent adverse effects on this community.
- 23 ● *Vegetation management.* Vegetation management, in the form of physical removal and chemical  
24 treatment, would be a periodic activity associated with the long-term maintenance of water  
25 conveyance facilities and restoration sites (*CM11 Natural Community Enhancement and*  
26 *Management*). Use of herbicides to control nuisance vegetation could pose a long-term hazard to  
27 grassland natural community at or adjacent to treated areas. The hazard could be created by  
28 uncontrolled drift of herbicides, uncontrolled runoff of contaminated stormwater onto the  
29 natural community, or direct discharge of herbicides to grassland areas being treated for  
30 invasive species removal. Environmental commitments and *AMM5 Spill Prevention, Containment,*  
31 *and Countermeasure Plan* have been made part of the BDCP to reduce hazards to humans and  
32 the environment from use of various chemicals during maintenance activities, including the use  
33 of herbicides. These commitments are described in Appendix 3B, including the commitment to  
34 prepare and implement spill prevention, containment, and countermeasure plans and  
35 stormwater pollution prevention plans. Best management practices, including control of drift  
36 and runoff from treated areas, and use of herbicides approved for use in terrestrial  
37 environments would also reduce the risk of affecting natural communities adjacent to water  
38 conveyance features and levees associated with restoration activities.
- 39 ● *Channel dredging.* Long-term operation of the Alternative 4 intakes on the Sacramento River  
40 would include periodic dredging of sediments that might accumulate in front of intake screens.  
41 The dredging could occur adjacent to grassland natural community. This activity should not  
42 permanently reduce the acreage of grassland natural community because it is periodic in  
43 nature; the grassland in the vicinity of the proposed intakes is ruderal grasses and herbs with  
44 low habitat value.
- 45 ● *Habitat enhancement.* The BDCP includes a long-term management element for the natural  
46 communities within the Plan Area (CM11). For the grassland natural community, a management

1 plan would be prepared that specifies actions to improve the value of the habitats for covered  
2 species. Actions would include control of invasive nonnative plant and animal species, fire  
3 management, restrictions on vector control and application of herbicides, and maintenance of  
4 infrastructure that would allow for movement through the community. The enhancement efforts  
5 would improve the long-term value of this community for both special-status and common  
6 species.

7 The various operations and maintenance activities described above could alter acreage of grassland  
8 natural community in the study area through changes in flow patterns and changes in periodic  
9 inundation of this community. Activities could also introduce sediment and herbicides that would  
10 reduce the value of this community to common and sensitive plant and wildlife species. Other  
11 periodic activities associated with the Plan, including management, protection and enhancement  
12 actions associated with *CM3 Natural Communities Protection and Restoration* and *CM11 Natural*  
13 *Communities Enhancement and Management*, would be undertaken to enhance the value of the  
14 community. While some of these activities could result in small changes in acreage, these changes  
15 would be greatly offset by restoration activities planned as part of *CM8 Grassland Natural*  
16 *Community Restoration*, or minimized by implementation of AMM2, AMM4, AMM5, and AMM10. The  
17 management actions associated with levee repair, periodic dredging and control of invasive plant  
18 species would also result in a long-term benefit to the species associated with grassland habitats by  
19 improving water movement in adjacent waterways and by eliminating competitive, invasive species  
20 of plants.

21 **NEPA Effects:** Ongoing operation, maintenance and management activities associated with  
22 Alternative 4 would not result in a net permanent reduction in grassland natural community within  
23 the study area. Therefore, there would be no adverse effect on this natural community.

24 **CEQA Conclusion:** The operation and maintenance activities associated with Alternative 4 would  
25 have the potential to create minor changes in total acreage of grassland natural community in the  
26 study area, and could create temporary increases sedimentation. The activities could also introduce  
27 herbicides periodically to control nonnative, invasive plants. Implementation of environmental  
28 commitments and AMM2, AMM4, AMM5, and AMM10 would minimize these impacts, and other  
29 operations and maintenance activities, including management, protection and enhancement actions  
30 associated with *CM3 Natural Communities Protection and Restoration* and *CM11 Natural*  
31 *Communities Enhancement and Management*, would create positive effects, including reduced  
32 competition from invasive, nonnative plants in these habitats. Long-term restoration activities  
33 associated with *CM8 Grassland Natural Community Restoration* and protection actions associated  
34 with *CM3 Natural Communities Protection and Restoration* would increase the value of this natural  
35 community in the study area. Ongoing operation, maintenance and management activities would not  
36 result in a net permanent reduction in this natural community within the study area. Therefore,  
37 there would be a less-than-significant impact on the grassland natural community.

### 38 **Inland Dune Scrub**

39 The inland dune scrub natural community is composed of vegetated, stabilized sand dunes  
40 associated with river and estuarine systems. In the study area, the inland dune scrub community  
41 consists of remnants of low-lying ancient stabilized dunes related to the Antioch Dunes formation  
42 located near the town of Antioch (CZ 10; see Figure 12-1). While inland dune scrub is within the  
43 BDCP Plan Area, none of the Alternative 4 conservation measures or covered actions is expected to  
44 affect this community.

1       **Cultivated Lands**

2       Cultivated lands is the major land cover type in the study area (487,106 acres, see Table 12-1). The  
3       Delta, the Yolo Bypass and the Cache Slough drainage are dominated by various types of agricultural  
4       activities, with crop production the dominant element (see Figure 12-1). Major crops and cover  
5       types in agricultural production include grain and hay crops (wheat, oats and barley), field crops  
6       (corn, beans and safflower), truck crops (tomatoes, asparagus and melons), pasture (alfalfa, native  
7       and nonnative pasture), rice, orchards, and vineyards. Tables 12-2 and 12-3 list special-status  
8       wildlife species supported by cultivated lands.

9       The effects of Alternative 4 on cultivated lands are discussed from various perspectives in this  
10      document. Chapter 14, *Agricultural Resources*, includes a detailed analysis of cropland conversion as  
11      it relates to agricultural productivity. Many of the discussions of individual terrestrial plant and  
12      wildlife species in this chapter also focus on the relevance of cultivated land loss. Because cultivated  
13      lands is not a natural community and because the effects of its loss are captured in the individual  
14      species analyses, there is no separate analysis of this land cover type presented here. Table 14-8 in  
15      Chapter 14 provides a comparison of important farmland losses that would result from construction  
16      of CM1 water conveyance facilities for each alternative, and Table 14A-1 in Appendix 14A, *Individual*  
17      *Crop Effects as a Result of BDCP Water Conveyance Facility Construction*, provides a similar  
18      comparison for losses of individual crops. Table 12-ES-1 in this chapter's Summary of Effects  
19      identifies the total cultivated land loss for all project alternatives. For Alternative 4, the total loss  
20      (permanent and temporary) is estimated to be 58,324 acres. The majority of the permanent loss  
21      would be associated with habitat restoration activities, specifically Yolo Bypass fisheries  
22      enhancement (CM2; 629 acres), tidal marsh restoration (CM4; 39,565 acres), floodplain restoration  
23      (CM5; 2,087 acres), riparian natural community restoration (CM7; 4,553 acres), grassland  
24      restoration (CM8; 2,000 acres) and nontidal marsh restoration (CM10; 1,950 acres). Construction of  
25      the modified tunnel and associated water conveyance facilities (CM1) would permanently remove  
26      4,588 acres of cultivated lands.

27      **Developed Lands**

28      Additional lands in the study area that were not designated with a natural community type have  
29      been characterized as developed lands (90,660 acres). Developed lands include lands with  
30      residential, industrial, and urban land uses, as well as landscaped areas, riprap, road surfaces and  
31      other transportation facilities (see Figure 12-1 and the Terrestrial Biology Mapbook). Developed  
32      lands support some common plant and wildlife species, whose abundance and species richness vary  
33      with the intensity of development. One special-status species, the giant garter snake, is closely  
34      associated with a small element of developed lands; specifically, embankments and levees near  
35      water that are covered with riprap provide giant garter snake habitat.

36      As with cultivated lands, no effort has been made to analyze the effects of Alternative 4 conservation  
37      measures on this land cover type because it is not a natural community. The effects of its conversion  
38      are discussed in Chapter 13, *Land Use*. Where the loss of developed lands may affect individual  
39      special-status species or common species, the impact analysis is contained in that species  
40      discussion.

## 1 **Wildlife Species**

### 2 **Vernal Pool Crustaceans**

3 This section describes the effects of Alternative 4, including water conveyance facilities construction  
4 and implementation of other conservation components, on vernal pool crustaceans (California  
5 linderiella, Conservancy fairy shrimp, longhorn fairy shrimp, midvalley fairy shrimp, vernal pool  
6 fairy shrimp, and vernal pool tadpole shrimp). The habitat model used to assess effects for the  
7 vernal pool crustaceans consists of: vernal pool complex, which consists of vernal pools and uplands  
8 that display characteristic vernal pool and swale visual signatures that have not been significantly  
9 affected by agricultural or development practices; alkali seasonal wetlands in CZ 8; and degraded  
10 vernal pool complex, which consists of low-value ephemeral habitat ranging from areas with vernal  
11 pool and swale visual signatures that display clear evidence of significant disturbance due to  
12 plowing, disking, or leveling to areas with clearly artificial basins such as shallow agricultural  
13 ditches, depressions in fallow fields, and areas of compacted soils in pastures. For the purpose of the  
14 effects analysis, vernal pool complex is categorized as high-value for vernal pool crustaceans and  
15 degraded vernal pool complex is categorized as low-value for these species. Alkali seasonal wetlands  
16 in CZ 8 were included in the model as high-value habitat for vernal pool crustaceans. Also included  
17 as low-value habitat for vernal pool crustaceans are areas along the eastern boundary of CZ 11 that  
18 are mapped as vernal pool complex because they flood seasonally and support typical vernal pool  
19 plants, but which do not include topographic depressions that are characteristic of vernal pool  
20 crustacean habitat.

21 Construction and restoration associated with Alternative 4 conservation measures would result in  
22 permanent losses (see Table 12-4-12) and indirect conversions of vernal pool crustacean modeled  
23 habitat. The majority of the losses would take place over an extended period of time as tidal marsh is  
24 restored in the Plan Area. Full implementation of Alternative 4 would also include the following  
25 conservation actions over the term of the BDCP to benefit vernal pool crustaceans (BDCP Chapter 3,  
26 *Conservation Strategy*).

- 27 ● Protect 600 acres of vernal pool complex in CZ 1, CZ 8, or CZ 11, primarily in core vernal pool  
28 recovery areas (Objective VPNC1.1, associated with CM3).
- 29 ● Restore vernal pool complex in CZ 1, CZ 8, and CZ 11 to achieve no net loss of vernal pool  
30 acreage (up to 67 acres of vernal pool complex restoration [10 wetted acres])(Objective  
31 VPNC1.2, associated with CM9).
- 32 ● Increase size and connectivity of protected vernal pool complexes in plan area and increase  
33 connectivity with complexes outside the Plan Area (Objective VPNC1.3)
- 34 ● Protect the range of inundation characteristics of vernal pools in the Plan Area (Objective  
35 VPNC1.4)
- 36 ● Maintain and enhance vernal pool complexes to provide appropriate inundation (ponding) for  
37 supporting and sustaining vernal pool species (Objective VPNC2.1)
- 38 ● Protect one currently unprotected occurrence of conservancy fairy shrimp (Objective VPC1.1)

39 As explained below, with the restoration or protection of these amounts of habitat, in addition to  
40 implementation of AMMs, impacts on vernal pool crustaceans would not be adverse for NEPA  
41 purposes and would be less than significant for CEQA purposes.

1 **Table 12-4-12. Changes in Vernal Pool Crustacean Modeled Habitat Associated with Alternative 4**  
2 **(acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	High-value	8	8	16	16	NA	NA
	Low-value	7	7	2	2	NA	NA
<b>Total Impacts CM1</b>		<b>15</b>	<b>15</b>	<b>18</b>	<b>18</b>	<b>NA</b>	<b>NA</b>
CM2-CM18 <sup>b</sup>	High-value	0	0	0	0	0-4	0
	Low-value	201	372	0	0	0	0
<b>Total Impacts CM2-CM18</b>		<b>201</b>	<b>372</b>	<b>0</b>	<b>0</b>	<b>0-4</b>	<b>0</b>
<b>TOTAL IMPACTS</b>		<b>216</b>	<b>387</b>	<b>18</b>	<b>18</b>	<b>0-4</b>	<b>0</b>

<sup>a</sup> See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

3  
4 **Impact BIO-32: Loss or Conversion of Habitat for and Direct Mortality of Vernal Pool**  
5 **Crustaceans**

6 Alternative 4 conservation measures would result in the direct, permanent loss of up to 387 acres of  
7 modeled vernal pool crustacean habitat from conveyance facilities construction (CM1) and tidal  
8 restoration (CM4). In addition, the conservation measures could result in the indirect conversion  
9 due to hydrologic changes of an additional 145 acres of vernal pool crustacean habitat (98 acres of  
10 high-value habitat and 47 acres of low-value habitat) from conveyance facilities construction (CM1)  
11 and based on the hypothetical footprints for tidal restoration (CM4). Construction of the water  
12 conveyance facilities and restoration activities may result in the modification of hardpan and  
13 changes to the perched water table, which could lead to alterations in the rate, extent, and duration  
14 of inundation of nearby vernal pool crustacean habitat. USFWS typically considers construction  
15 within 250 feet of vernal pool crustacean habitat to constitute a possible conversion of crustacean  
16 habitat unless more detailed information is provided to further refine the limits of any such effects.  
17 For the purposes of this analysis, the 250-foot buffer was applied to the water conveyance facilities  
18 work areas where surface and subsurface disturbance activities would take place and to restoration  
19 hypothetical footprints. Habitat enhancement and management activities (CM11), which include  
20 disturbance or removal of nonnative vegetation, could result in local adverse habitat effects.

21 Alternative 4 would also result in impacts on critical habitat for Conservancy fairy shrimp (248  
22 acres), vernal pool fairy shrimp (462 acres), and vernal pool tadpole shrimp (270 acres). The  
23 hypothetical tidal restoration (CM4) footprints in CZ 11 account for all of the effects on critical

1 habitat for Conservancy fairy shrimp and vernal pool tadpole shrimp. Vernal pool fairy shrimp  
2 critical habitat would also be affected by CM4 in this same area and would be affected by  
3 conveyance facilities construction (CM1) west of Clifton Court Forebay. *AMM12 Vernal Pool*  
4 *Crustaceans* would ensure that there would be no adverse modification of the primary constituent  
5 elements of critical habitat for these species.

6 Because the estimates of habitat loss resulting from tidal inundation are based on projections of  
7 where restoration may occur, actual effects are expected to be lower because sites would be selected  
8 and restoration projects designed to minimize or avoid effects on the covered vernal pool  
9 crustaceans. As specified in *AMM12 Vernal Pool Crustaceans* and *CM9 Vernal Pool and Alkali Seasonal*  
10 *Wetland Complex Restoration*, the BDCP Implementation Office would ensure that tidal restoration  
11 projects and other covered activities would be designed such that no more than a total of 10 wetted  
12 acres of vernal pool crustacean habitat are permanently lost. AMM12 would also ensure that no  
13 more than 20 wetted acres of vernal pool crustacean habitat are indirectly affected by alterations to  
14 hydrology resulting from adjacent BDCP covered activities, in particular tidal restoration. *AMM30*  
15 *Transmission Line Design and Alignment Guidelines* would ensure that temporary transmission lines  
16 avoid removal of wetted acres of vernal pools and alkali seasonal wetlands. The term *wetted acres*  
17 refers to an area that would be defined by the three parameter wetland delineation method used by  
18 the U.S. Army Corps of Engineers to determine the limits of a wetland, which involve an evaluation  
19 of wetland soil, vegetation, and hydrology characteristics. This acreage differs from vernal pool  
20 complex acreages in that a vernal pool complex is composed of individual wetlands (vernal pools)  
21 and those upland areas that are in between and surrounding them, which provide the supporting  
22 hydrology (surface runoff and groundwater input), organic and nutrient inputs, and refuge for the  
23 terrestrial phase of some vernal pool species.

24 A summary statement of the combined impacts and NEPA and CEQA conclusions follows the  
25 individual conservation measure discussions.

- 26 • *CM1 Water Facilities and Operation*: Construction of Alternative 4 conveyance facilities would  
27 result in the permanent and temporary combined loss of approximately 33 acres of vernal pool  
28 crustacean habitat, composed of 24 acres of high-value and 9 acres of low-value habitat (Table  
29 12-4-12). The construction of the conveyance facilities would result in the permanent loss of one  
30 vernal pool fairy shrimp CNDDDB occurrence as a result of the expansion of Clifton Court  
31 Forebay. In addition, conveyance facility construction could result in the indirect conversion of  
32 10 acres of modeled vernal pool crustacean habitat in the vicinity of Clifton Court Forebay. The  
33 indirect effects would result from the construction of temporary transmission lines and from the  
34 storage of RTM. The affected areas consist of 8 acres of high-quality habitat and 2 acres of low-  
35 quality habitat and there are records of vernal pool fairy shrimp and midvalley fairy shrimp in  
36 the vicinity of these areas (California Department of Fish and Game 2012). Alternative 4 would  
37 also result in the permanent loss of 178 acres and temporary impacts on 14 acres of critical  
38 habitat for vernal pool fairy shrimp. The permanent impacts on critical habitat are associated  
39 with the a RTM disposal area west of Clifton Court Forebay (173 acres) and a permanent access  
40 road just south of this area (5 acres). The RTM disposal area has been mapped by the BDCP as  
41 mostly cultivated lands with the more eastern portion mapped as grasslands. An existing farm  
42 road would serve as the permanent access road, so there likely would be no disturbance to  
43 vernal pool crustacean habitat associated with any improvements to this road. The 14 acres of  
44 temporary impacts are associated with a temporary transmission line between Byron Highway  
45 and Clifton Court Forebay. Approximately half of this area is mapped by the BDCP as vernal pool  
46 complex. *AMM12 Vernal Pool Crustaceans* would ensure that there would be no adverse

1 modification of the primary constituent elements of critical habitat for these species. *AMM30*  
2 *Transmission Line Design and Alignment Guidelines* would ensure that temporary transmission  
3 lines are designed to avoid removal of wetted acres of vernal pools and alkali seasonal wetlands.

- 4 • *CM4 Tidal Natural Communities Restoration*: Tidal natural communities restoration would result  
5 in the permanent loss of approximately 372 acres of low-value vernal pool crustacean habitat,  
6 which consists of degraded vernal pool complex. The BDCP describes degraded vernal pool  
7 complex as areas of low-value ephemeral habitat ranging from areas with vernal pool and swale  
8 visual signatures that display clear evidence of significant disturbance due to plowing, disking,  
9 or leveling to areas with clearly artificial basins such as shallow agricultural ditches, depressions  
10 in fallow fields, and areas of compacted soils in pastures. The actual density of vernal pools or  
11 other aquatic features in these areas is unknown, but a 2012 review of Google Earth imagery of  
12 these habitats found that they appear to generally have low densities. However, areas mapped  
13 as degraded vernal pool complex may still provide habitat for vernal pool crustaceans as  
14 evidenced by records of vernal pool fairy shrimp, vernal pool tadpole shrimp, and California  
15 linderiella occurring in degraded vernal pool complex in CZ 4 (California Department of Fish and  
16 Game 2012). Helm (1998) notes that many vernal pool crustaceans can occur in degraded  
17 vernal pool habitats and artificial habitats. In CZ 2 and CZ 4, there are several records of covered  
18 vernal pool crustaceans occurring outside of modeled habitat in areas that appear to be road  
19 side ditches. So though degraded vernal pool complexes may not represent botanically diverse  
20 vernal pools they still can provide habitat for vernal pool crustaceans and thus the loss of 372  
21 acres of degraded vernal pool complex may result in the loss of occupied vernal pool crustacean  
22 habitat. In addition, tidal restoration could result in the indirect conversion of 135 acres of  
23 vernal pool crustacean habitat, which consist of 90 acres of high-value and 45 acres of low-value  
24 habitat. The hypothetical restoration footprints overlap with a CNDDDB record for vernal pool  
25 fairy shrimp near the current edge of Suisun Marsh. Tidal natural community restoration under  
26 Alternative 4 would also result in impacts on critical habitat for Conservancy fairy shrimp (248  
27 acres), vernal pool tadpole shrimp (270 acres), and vernal pool fairy shrimp (270 acres). *AMM12*  
28 *Vernal Pool Crustaceans* would ensure that there would be no adverse modification of the  
29 primary constituent elements of critical habitat for these species.

- 30 • *CM11 Natural Communities Enhancement and Management*: As described in the BDCP,  
31 restoration/creation of vernal pools to achieve no net loss and the protection of 600 acres of  
32 vernal pool complex would benefit vernal pool crustaceans (Table 12-4-12). A variety of habitat  
33 management actions included in CM11 that are designed to enhance wildlife values in BDCP-  
34 protected habitats may result in localized ground disturbances that could temporarily affect  
35 vernal pool crustacean habitat. Ground-disturbing activities, such as removal of nonnative  
36 vegetation and road and other infrastructure maintenance, are expected to have minor effects  
37 on vernal pool crustacean habitat and are expected to result in overall improvements to and  
38 maintenance of vernal pool crustacean habitat values over the term of the BDCP. These effects  
39 cannot be quantified, but are expected to be minimal and would be avoided and minimized by  
40 the AMMs listed below.

41 The following paragraphs summarize the combined effects discussed above and describe other  
42 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA impact conclusions are  
43 also included. Table 12-4-13 was prepared to further analyze BDCP effects on vernal pool  
44 crustaceans using wetted acres of habitat in order to compare the effects of this alternative with the  
45 effect limits established in BDCP Chapter 3, Section 3.3, *Biological Goals and Objectives* and *AMM12*  
46 *Vernal Pool Crustaceans*, which are measured in wetted acres of habitat. Wetted acres were

1 estimated by using the BDCP’s assumption that restored vernal pool complexes would have a 15%  
 2 density of vernal pools (i.e., of 100 acres of vernal pool complex 15 acres would constitute vernal  
 3 pools and the remaining 85 acres supporting uplands). Based on an informal evaluation of aerial  
 4 photographs of the Plan Area it is likely that the actual densities within the Plan Area are  
 5 approximately 10%, but the 15% density value was chosen as a conservative estimate for  
 6 determining effects.

7 **Table 12-4-13. Estimated Effects on Wetted Vernal Pool Crustacean Habitat under Alternative 4**  
 8 **(acres)**

	Direct Loss		Indirect Conversion	
	Near-Term	Late Long-Term	Near-Term	Late Long-Term
BDCP Impact Limit <sup>a</sup>	5	10	10	20
Alternative 4 Impact <sup>b</sup>	CM1 <sup>c</sup>	5.0	1.5	1.5
	CM4 <sup>d</sup>	30.2	11.0	20.3
<b>Total</b>		<b>35.2</b>	<b>12.5</b>	<b>21.8</b>

- <sup>a</sup> Because roughly half of the impacts would occur in the near-term, it is assumed that the impact limit in the near-term would be 5 wetted acres for direct loss and 10 acres for indirect.
- <sup>b</sup> These acreages were generated by assuming that the modeled habitat identified in Table 12-4-12 has densities of wetted habitat at 15%. The direct effects numbers include permanent and temporary impacts.
- <sup>c</sup> The temporary impacts from transmission line construction associated with CM1 would be zero because the commitment in AMM30, which calls for temporary transmission lines to avoid removal of alkali seasonal wetland and vernal pool wetted acres. This would lower CM1 impacts to 2.3 acres.
- <sup>d</sup> These impacts are based on the hypothetical restoration footprints and would likely be lower based on the BDCP’s commitment to minimize and avoid effects on vernal pool crustacean habitat as much as practicable. The values for near-term indirect effects were assumed to be slightly more than half of what the late long-term value would be.

9

10 ***Near-Term Timeframe***

11 Because the water conveyance facilities construction is being evaluated at the project level, the near-  
 12 term BDCP conservation strategy has been evaluated to determine whether it would provide  
 13 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the effects of  
 14 construction would not be adverse under NEPA and would be less than significant under CEQA.  
 15 Table 12-4-13 lists the impacts on modeled vernal pool crustacean habitat that is based on the  
 16 natural community mapping done within the study area. The impacts from tidal natural  
 17 communities restoration (CM4) are based on hypothetical footprints and do not reflect actual  
 18 impacts on vernal pool crustacean habitat considering the BDCP’s commitment to design projects to  
 19 minimize or avoid effects on covered vernal pool crustaceans (see AMM12 and AMM30). As seen in  
 20 Table 12-4-13, Alternative 4 would not meet the Plan’s near-term biological goals and objectives for  
 21 direct loss and indirect conversion unless near-term projects are designed to ensure that they do not  
 22 exceed these impact limits.

23 Typical NEPA and CEQA project-level mitigation ratios for loss of vernal pools affected by CM1  
 24 would be 1:1 for restoration and 2:1 for protection. Typically, indirect conversion impacts are  
 25 mitigated by protecting vernal pools at a 2:1 ratio. Using these typical ratios would indicate that 5  
 26 wetted acres of vernal pool crustacean habitat (or 33 acres of vernal pool complex) should be  
 27 restored and 13 wetted acres (or 87 acres of vernal pool complex) protected to mitigate the CM1

1 direct and indirect effects on vernal pool crustacean habitat. However, with the implementation of  
2 AMM30 the effects on wetted acres of vernal pool crustacean habitat from CM1 would be reduced by  
3 approximately 2.7 acres (18 acres of modeled vernal pool crustacean habitat) by redesigning the  
4 temporary transmission line west of Clifton Court Forebay. Assuming that the BDCP would apply the  
5 impact limits presented in Table 12-4-13 and implement AMM30, impacts on wetted vernal pools  
6 resulting from tidal restoration in the near-term could not exceed 2.7 acres of direct effects on  
7 wetted vernal pool crustacean habitat and 9.5 wetted acres of indirect effects. The impacts based on  
8 the hypothetical tidal restoration footprints would exceed these limits. When and if these limits are  
9 met, the BDCP would need to restore up to 5 wetted acres (33 acres of vernal pool complex) and  
10 protect up to 30 wetted acres (200 acres of vernal pool complex) in the near-term to offset the  
11 effects of CM1 and CM4.

12 The BDCP has committed to near-term goal of protecting 400 acres of vernal pool complex (see  
13 Table 3-4 in Chapter 3, *Description of Alternatives*) by protecting at least 2 wetted acres of vernal  
14 pools for each wetted acre directly or indirectly affected. The BDCP has also committed to  
15 restoring/creating vernal pools such that there is no net loss of vernal pool acreage. The amount of  
16 restoration would be determined during implementation based on the following criteria.

- 17 ● If restoration is completed (i.e., restored natural community meets all success criteria) prior to  
18 impacts, then 1.0 wetted acre of vernal pools would be restored for each wetted acre directly  
19 affected (1:1 ratio).
- 20 ● If restoration takes place concurrent with impacts (i.e., restoration construction is completed,  
21 but restored habitat has not met all success criteria, prior to impacts occurring), then 1.5 wetted  
22 acres of vernal pools would be restored for each wetted acre directly affected (1.5:1 ratio).

23 The species-specific biological goals and objectives would also inform the near-term protection and  
24 restoration efforts. These Plan goals represent performance standards for considering the  
25 effectiveness of restoration actions. The acres of protection and restoration contained in the near-  
26 term Plan goals would keep pace with the loss of habitat and effects on vernal pool crustacean  
27 habitat.

28 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
29 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
30 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
31 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
32 *Material*, *AMM10 Restoration of Temporarily Affected Natural Communities*, *AMM12 Vernal Pool*  
33 *Crustaceans*, *AMM30 Transmission Line Design and Alignment Guidelines*, and *AMM37 Recreation*. All  
34 of these AMMs include elements that avoid or minimize the risk of affecting habitats and species  
35 adjacent to work areas. The AMMs are described in detail in BDCP Appendix 3.C.

### 36 ***Late Long-Term Timeframe***

37 The BDCP states that covered activities would not result in more than 10 wetted acres of direct loss  
38 and no more than 20 wetted acres of indirect conversion effects on vernal pools by the late long-  
39 term (see Objective VPNC1.2 and AMM12). As seen in Table 12-4-13 and discussed above, the effects  
40 of CM1 alone would be within the near-term limits, but overall Alternative 4 would not meet the  
41 Plan's late long-term biological goals and objectives for direct and indirect effects unless tidal  
42 restoration projects are designed to ensure that they do not exceed these impact limits.

1 The Plan has committed to a late long-term goal of protecting 600 acres of vernal pool complex in  
2 either Conservation Zones 1, 8, or 11, primarily in core vernal pool recovery areas (Objective  
3 VPNC1.1) by protecting at least 2 wetted acres of vernal pools protected for each wetted acre  
4 directly or indirectly affected. The Plan also includes a commitment to restore or create vernal pools  
5 such that the Plan results in no net loss of vernal pool acreage (Objective VPNC1.2). The protection  
6 and restoration would be achieved using the criteria presented above as well as by following the  
7 other specific biological goals and objectives, which include:

- 8 ● Increasing the size and connectivity of protected vernal pool complexes (Objective VPNC1.3)
- 9 ● Protecting the range of inundation characteristics that are currently represented by vernal pool  
10 throughout the Plan Area (Objective VPNC1.4)
- 11 ● Protecting one currently unprotected occurrence of conservancy fairy shrimp (Objective  
12 VPC1.1)

13 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6) estimates that the restoration  
14 and protection actions discussed above, as well as the restoration and protection of alkali seasonal  
15 wetlands that could overlap with the species model, could result in the restoration of 51 acres and  
16 the protection of 608 acres of modeled habitat for vernal pool crustaceans.

17 **NEPA Effects:** The near-term loss of vernal pool crustacean habitat under Alternative 4 would not be  
18 adverse under NEPA because the BDCP has committed to avoiding and minimizing effects from tidal  
19 restoration and to restoring and protecting an acreage that meets or exceeds the typical mitigation  
20 ratios described above. In the absence of other conservation actions, the modification of vernal pool  
21 crustacean habitat and potential mortality of a special-status species resulting from Alternative 4 in  
22 the late long-term would represent an adverse effect. However, the BDCP has committed to impact  
23 limits for vernal pool crustacean habitat and to habitat protection, restoration, management, and  
24 enhancement associated with CM3, CM9, and CM11. This habitat protection, restoration,  
25 management and enhancement would be guided by species-specific goals and objectives, and by  
26 AMM1-AMM6, AMM10, AMM12, AMM30, and AMM37, which would be in place throughout the  
27 period of construction. Considering these commitments, losses and conversion of vernal pool  
28 crustacean habitat under Alternative 4 would not be an adverse effect.

### 29 **CEQA Conclusion:**

#### 30 **Near-Term Timeframe**

31 Because the water conveyance facilities construction is being evaluated at the project level, the near-  
32 term BDCP conservation strategy has been evaluated to determine whether it would provide  
33 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the impacts of  
34 construction would be less than significant. Table 12-4-12 above lists the impacts on modeled vernal  
35 pool crustacean habitat that is based on the natural community mapping done within the study area.  
36 The impacts from tidal natural communities restoration (CM4) are based on hypothetical footprints  
37 and do not reflect actual impacts on vernal pool crustacean habitat considering the BDCP's  
38 commitment to design restoration projects to minimize or avoid effects on covered vernal pool  
39 crustaceans (see AMM12 and AMM30). As seen in Table 12-4-13, Alternative 4 would not meet the  
40 Plan's near-term biological goals and objectives for direct and indirect effects unless near-term  
41 projects are designed to ensure that they do not exceed these impact limits.

42 Typical NEPA and CEQA project-level mitigation ratios for loss of vernal pools affected by CM1  
43 would be 1:1 for restoration and 2:1 for protection. Typically, indirect conversion impacts are

1 mitigated by protecting vernal pools at a 2:1 ratio. Using these typical ratios would indicate that 5  
2 wetted acres of vernal pool crustacean habitat (or 33 acres of vernal pool complex) should be  
3 restored and 13 wetted acres (or 87 acres of vernal pool complex) protected to mitigate the CM1  
4 direct and indirect effects on vernal pool crustacean habitat. However, with the implementation of  
5 AMM30 the effects on wetted acres of vernal pool crustacean habitat from CM1 would be reduced by  
6 approximately 2.7 acres (18 acres of modeled vernal pool crustacean habitat) by redesigning the  
7 temporary transmission line west of Clifton Court Forebay. Assuming that the BDCP would apply the  
8 impact limits presented in Table 12-4-13 and implement AMM30, impacts on wetted vernal pools  
9 resulting from tidal restoration in the near-term could not exceed 2.7 acres of direct effects on  
10 wetted vernal pool acreage and 9.5 wetted acres of indirect effects. The impacts based on the  
11 hypothetical tidal restoration footprints would exceed these limits. When and if these limits are met,  
12 the BDCP would need to restore up to 5 wetted acres (33 acres of vernal pool complex) and protect  
13 up to 30 wetted acres (200 acres of vernal pool complex) in the near-term to offset the effects of  
14 CM1 and CM4.

15 The BDCP has committed to near-term goal of protecting 400 acres of vernal pool complex (see  
16 Table 3-4 in Chapter 3, *Description of Alternatives*) by protecting at least 2 wetted acres of vernal  
17 pools for each wetted acre directly or indirectly affected. The BDCP has also committed to  
18 restoring/creating vernal pools such that there is no net loss of vernal pool acreage. The amount of  
19 restoration would be determined during implementation based on the following criteria.

- 20 • If restoration is completed (i.e., restored natural community meets all success criteria) prior to  
21 impacts, then 1.0 wetted acre of vernal pools would be restored for each wetted acre directly  
22 affected (1:1 ratio).
- 23 • If restoration takes place concurrent with impacts (i.e., restoration construction is completed,  
24 but restored habitat has not met all success criteria, prior to impacts occurring), then 1.5 wetted  
25 acres of vernal pools would be restored for each wetted acre directly affected (1.5:1 ratio).

26 The species-specific biological goals and objectives would also inform the near-term protection and  
27 restoration efforts. These Plan goals represent performance standards for considering the  
28 effectiveness of restoration actions. The acres of protection and restoration contained in the near-  
29 term Plan goals would keep pace with the loss of habitat and effects on vernal pool crustacean  
30 habitat.

31 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
32 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
33 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
34 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
35 *Material*, *AMM10 Restoration of Temporarily Affected Natural Communities*, *AMM12 Vernal Pool*  
36 *Crustaceans*, *AMM30 Transmission Line Design and Alignment Guidelines*, and *AMM37 Recreation*. All  
37 of these AMMs include elements that avoid or minimize the risk of affecting habitats and species  
38 adjacent to work areas. The AMMs are described in detail in BDCP Appendix 3.C.

39 The natural community restoration and protection activities are expected to be concluded in the  
40 first 10 years of Plan implementation, which is close enough in time to the occurrence of impacts on  
41 constitute adequate mitigation for CEQA purposes. These commitments, implemented together with  
42 the AMMs and biological goals and objectives, are more than sufficient to support the conclusion  
43 that the near-term effects of Alternative 4 would be less than significant under CEQA.

1 **Late Long-Term Timeframe**

2 The BDCP states that covered activities would not result in more than 10 wetted acres of direct loss  
3 and no more than 20 wetted acres of indirect conversion effects on vernal pools by the late long-  
4 term (see Objective VPNC1.2 and AMM12). As seen in Table 12-4-13, the effects of CM1 alone would  
5 be well within the near-term limits, but overall Alternative 4 would not meet the Plan's late long-  
6 term biological goals and objectives for direct and indirect effects unless near-term tidal restoration  
7 projects are designed to ensure that that they do not exceed these impact limits.

8 The Plan has committed to late long-term goal of protecting 600 acres of vernal pool complex in  
9 either Conservation Zones 1, 8, or 11, primarily in core vernal pool recovery areas (Objective  
10 VPNC1.1) by protecting at least 2 wetted acres of vernal pools protected for each wetted acre  
11 directly or indirectly affected. The Plan also includes a commitment to restore or create vernal pools  
12 such that the Plan results in no net loss of vernal pool acreage (Objective VPNC1.2). The protection  
13 and restoration would be achieved using the criteria presented above as well as by following the  
14 other specific biological goals and objectives, which include:

- 15 ● Increasing the size and connectivity of protected vernal pool complexes (Objective VPNC1.3)
- 16 ● Protecting the range of inundation characteristics that are currently represented by vernal pool  
17 throughout the Plan Area (Objective VPNC1.4)
- 18 ● Protecting one currently unprotected occurrence of conservancy fairy shrimp (Objective  
19 VPC1.1)

20 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6) estimates that the restoration  
21 and protection actions discussed above, as well as the restoration and protection of alkali seasonal  
22 wetlands that could overlap with the species model, could result in the restoration of 51 acres and  
23 the protection of 608 acres of modeled habitat for vernal pool crustaceans.

24 The effects on vernal pool crustacean habitat from Alternative 4 would represent an adverse effect  
25 as a result of habitat modification of a special-status species and potential for direct mortality in the  
26 absence of other conservation actions. However, the BDCP has committed to impact limits for vernal  
27 pool crustacean habitat and to habitat protection, restoration, management and enhancement  
28 associated with CM3, CM9, and CM11. These conservation activities would be guided by species-  
29 specific goals and objectives, and by AMM1-AMM6, AMM10, AMM12, AMM30, and AMM37, which  
30 would be in place throughout the time period of construction. Considering these commitments,  
31 Alternative 4 over the term of the BDCP would not result in a substantial adverse effect through  
32 habitat modifications and would not substantially reduce the number or restrict the range of vernal  
33 pool crustaceans. Therefore, Alternative 4 would have a less-than-significant impact on vernal pool  
34 crustaceans.

35 **Impact BIO-33: Indirect Effects of Plan Implementation on Vernal Pool Crustaceans**

36 Construction and maintenance activities associated with water conveyance facilities, and restoration  
37 actions could indirectly affect vernal pool crustaceans and their habitat in the vicinity of  
38 construction and restoration areas, and maintenance activities. These potential effects would be  
39 minimized or avoided through AMM1-AMM6, AMM10, and AMM12, which would be in effect  
40 throughout the Plan's construction phase.

41 **NEPA Effects:** Water conveyance facilities construction and restoration activities could indirectly  
42 affect vernal pool crustaceans and their habitat in the vicinity of construction areas. Ground-

1 disturbing activities, stockpiling of soils, and maintenance and refueling of heavy equipment could  
2 result in the inadvertent release of sediment and hazardous substances into this habitat. These  
3 potential effects would be avoided and minimized through AMM1–AMM6, which would be in effect  
4 throughout the Plan’s construction phase. Vernal pool crustaceans and their habitat could be  
5 periodically indirectly affected by maintenance activities at water conveyance facilities.  
6 Embankment maintenance activities around Clifton Court Forebay could result in the inadvertent  
7 discharge of sediments and hazardous materials into vernal pool crustacean habitat that occurs  
8 along the southern and western boundaries of the forebays. These potential effects would be  
9 avoided and minimized through AMM1–AMM6, which would be in effect throughout the term of the  
10 Plan. The indirect effects of Alternative 4 on vernal pool crustacean habitat would not be adverse  
11 under NEPA.

12 **CEQA Conclusion:** Construction and maintenance activities associated with water conveyance  
13 facilities, and restoration actions could indirectly impact vernal pool crustaceans and their habitat in  
14 the vicinity of construction and restoration areas, and maintenance activities. These potential  
15 impacts would be minimized or avoided through AMM1–AMM6, AMM10, and AMM12, which would  
16 be in effect throughout the construction phase. The indirect impacts of Alternative 4 would be less  
17 than significant under CEQA.

18 **Impact BIO-34: Periodic Effects of Inundation of Vernal Pool Crustacean Habitat as a Result of**  
19 **Implementation of Conservation Components**

20 Flooding of the Yolo Bypass under *CM2 Yolo Bypass Fisheries Enhancement* would periodically affect  
21 0 to 4 acres of modeled vernal pool crustacean habitat (Table 12-4-12). There would be no periodic  
22 effects from *CM5 Seasonally Inundated Floodplain Restoration*.

23 **NEPA Effects:** BDCP Appendix 5.J, *Effects on Natural Communities, Wildlife, and Plants*, describes the  
24 methods used to estimate periodic inundation effects in the Yolo Bypass. Based on this method,  
25 periodic inundation could affect vernal pool crustaceans occupying areas ranging from 0 acres of  
26 habitat during most notch flows to an estimated 4 acres during a notch flow of 6,000 cfs. BDCP-  
27 associated inundation of areas that would not otherwise have been inundated is expected to occur in  
28 no more than 30% of all years, because Fremont Weir is expected to overtop the remaining 70% of  
29 all years, and during those years notch operations would not typically affect the maximum extent of  
30 inundation. In more than half of all years under Existing Conditions, an area greater than the BDCP-  
31 related inundation area already inundates in the bypass. Yolo Bypass flooding is expected to have a  
32 minimal effect on vernal pool crustaceans and would thus not be adverse under NEPA.

33 **CEQA Conclusion:** Alternative 4 would periodically inundate at most 4 acres of vernal pool  
34 crustacean habitat during the maximum flows over the Fremont Weir. The periodic inundation is  
35 not anticipated to result in a conversion of vernal pool crustacean habitat into different wetland  
36 habitat. BDCP-associated inundation of areas that would not otherwise have been inundated is  
37 expected to occur in no more than 30% of all years, because Fremont Weir is expected to overtop  
38 the remaining 70% of all years, and during those years notch operations would not typically affect  
39 the maximum extent of inundation. In more than half of all years under Existing Conditions, an area  
40 greater than the BDCP-related inundation area already inundates in the bypass. Yolo Bypass  
41 flooding is expected to have a minimal effect on vernal pool crustaceans and would thus result in  
42 less-than-significant impacts on the species.

1       **Valley Elderberry Longhorn Beetle**

2       The habitat model used to assess the effects for valley elderberry longhorn beetle is based on  
3       riparian habitat and nonriparian habitat (vernal pool complexes and grasslands within 200 feet of  
4       channels). Construction and restoration associated with Alternative 4 conservation measures would  
5       result in both temporary and permanent losses of valley elderberry longhorn beetle modeled habitat  
6       as indicated in Table 12-4-14. The majority of the losses would take place over an extended period  
7       of time as the restoration conservation measures are being implemented. In addition, an estimated 7  
8       elderberry shrubs could be impacted by the Alternative 4 conveyance alignment (CM1). Full  
9       implementation of Alternative 4 would also include the following conservation actions over the term  
10      of the BDCP to benefit valley elderberry longhorn beetle (BDCP Chapter 3, *Conservation Strategy*).

- 11      • Mitigate impacts on elderberry shrubs consistent with USFWS conservation guidelines for the  
12      species (Objective VELB1.1).
- 13      • Site elderberry longhorn beetle habitat restoration adjacent to occupied habitat (Objective  
14      VELB1.2).
- 15      • Restore 5,000 acres of valley/foothill riparian (Objective VFRNC1.1, associated with CM7).
- 16      • Protect 750 acres of valley/foothill riparian (Objective VFRNC1.2, associated with CM3).
- 17      • Maintain or increase the abundance and distribution of rare or uncommon vegetation alliances,  
18      such as *Sambuca nigra* (blue elderberry stands) alliance (Objective VFRNC3.1, associated with  
19      CM7 and CM11).

20      As explained below, with the restoration or protection of these amounts of habitat, impacts on valley  
21      elderberry longhorn beetle would not be adverse for NEPA purposes and would be less than  
22      significant for CEQA purposes.

1 **Table 12-4-14. Changes in Valley Elderberry Longhorn Beetle Modeled Habitat Associated with**  
2 **Alternative 4 (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	Riparian	34	34	30	30	NA	NA
	Non-riparian	227	227	62	62	NA	NA
<b>Total Impacts CM1</b>		<b>261</b>	<b>261</b>	<b>92</b>	<b>92</b>	<b>NA</b>	<b>NA</b>
CM2–CM18	Riparian	381	678	76	111	44–80	266
	Non-riparian	142	311	94	108	103–244	287
<b>Total Impacts CM2–CM18</b>		<b>523</b>	<b>989</b>	<b>170</b>	<b>219</b>	<b>161–325</b>	<b>553</b>
<b>TOTAL IMPACTS</b>		<b>784</b>	<b>1,250</b>	<b>262</b>	<b>311</b>	<b>161–325</b>	<b>553</b>

<sup>a</sup> See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-35: Loss of Valley Elderberry Longhorn Beetle Habitat**

5 Alternative 4 conservation measures would result in the permanent and temporary loss combined  
6 of up to 1,561 acres of modeled valley elderberry longhorn beetle habitat (853 acres of riparian  
7 habitat and 708 acres of nonriparian habitat), and an estimated 7 elderberry shrubs from CM1,  
8 which represent potential habitat for the species (Table 12-4-14). Due to the limitation of the habitat  
9 suitability model, all of these effects are assumed to be a large overestimate of the true effect on  
10 potential valley elderberry longhorn beetle habitat. Conservation measures that would result in  
11 these losses are conveyance facilities and transmission line construction, and establishment and use  
12 of borrow and spoil areas (CM1), Fremont Weir/Yolo Bypass improvements (CM2), tidal habitat  
13 restoration (CM4), and floodplain restoration (CM5). Habitat enhancement and management  
14 activities (CM11), which include ground disturbance or removal of nonnative vegetation, could  
15 result in local adverse habitat effects. In addition, maintenance activities associated with the long-  
16 term operation of the water conveyance facilities and other BDCP physical facilities could degrade  
17 or eliminate valley elderberry longhorn beetle habitat. Timely implementation of the near-term  
18 habitat protection and restoration contained in the Plan and implementation of AMMs committed to  
19 in the Plan would result in no adverse effects under NEPA and less-than-significant impacts under  
20 CEQA. Each of these activities is described below.

- 21 • *CM1 Water Facilities and Operation*: Construction of Alternative 4 conveyance facilities would  
22 result in the permanent and temporary combined loss of approximately 353 acres of modeled

1 valley elderberry longhorn beetle habitat, composed of 64 acres of riparian habitat and 289  
2 acres of nonriparian habitat (Table 12-4-14). In addition, an estimated 7 shrubs could be  
3 removed as a result of conveyance facilities construction. The exact number of shrubs to be  
4 impacted would be determined during pre-construction surveys of the footprints of the  
5 conveyance facility and associated work areas as part of the implementation of *AMM15 Valley*  
6 *Elderberry Longhorn Beetle*. Most of these impacts are associated with the intake and forebay  
7 construction in the north delta. There are no records of valley elderberry longhorn beetle within  
8 these impact areas. The portion of the above impacts that result from temporary habitat loss  
9 includes 92 acres of modeled valley elderberry longhorn beetle habitat (30 acres riparian and  
10 62 acres nonriparian habitat). Elderberry shrubs could be affected from ground-disturbing  
11 activities associated with conveyance construction footprints, temporary access roads, and  
12 staging areas.

- 13 ● *CM2 Yolo Bypass Fisheries Enhancement*: Construction activity associated with fisheries  
14 improvements in the Yolo Bypass would result in the permanent and temporary removal of  
15 approximately 295 acres of modeled valley elderberry longhorn beetle habitat, composed of 159  
16 acres of riparian habitat and 136 acres of nonriparian habitat. Approximately 125 acres of  
17 permanent impacts (83 acres of riparian and 41 acres of nonriparian) would mostly occur at the  
18 north end of the Yolo Bypass from Fremont Weir improvements. The 170 acres of temporary  
19 impacts (76 acres of riparian and 94 acres of nonriparian) would mostly be from work on the  
20 Fremont Weir, the Sacramento Weir, and levees along the Bypass. Elderberry shrubs could be  
21 affected from ground-disturbing activities associated with the re-contouring of surface  
22 topography, excavation or modification of channels, levee modification, and removal of riprap  
23 and other protections from channel banks.
- 24 ● *CM4 Tidal Natural Communities Restoration*: Tidal natural communities restoration would result  
25 in the permanent loss of approximately 813 acres of modeled valley elderberry longhorn beetle  
26 habitat, composed of 552 acres of riparian and 260 acres of nonriparian habitat. The majority of  
27 these impacts would be associated with tidal restoration in the Delta and only 42 acres of these  
28 impacts (all nonriparian) would be from tidal restoration in Suisun Marsh. Elderberry shrubs  
29 could be affected from ground-disturbing activities associated with the re-contouring of surface  
30 topography, excavation or modification of channels, type conversion from riparian and  
31 grasslands to tidal habitat, levee removal and modification, and removal of riprap and other  
32 protections from channel banks.
- 33 ● *CM5 Seasonally Inundated Floodplain Restoration*: Levee construction associated with floodplain  
34 restoration in the south Delta (CZ 7) would result in the permanent and temporary removal of  
35 approximately 101 acres of valley elderberry longhorn beetle habitat, composed of 78 acres of  
36 riparian and 23 acres of nonriparian. Approximately half of these impacts (52 acres) would be  
37 permanent impacts from levee construction and the other half (49 acres) would be temporary  
38 impacts associated with the levee construction. There is one CNDDDB record of valley elderberry  
39 longhorn beetle occurring in CZ 7 just west of Middle River on Union Island. This record and  
40 other elderberry shrubs could be affected from ground-disturbing activities associated with the  
41 re-contouring of surface topography, excavation or modification of channels, levee removal and  
42 modification, and removal of riprap and other protections from channel banks.
- 43 ● *CM11 Natural Communities Enhancement and Management*: Activities associated with natural  
44 communities enhancement and management, such as grazing practices and ground disturbance  
45 or herbicide use in the control of nonnative vegetation, intended to maintain and improve  
46 habitat functions of BDCP protected habitats for covered species could result in loss of

1 elderberry shrubs and the potential for injury or mortality to beetles. These effects cannot be  
2 quantified, but are expected to be minimal and would be avoided and minimized by the AMMs  
3 listed below.

- 4 • Operations and maintenance: Post-construction operation and maintenance of the above-  
5 ground water conveyance facilities and restoration infrastructure could result in ongoing but  
6 periodic disturbances that could affect valley elderberry beetle. Maintenance activities would  
7 include vegetation management, levee and structure repair, and re-grading of roads and  
8 permanent work areas could affect elderberry shrubs occupied by the species. These effects,  
9 however, would be reduced by AMMs listed below.

10 The following paragraphs summarize the combined effects discussed above and describe other  
11 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA impact conclusions are  
12 also included.

### 13 ***Near-Term Timeframe***

14 Because the water conveyance facilities construction is being evaluated at the project level, the near-  
15 term BDCP conservation strategy has been evaluated to determine whether it would provide  
16 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the effects of  
17 construction would not be adverse under NEPA and would be less than significant under CEQA.  
18 Alternative 4 would result in permanent and temporary impacts on 1,046 acres of modeled habitat  
19 (521 acres of riparian and 525 acres of nonriparian) for valley elderberry longhorn beetle in the  
20 study area in the near-term. These effects would result from the construction of the water  
21 conveyance facilities (CM1, 64 acres of riparian and 289 acres of nonriparian), and implementing  
22 other conservation measures (Yolo Bypass fisheries improvements [CM2] and tidal restoration  
23 [CM4], 693 acres of modeled habitat). The other conservation measures account for 457 of the 521  
24 acres (88%) of impacts on riparian habitat. Based on the DHCCP survey data of the Conveyance  
25 Planning Area (see Appendix 12C), an estimated seven elderberry shrubs would be impacted in the  
26 near-term by CM1 (see Section 12.3.2.3 for a discussion on the methods used to make this estimate).

27 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by  
28 CM1 and that are identified as habitat for valley elderberry longhorn beetle in Chapter 3 of the BDCP  
29 would be 1:1 for restoration and 1:1 for protection for riparian habitat. Using these typical ratios  
30 would indicate that 64 acres of the riparian habitat should be restored/created and 64 acres of  
31 existing riparian should be protected to mitigate the CM1 losses of valley elderberry longhorn beetle  
32 habitat. The near-term effects of other conservation actions would require 457 acres of riparian  
33 restoration and 457 acres of riparian protection using the same typical NEPA and CEQA ratios (1:1  
34 for restoration and 1:1 for protection).

35 The BDCP has committed to near-term goals of protecting 750 acres of riparian and restoring 800  
36 acres of riparian habitat in the Plan Area. These conservation actions would occur in the same  
37 timeframe as the construction and early restoration losses, thereby minimizing adverse effects on  
38 valley elderberry longhorn beetle. In addition, BDCP Objectives VELB 1.1 and 1.2, which call for  
39 implementing the USFWS (1999) conservation guidelines for valley elderberry longhorn beetle  
40 (transplanting elderberry shrubs and planting elderberry seedlings and associated natives) and  
41 siting elderberry restoration within drainages immediately adjacent to or in the vicinity of sites  
42 confirmed to be occupied by valley elderberry longhorn beetle. These objectives would be met  
43 through the implementation of CM7 *Riparian Natural Community Restoration*. CM7 *Riparian Natural*  
44 *Community Restoration* specifically calls for the planting of elderberry shrubs in large, contiguous

1 clusters with a mosaic of associated natives as part of riparian restoration consistent with USFWS  
2 (1999) conservation guidelines. These Plan goals represent performance standards for considering  
3 the effectiveness of restoration actions. The acres of protection and restoration contained in the  
4 near-term Plan goals and the additional species specific measures within CM7 satisfy the typical  
5 mitigation that would be applied to the project-level effects of CM1, as well as mitigating the near-  
6 term effects of the other conservation measures.

7 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*  
8 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*  
9 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
10 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
11 *Material, and AMM15 Valley Elderberry Longhorn Beetle. AMM15 requires surveys for elderberry*  
12 *shrubs within 100 feet of any ground disturbing activities, the implementation of avoidance and*  
13 *minimize measures for any shrubs that are identified within this 100-foot buffer, and transplanting*  
14 *shrubs that can't be avoided. All of these AMMs include elements that avoid or minimize the risk of*  
15 *affecting habitats and species adjacent to work areas and RTM storage sites. The AMMs are*  
16 *described in detail in BDCP Appendix 3.C.*

### 17 **Late Long-Term Timeframe**

18 Based on modeled habitat, the study area supports approximately 34,456 acres of modeled habitat  
19 (17,786 acres of riparian and 16,670 acres of nonriparian) for valley elderberry longhorn beetle.  
20 Alternative 4 as a whole would result in the permanent loss of and temporary effects on 1,561 acres  
21 of modeled valley elderberry longhorn beetle habitat (853 acres of riparian habitat and 708 acres of  
22 nonriparian habitat) during the term of the Plan (5% of the modeled habitat in the study area). The  
23 locations of these losses are described above in the analyses of individual conservation measures.  
24 These losses would not fragment any known populations of valley elderberry longhorn beetle. The  
25 Plan includes a commitment to protect 750 acres of riparian habitat and restoring/creating 5,000  
26 acres of riparian habitat in the Plan Area. According to Objective VELB1.2, the restoration of  
27 elderberry longhorn beetle habitat would occur adjacent to occupied habitat, which would provide  
28 connectivity between occupied and restored habitats and improve the species' ability to disperse  
29 within and outside the Plan Area. Other factors relevant to effects on valley elderberry longhorn  
30 beetle include:

- 31 ● Habitat loss is widely dispersed throughout the study area and would not be concentrated in  
32 any one location.
- 33 ● There would be a temporal loss of riparian habitat during the near-term evaluation period  
34 because most of the affected riparian vegetation would be removed during the near-term  
35 timeframe, while large quantities of riparian habitat would not be restored until the early and  
36 late long-term timeframes. Effects on valley elderberry longhorn beetle of this temporal loss of  
37 riparian vegetation are expected to be minimal because much of the riparian habitat in the Plan  
38 Area is not known to be currently occupied by the species, because all elderberry shrubs that  
39 are suitable for transplantation would be moved to conservation areas in the Plan Area, and  
40 because most of the affected community is composed of small patches of riparian scrub and  
41 herbaceous vegetation that are fragmented and distributed across the agricultural landscape of  
42 the Plan Area and thus are likely to provide no or low-value habitat for the beetle.
- 43 ● Temporarily disturbed areas would be restored within 1 year following completion of  
44 construction and management activities. Under AMM10, a restoration and monitoring plan

1 would be developed prior to initiating any construction-related activities associated with the  
2 conservation measures or other covered activities that would result in temporary effects on  
3 natural communities.

4 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6) estimates that the restoration  
5 and protection actions discussed above, as well as other actions that overlap with the nonriparian  
6 portions of the species model, could result in the restoration of 4,857 acres (riparian) and the  
7 protection of 2,363 acres (729 acres of riparian and 1,634 acres of nonriparian channels and  
8 grassland) of modeled habitat for valley elderberry longhorn beetle.

9 **NEPA Effects:** The near-term loss of valley elderberry longhorn beetle habitat under Alternative 4  
10 would not be adverse because the BDCP has committed to restoring and protecting an acreage that  
11 exceeds the typical mitigation ratios described above, in addition to avoiding impacts on shrubs and  
12 transplanting those that can't be avoided. In the absence of other conservation actions, the losses of  
13 valley elderberry longhorn beetle habitat and potential for direct mortality of a special-status  
14 species associated with Alternative 4 in the late long-term would represent an adverse effect.  
15 However, with habitat protection and restoration associated with CM7, guided by species-specific  
16 goals and objectives and by AMM1-AMM6, AMM10, and AMM15, which would be in place  
17 throughout the construction period, the effects of Alternative 4 as a whole on valley elderberry  
18 longhorn beetle would not be adverse under NEPA.

19 **CEQA Conclusion:**

20 **Near-Term Timeframe**

21 Because the water conveyance facilities construction is being evaluated at the project level, the near-  
22 term BDCP conservation strategy has been evaluated to determine whether it would provide  
23 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the impacts of  
24 construction would be less than significant. Alternative 4 would result in permanent and temporary  
25 impacts on 1,046 acres of modeled habitat (521 acres of riparian and 525 acres of nonriparian) for  
26 valley elderberry longhorn beetle in the study area in the near-term. These effects would result from  
27 the construction of the water conveyance facilities (CM1, 64 acres of riparian and 289 acres of  
28 nonriparian), and implementing other conservation measures (Yolo Bypass fisheries improvements  
29 [CM2] and tidal restoration [CM4], 693 acres of modeled habitat). Based on the DHCCP survey data  
30 of the Conveyance Planning Area, an estimated seven elderberry shrubs would be impacted in the  
31 near-term (see Section 12.3.2.3 for a discussion on the methods used to make this estimate).

32 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by  
33 CM1 and that are identified in the biological goals and objectives for valley elderberry longhorn  
34 beetle in Chapter 3 of the BDCP would be 1:1 for restoration and 1:1 for protection for riparian  
35 habitat. Using these typical ratios would indicate that 64 acres of the riparian habitat should be  
36 restored/created and 64 acres of existing riparian should be protected to mitigate the CM1 losses of  
37 valley elderberry longhorn beetle habitat. The near-term effects of other conservation actions would  
38 require 457 acres of riparian restoration and 457 acres of riparian protection using the same typical  
39 NEPA and CEQA ratios (1:1 for restoration and 1:1 for protection).

40 The BDCP has committed to near-term goals of protecting 750 acres of riparian and restoring 800  
41 acres of riparian habitat in the Plan Area. These conservation actions would occur in the same  
42 timeframe as the construction and early restoration losses, thereby minimizing adverse effects on  
43 valley elderberry longhorn beetle. In addition, BDCP Objectives VELB 1.1 and 1.2, which call for

1 implementing the USFWS (1999) conservation guidelines for valley elderberry longhorn beetle  
2 (transplanting elderberry shrubs and planting elderberry seedlings and associated natives) and  
3 siting elderberry restoration within drainages immediately adjacent to or in the vicinity of sites  
4 confirmed to be occupied by valley elderberry longhorn beetle. These objectives would be met  
5 through the implementation of *CM7 Riparian Natural Community Restoration*. CM7 specifically calls  
6 for the planting of elderberry shrubs in large, contiguous clusters with a mosaic of associated  
7 natives as part of riparian restoration consistent with USFWS (1999) conservation guidelines.

8 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
9 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
10 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
11 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
12 *Material*, and *AMM15 Valley Elderberry Longhorn Beetle*. AMM15 requires surveys for elderberry  
13 shrubs within 100 feet of any ground disturbing activities, the implementation avoidance and  
14 minimize measures for any shrubs that are identified within this 100-foot buffer, and transplanting  
15 shrubs that can't be avoided. All of these AMMs include elements that avoid or minimize the risk of  
16 affecting habitats and species adjacent to work areas and RTM storage sites. The AMMs are  
17 described in detail in BDCP Appendix 3.C.

18 The natural community restoration and protection activities are expected to be concluded in the  
19 first 10 years of Plan implementation, which is close enough in time to the occurrence of impacts to  
20 constitute adequate mitigation for CEQA purposes. These commitments, implemented together with  
21 the AMMs, are more than sufficient to support the conclusion that the near-term impacts of  
22 Alternative 4 would be less than significant under CEQA.

### 23 **Late Long-Term Timeframe**

24 Alternative 4 as a whole would result in the permanent loss of and temporary effects on 1,561 acres  
25 of modeled valley elderberry longhorn beetle habitat (853 acres of riparian habitat and 708 acres of  
26 nonriparian habitat) during the term of the Plan (5% of the modeled habitat in the study area). The  
27 locations of these losses are described above in the analyses of individual conservation measures.  
28 The Plan includes a commitment to protect 750 acres of riparian habitat and restore or create 5,000  
29 acres of riparian habitat in the Plan Area. According to Objective VELB1.2, the restoration of  
30 elderberry longhorn beetle habitat would occur adjacent to occupied habitat, which would provide  
31 connectivity between occupied and restored habitats and improve the species' ability to disperse  
32 within and outside the Plan Area. The BDCP also includes a number of AMMs (AMM1-AMM6,  
33 AMM10, and AMM15) directed at minimizing or avoiding potential impacts on valley elderberry  
34 longhorn beetle. The large acreages of conservation would adequately compensate for the modeled  
35 habitats lost to construction and restoration activities.

36 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6) estimates that the restoration  
37 and protection actions discussed above, as well as others actions that overlap with the nonriparian  
38 portions of the species model, could result in the restoration of 4,857 acres (riparian) and the  
39 protection of 2,363 acres (729 acres of riparian and 1,634 acres of nonriparian channels and  
40 grassland) of modeled habitat for valley elderberry longhorn beetle.

41 Considering these protection and restoration provisions, which would provide acreages of new or  
42 enhanced habitat in amounts greater than necessary to compensate for habitats lost to construction  
43 and restoration activities, implementation of Alternative 4 as a whole would not result in a  
44 substantial adverse effect through habitat modifications and would not substantially reduce the

1 number or restrict the range of the species. Therefore, the alternative would have a less-than-  
2 significant impact on valley elderberry longhorn beetle.

### 3 **Impact BIO-36: Indirect Effects on Valley Elderberry Longhorn Beetle and its Habitat**

4 Construction activities associated with water conveyance facilities, conservation components and  
5 ongoing habitat enhancement, as well as operation and maintenance of above-ground water  
6 conveyance facilities, including the transmission facilities, could result in ongoing periodic post-  
7 construction disturbances with localized impacts on valley elderberry longhorn beetle over the term  
8 of the BDCP. Construction related effects could result from ground-disturbing activities, stockpiling  
9 of soils, and maintenance and refueling of heavy equipment could result in dust and the inadvertent  
10 release of hazardous substances in areas where elderberry shrubs occur. A GIS analysis (see Section  
11 12.3.2.3 for a discussion on the methods used to make this estimate) estimates that approximately  
12 45 shrubs could be indirectly affected by conveyance facilities construction (CM1). Restoration  
13 activities could result in excavation or modification of channels, type conversion from riparian and  
14 grasslands to tidal habitat, levee removal and modification, and removal of riprap and other  
15 protections from channel banks that occur within 100 feet of an elderberry shrubs. These potential  
16 effects would be minimized or avoided through AMM1–AMM6, AMM10, and AMM15, which would  
17 be in effect throughout the Plan’s construction phase.

18 **NEPA Effects:** The indirect effects on valley elderberry longhorn beetle as a result of implementing  
19 Alternative 4 conservation actions would not have an adverse effect on valley elderberry longhorn  
20 beetle.

21 **CEQA Conclusion:** Ground-disturbing activities, stockpiling of soils, and the potential release of dust  
22 and hazardous substances would accompany construction of the water conveyance facilities. An  
23 estimated 45 shrubs could be indirectly affected by conveyance facilities construction (CM1). In  
24 addition, ground-disturbing activities associated with the re-contouring of surface topography,  
25 excavation or modification of channels, type conversion from riparian and grasslands to tidal  
26 habitat, levee removal and modification, and removal of riprap and other protections from channel  
27 banks could indirectly affected elderberry shrubs that occur within 100 feet of these restoration  
28 activities. With the implementation of AMM1–AMM6, AMM10, and AMM15 as part of Alternative 4  
29 construction, operation, and maintenance, the BDCP would avoid the potential for substantial  
30 adverse indirect effects on valley elderberry longhorn beetle in that the Plan would not result in a  
31 substantial reduction in numbers or a restriction in the range of valley elderberry longhorn beetle.  
32 Therefore, the indirect effects under this alternative would have a less-than-significant impact on  
33 valley elderberry longhorn beetle.

### 34 **Impact BIO-37: Periodic Effects of Inundation of Valley Elderberry Longhorn Beetle Habitat** 35 **as a Result of Implementation of Conservation Components**

36 Flooding of the Yolo Bypass from *CM2 Yolo Bypass Fisheries Enhancement* would periodically affect  
37 161 to 325 acres of modeled valley elderberry longhorn beetle habitat (Table 12-4-14).

38 *CM5 Seasonally Inundated Floodplain Restoration* would periodically inundate 553 acres of modeled  
39 valley elderberry longhorn beetle habitat (Table 12-4-14).

40 It is unknown at this time how much of the modeled habitat that would be inundated as a result of  
41 CM2 and CM5 actually contains elderberry shrubs. Elderberry shrubs have been found to be  
42 intolerant of long periods of inundation and there is evidence that they die very quickly after even

1 short periods of flooding (River Partners 2008). During monitoring of a restoration project at the  
2 San Joaquin River National Wildlife Refuge, River Partners found that nearly all (99 to 100%) of the  
3 four year old elderberry shrubs in restoration plots died after 15–17 weeks of inundation, and River  
4 Partners noted in general that the shrubs died very quickly after even short periods of flooding  
5 (River Partners 2008). Talley et al (2006) in their report assisting the USFWS 5-year review of the  
6 species, note that elderberry shrubs respond negatively to saturated soil conditions and that they  
7 can only tolerate temporary root crown inundation. Therefore, in the areas that would be  
8 periodically inundated by the implementation of CM2 it is likely that there are few, if any, mature  
9 shrubs in these areas because under current conditions they would be inundated in about 50% of all  
10 years for approximately 7 weeks. The areas affected by CM5 are not currently inundated and thus  
11 elderberry shrubs could be present in these areas.

12 The periodic effects on modeled habitat for valley elderberry longhorn beetle associated with  
13 implementing Alternative 4 could adversely affect valley elderberry longhorn beetle habitat  
14 (elderberry shrubs) and make modeled habitat there unsuitable for future elderberry  
15 establishment. Based on the information presented above, the current conditions in those areas that  
16 would be periodically inundated in Yolo Bypass (CM2) are not likely very suitable for elderberry  
17 shrubs and, thus, CM2 would likely have minimal effects, if any, on the species. The modeled habitat  
18 that would be periodically inundated from the implementation of CM5 could result in adverse effects  
19 on valley elderberry longhorn beetle.

20 **NEPA Effects:** Periodic effects of the inundation of valley elderberry longhorn beetle habitat as a  
21 result of implementing Alternative 4 conservation actions would not be adverse under NEPA when  
22 taking into consideration CM7 habitat protection and restoration. This habitat protection and  
23 restoration would be guided by species-specific goals and objectives, and by AMM1–AMM6, AMM10,  
24 and AMM15, which would be in place throughout the time period that periodic effects would occur.

25 **CEQA Conclusion:** Alternative 4 (CM2 and CM5) would have periodic impacts on modeled valley  
26 elderberry longhorn beetle habitat. The periodic inundation of between 161 and 325 acres (CM2)  
27 and 553 acres (CM5) of modeled habitat could result in the death of elderberry shrubs that may  
28 occur there and thus potentially impact valley elderberry longhorn beetle. The Plan includes the  
29 restoration of 5,000 acres of riparian habitat (Objective VFRNC1.1) and the protection of 750 acres  
30 riparian habitat (VFRNC1.2) would include areas for elderberry restoration and protection. The  
31 BDCP also includes AMM1–AMM6, AMM10, and AMM15, which would minimize and avoid impacts  
32 on valley elderberry longhorn beetle prior to Yolo Bypass fisheries enhancement and floodplain  
33 restoration activities. AMM15, which includes a measure for following the USFWS (1999)  
34 conservation guidelines for valley elderberry longhorn beetle, would be used to identify shrubs for  
35 transplanting to conservation areas that otherwise could be adversely affected by periodic  
36 inundation in Yolo Bypass and floodplain restoration areas. These conservation actions would  
37 compensate for the periodic impacts on valley elderberry longhorn beetle.

38 Considering these protection and restoration provisions and avoidance and minimization measures,  
39 implementation of Alternative 4 as a whole would not result in a substantial adverse effect through  
40 habitat modifications and would not substantially reduce the number or restrict the range of the  
41 species. Therefore, periodic effects of inundation resulting from Alternative 4 would have a less-  
42 than-significant impact on valley elderberry longhorn beetle.

## 1       **Nonlisted Vernal Pool Invertebrates**

2       This section describes the effects of Alternative 4, including water conveyance facilities construction  
3       and implementation of other conservation components, on nonlisted vernal pool invertebrates that  
4       are not covered by the Plan (Blennosperma vernal pool andrenid bee, hairy water flea, Ricksecker's  
5       water scavenger beetle, curved-foot hygrotus beetle, molestan blister beetle). Little is known about  
6       the range of these species so it is assumed that they have potential to occur in the same areas  
7       described by the vernal pool crustacean modeled habitat. That habitat model consists of: vernal pool  
8       complex, which consists of vernal pools and uplands that display characteristic vernal pool and  
9       swale visual signatures that have not been significantly affected by agricultural or development  
10      practices; alkali seasonal wetlands in CZ 8; and degraded vernal pool complex, which consists of  
11      low-value ephemeral habitat ranging from areas with vernal pool and swale visual signatures that  
12      display clear evidence of significant disturbance due to plowing, disking, or leveling to areas with  
13      clearly artificial basins such as shallow agricultural ditches, depressions in fallow fields, and areas of  
14      compacted soils in pastures. For the purpose of the effects analysis, vernal pool complex is  
15      categorized as high-value and degraded vernal pool complex is categorized as low-value for these  
16      species. Alkali seasonal wetlands in CZ 8 were also included as high-value habitat for vernal pool  
17      crustaceans in the model. Also included as low-value for vernal pool habitat are areas along the  
18      eastern boundary of CZ 11 that are mapped as vernal pool complex because they flood seasonally  
19      and support typical vernal pool plants, but do not include topographic depressions that are  
20      characteristic of vernal pools.

21      Construction and restoration associated with Alternative 4 conservation measures would result in  
22      permanent losses of habitat for nonlisted vernal pool invertebrates as indicated in Table 12-4-15  
23      and indirect conversions of vernal pool habitat. The majority of the losses would take place over an  
24      extended period of time as tidal marsh is restored in the Plan Area. Full implementation of  
25      Alternative 4 would also include the following conservation actions over the term of the BDCP that  
26      would benefit nonlisted vernal pool invertebrates (BDCP Chapter 3, *Conservation Strategy*).

- 27      ● Protect 600 acres of vernal pool complex in CZ 1, CZ 8, or CZ 11, primarily in core vernal pool  
28      recovery areas (ObjectiveVPNC1.1, associated with CM3).
- 29      ● Restore vernal pool complex in CZ 1, CZ 8, and CZ 11 to achieve no net loss of vernal pool  
30      acreage (up to 67 acres of vernal pool complex restoration [10 wetted acres])(Objective  
31      VPNC1.2, associated with CM9).
- 32      ● Increase size and connectivity of protected vernal pool complexes in plan area and increase  
33      connectivity with complexes outside the Plan Area (ObjectiveVPNC1.3)
- 34      ● Protect the range of inundation characteristics of vernal pools in the Plan Area (Objective  
35      VPNC1.4)
- 36      ● Maintain and enhance vernal pool complexes to provide appropriate inundation (ponding) for  
37      supporting and sustaining vernal pool species (Objective VPNC2.1)

38      As explained below, with the restoration or protection of these amounts of habitat, impacts on  
39      nonlisted vernal pool invertebrates would not be adverse for NEPA purposes and would be less-than  
40      significant for CEQA purposes.

1  
2

**Table 12-4-15. Changes in Nonlisted Vernal Pool Invertebrate Habitat Associated with Alternative 4 (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1 <sup>g</sup>	High-value (vernal pool complex)	8	8	16	16	NA	NA
	Low-value (degraded vernal pool complex)	7	7	2	2	NA	NA
<b>Total Impacts CM1</b>		<b>15</b>	<b>15</b>	<b>18</b>	<b>18</b>	<b>NA</b>	<b>NA</b>
CM2–CM18 <sup>g</sup>	High-value (vernal pool complex)	0	0	0	0	0–4	0
	Low-value (degraded vernal pool complex)	201	372	0	0	0	0
<b>Total Impacts CM2–CM18</b>		<b>201</b>	<b>372</b>	<b>0</b>	<b>0</b>	<b>0–4</b>	<b>0</b>
<b>TOTAL IMPACTS</b>		<b>216</b>	<b>387</b>	<b>18</b>	<b>18</b>	<b>0–4</b>	<b>0</b>

<sup>a</sup> See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-38: Loss or Conversion of Habitat for and Direct Mortality of Nonlisted Vernal**  
5 **Pool Invertebrates**

6 Alternative 4 conservation measures would result in the direct, permanent loss of up to 387 acres of  
7 vernal pool habitat from conveyance facilities construction (CM1) and the hypothetical footprints  
8 for tidal natural communities restoration (CM4). In addition, the conservation measures could result  
9 in the indirect conversion due to hydrologic alteration of an additional 145 acres of vernal pool  
10 habitat (98 acres of high-value habitat and 47 acres of low-value habitat) from conveyance facilities  
11 construction (CM1) and based on the hypothetical footprints for tidal restoration (CM4).

12 Construction of the water conveyance facilities and restoration activities may result in the  
13 modification of hardpan and changes to the perched water table, which could lead to alterations in  
14 the rate, extent, and duration of inundation of nearby vernal pool habitat. USFWS typically considers  
15 construction within 250 feet of vernal pools to constitute an indirect effect unless more detailed  
16 information is provided to further refine the limits of any such effects. For the purposes of this  
17 analysis, the 250-foot buffer was applied to the water conveyance facilities work areas where  
18 surface and subsurface disturbance activities would take place and to restoration hypothetical  
19 footprints. Habitat enhancement and management activities (CM11), which include disturbance or  
20 removal of nonnative vegetation, could result in local adverse habitat effects.

1 Because the estimates of habitat loss resulting from tidal inundation are based on projections of  
2 where restoration may occur, actual effects are expected to be lower because sites would be selected  
3 and restoration projects designed to minimize or avoid effects on the vernal pools. As specified in  
4 the BDCP, the BDCP Implementation Office would ensure that tidal restoration projects and other  
5 covered activities would be designed such that no more than a total of 10 wetted acres of vernal  
6 pools are permanently lost. *AMM12 Vernal Pool Crustaceans* would ensure that no more than 20  
7 wetted acres of vernal pool habitat are indirectly affected by alterations to hydrology resulting from  
8 adjacent BDCP covered activities, in particular tidal restoration. The term *wetted acres* refers to an  
9 area that would be defined by the three parameter wetland delineation method used by the U.S.  
10 Army Corps of Engineers to determine the limits of a wetland, which involves an evaluation of  
11 wetland soil, vegetation, and hydrology characteristics. This acreage differs from vernal pool  
12 complex acreages in that a vernal pool complex is composed of individual wetlands (vernal pools)  
13 and those upland areas that are in between and surrounding them, which provide the supporting  
14 hydrology (surface runoff and groundwater input), organic and nutrient inputs, and refuge for the  
15 terrestrial phase of some vernal pool species.

16 A summary statement of the combined impacts and NEPA and CEQA conclusions follows the  
17 individual conservation measure discussions.

- 18 • *CM1 Water Facilities and Operation*: Construction of Alternative 4 conveyance facilities would  
19 result in the permanent and temporary combined loss of approximately 33 acres of vernal pool  
20 habitat, composed of 24 acres of high-value and 9 acres of low-value habitat (Table 12-4-15). In  
21 addition, the conveyance facilities could result in the indirect conversion of 10 acres of vernal  
22 pool habitat in the vicinity of Clifton Court Forebay. The indirect effects would result from the  
23 construction of temporary transmission lines and from the storage of reusable tunnel material.  
24 *AMM30 Transmission Line Design and Alignment Guidelines* would ensure that temporary  
25 transmission lines are designed to avoid removal of wetted acres of vernal pools and alkali  
26 seasonal wetlands. There are no records of these nonlisted vernal pool invertebrates at this  
27 location (California Department of Fish and Game 2012).
- 28 • *CM4 Tidal Natural Communities Restoration*: Tidal natural communities restoration would result  
29 in the permanent loss of approximately 372 acres of low-value vernal pool habitat, which  
30 consists of degraded vernal pool complex. The BDCP describes degraded vernal pool complex as  
31 areas of low-value ephemeral habitat ranging from areas with vernal pool and swale visual  
32 signatures that display clear evidence of significant disturbance due to plowing, disking, or  
33 leveling to areas with clearly artificial basins such as shallow agricultural ditches, depressions in  
34 fallow fields, and areas of compacted soils in pastures. The actual density of vernal pools or  
35 other aquatic features in these areas is unknown but a 2012 review of Google Earth imagery of  
36 these habitats found that they appear to generally have low densities. However, areas mapped  
37 as degraded vernal pool complex may still provide habitat for vernal pool species as evidenced  
38 by records of vernal pool fairy shrimp, vernal pool tadpole shrimp, and California linderiella  
39 occurring in degraded vernal pool complex in CZ 4 (California Department of Fish and Game  
40 2012). So though degraded vernal pool complexes may not represent botanically diverse vernal  
41 pools they still can provide habitat for vernal pool invertebrates and thus the loss of 372 acres of  
42 degraded vernal pool complex may result in the loss of occupied vernal pool invertebrate  
43 habitat. In addition, tidal restoration could result in the indirect conversion of 135 acres of  
44 vernal pool habitat, which consist of 90 acres of high-value and 45 acres of low-value habitat. No  
45 records of nonlisted vernal pool invertebrates would be directly impacted.

- 1 • *CM11 Natural Communities Enhancement and Management*: As described in the BDCP,  
2 restoration/creation of vernal pools to achieve no net loss and the protection of 600 acres of  
3 vernal pool complex would benefit vernal pool invertebrates (Table 12-4-15). A variety of  
4 habitat management actions included in CM11 that are designed to enhance wildlife values in  
5 BDCP-protected habitats may result in localized ground disturbances that could temporarily  
6 affect vernal pool invertebrate habitat. Ground-disturbing activities, such as removal of  
7 nonnative vegetation and road and other infrastructure maintenance, are expected to have  
8 minor effects on vernal pool invertebrate habitat and are expected to result in overall  
9 improvements to and maintenance of vernal pool habitat values over the term of the BDCP.  
10 These effects cannot be quantified, but are expected to be minimal and would be avoided and  
11 minimized by the AMMs listed below.

12 The following paragraphs summarize the combined effects discussed above and describe other  
13 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA impact conclusions are  
14 also included. Table 12-4-16 was prepared to further analyze BDCP effects on nonlisted vernal pool  
15 invertebrates using wetted acres of habitat in order to compare the effects of this alternative with  
16 the effect limits established in BDCP Chapter 3, Section 3.3, *Biological Goals and Objectives*, and  
17 AMM12, which are measured in wetted acres of habitat. Wetted acres were estimated by using the  
18 BDCP’s assumption that vernal pool complexes and degraded vernal pool complexes would have a  
19 15% density of vernal pools (i.e., of 100 acres of vernal pool complex 15 acres would constitute  
20 vernal pools and the remaining 85 acres supporting uplands). Based on an informal evaluation of  
21 aerial photographs of the Plan Area it is likely that the actual densities within the Plan Area are  
22 approximately 10%, but the 15% density value was chosen as a conservative estimate for  
23 determining effects.

24 **Table 12-4-16. Estimated Effects on Wetted Nonlisted Vernal Pool Species Habitat under**  
25 **Alternative 4 (acres)**

		Direct Loss		Indirect Conversion	
		Near-Term	Late Long-Term	Near-Term	Late Long-Term
BDCP Impact Limit <sup>a</sup>		5	10	10	20
Alternative 4	CM1 <sup>c</sup>	5.0	5.0	1.5	1.5
Impact <sup>b</sup>	CM4 <sup>c</sup>	30.2	55.8	11.0	20.3
<b>Total</b>		<b>35.2</b>	<b>60.8</b>	<b>12.5</b>	<b>21.8</b>

<sup>a</sup> Because roughly half of the impacts would occur in the near-term, it is assumed that the impact limit in the near-term would be 5 wetted acres for direct loss and 10 acres for indirect.

<sup>b</sup> These acreages were generated by assuming that the modeled habitat identified in Table 12-4-15 has densities of wetted habitat at 15%. The direct effects numbers include permanent and temporary impacts.

<sup>c</sup> The temporary impacts from transmission line construction associated with CM1 would be zero because the commitment in AMM30, which calls for temporary transmission lines to avoid removal of alkali seasonal wetland and vernal pool wetted acres. This would lower CM1 impacts to 2.3 acres.

<sup>d</sup> These impacts are based on the hypothetical restoration footprints and would likely be lower based on the BDCP’s commitment to minimize and avoid effects on vernal pool habitat as much as practicable. The values for near-term indirect effects were assumed to be slightly more than half of what the late long-term value would be.

1 **Near-Term Timeframe**

2 Because the water conveyance facilities construction is being evaluated at the project level, the near-  
3 term BDCP conservation strategy has been evaluated to determine whether it would provide  
4 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the effects of  
5 construction would not be adverse under NEPA and would be less than significant under CEQA.  
6 Table 12-4-15 above lists the impacts on nonlisted vernal pool invertebrate habitat that are based  
7 on the natural community mapping done within the study area. The impacts from tidal natural  
8 communities restoration (CM4) are based on hypothetical footprints and do not reflect actual  
9 impacts on vernal pool habitat considering the BDCP's commitment to design restoration projects to  
10 minimize or avoid effects on vernal pools (see AMM12 and AMM30). As seen in Table 12-4-16, the  
11 effects of CM1 alone would be well within the near-term limits. As seen in Table 12-4-16, Alternative  
12 4 would not meet the Plan's near-term biological goals and objectives for direct and indirect effects  
13 unless near-term projects are designed to ensure that they do not exceed these impact limits.

14 Typical NEPA and CEQA project-level mitigation ratios for loss of vernal pools affected by CM1  
15 would be 1:1 for restoration and 2:1 for protection. Typically, indirect conversion impacts are  
16 mitigated by protecting vernal pools at a 2:1 ratio. Using these typical ratios would indicate that 5  
17 wetted acres of vernal pool (or 33 acres of vernal pool complex) should be restored and 13 wetted  
18 acres (or 87 acres of vernal pool complex) protected to mitigate the CM1 direct and indirect effects  
19 on nonlisted vernal pool species habitat. However, with the implementation of AMM30 the effects on  
20 wetted acres of nonlisted vernal pool species habitat from CM1 would be reduced by approximately  
21 2.7 acres (18 acres of modeled habitat) by redesigning the temporary transmission line west of  
22 Clifton Court Forebay. Assuming that the BDCP would apply the impact limits presented in Table 12-  
23 4-13 and implement AMM30, impacts on wetted vernal pools resulting from tidal restoration in the  
24 near-term could not exceed 2.7 acres of direct effects on wetted vernal pool acreage and 9.5 wetted  
25 acres of indirect effects. The impacts based on the hypothetical tidal restoration footprints would  
26 exceed these limits. When and if these limits are met, the BDCP would need to restore up to 5 wetted  
27 acres (33 acres of vernal pool complex) and protect up to 30 wetted acres (200 acres of vernal pool  
28 complex) in the near-term to offset the effects of CM1 and CM4.

29 The BDCP has committed to near-term goal of protecting 400 acres of vernal pool complex (see  
30 Table 3-4 in Chapter 3, *Description of Alternatives*) by protecting at least 2 wetted acres of vernal  
31 pools for each wetted acre directly or indirectly affected. The BDCP has also committed to  
32 restoring/creating vernal pools such that there is no net loss of vernal pool acreage. The amount of  
33 restoration would be determined during implementation based on the following criteria.

- 34
- 35 ● If restoration is completed (i.e., restored natural community meets all success criteria) prior to  
36 impacts, then 1.0 wetted acre of vernal pools would be restored for each wetted acre directly  
37 affected (1:1 ratio).
  - 38 ● If restoration takes place concurrent with impacts (i.e., restoration construction is completed,  
39 but restored habitat has not met all success criteria, prior to impacts occurring), then 1.5 wetted  
40 acres of vernal pools would be restored for each wetted acre directly affected (1.5:1 ratio).

41 The Plan's biological goals and objectives would also inform the near-term protection and  
42 restoration efforts. These Plan goals represent performance standards for considering the  
43 effectiveness of restoration actions. The acres of protection and restoration contained in the near-  
44 term Plan goals would keep pace with the loss of habitat and effects on nonlisted vernal pool  
invertebrate habitat.

1 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
2 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
3 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
4 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
5 *Material*, *AMM10 Restoration of Temporarily Affected Natural Communities*, *AMM30 Transmission*  
6 *Line Design and Alignment Guidelines*, and *AMM37 Recreation*. *AMM12 Vernal Pool Crustaceans*,  
7 though developed for vernal pool crustaceans, includes measures to avoid and minimize direct and  
8 indirect effects on vernal pools and would thus be applicable to nonlisted vernal pool invertebrates  
9 as well. All of these AMMs include elements that avoid or minimize the risk of affecting habitats and  
10 species adjacent to work areas. The AMMs are described in detail in BDCP Appendix 3.C.

### 11 **Late Long-Term Timeframe**

12 The BDCP states that covered activities would not result in more than 10 wetted acres of direct loss  
13 and no more than 20 wetted acres of indirect conversion effects on vernal pools by the late long-  
14 term (see Objective VPNC1.2 and AMM12). As seen in Table 12-4-16, the effects of CM1 alone would  
15 be well within the near-term limits, but overall Alternative 4 would not meet the Plan's late long-  
16 term biological goals and objectives for direct and indirect effects unless tidal restoration projects  
17 are designed to ensure that that they do not exceed these impact limits.

18 The Plan has committed to late long-term goal of protecting 600 acres of vernal pool complex in  
19 either Conservation Zones 1, 8, or 11, primarily in core vernal pool recovery areas (Objective  
20 VPNC1.1) by protecting at least 2 wetted acres of vernal pools protected for each wetted acre  
21 directly or indirectly affected. The Plan also includes a commitment to restore or create vernal pools  
22 such that the Plan results in no net loss of vernal pool acreage (Objective VPNC1.2). The protection  
23 and restoration would be achieved using the criteria presented above as well as by following the  
24 other specific biological goals and objectives, which include:

- 25 • Increasing the size and connectivity of protected vernal pool complexes (Objective VPNC1.3)
- 26 • Protecting the range of inundation characteristics that are currently represented by vernal pool  
27 throughout the Plan Area (Objective VPNC1.4)

28 **NEPA Effects:** The near-term loss of vernal pool habitat under Alternative 4 would not be adverse  
29 under NEPA because the BDCP has committed to avoiding and minimizing effects from tidal  
30 restoration and to restoring and protecting an acreage that meets or exceeds the typical mitigation  
31 ratios described above. In the absence of other conservation actions, the potential modification of  
32 vernal pool habitat and potential mortality of special-status species resulting from Alternative 4 in  
33 the late long-term would represent an adverse effect. However, the BDCP has committed to impact  
34 limits for vernal pool habitat and to habitat protection, restoration, management and enhancement  
35 associated with CM3, CM9, and CM11. This habitat protection, restoration, management, and  
36 enhancement would be guided by species-specific goals and objectives, and by AMM1–AMM6,  
37 AMM10, AMM12, AMM30, and AMM37, which would be in place throughout the time period of  
38 construction. Considering these commitments, losses and conversions of nonlisted vernal pool  
39 invertebrates habitat under Alternative 4 would not be adverse.

1 **CEQA Conclusion:**

2 **Near-Term Timeframe**

3 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
4 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
5 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
6 impacts of construction would be less than significant under CEQA. Table 12-4-15 above lists the  
7 impacts on vernal pool habitat that is based on the natural community mapping done within the  
8 study area. The impacts from tidal natural communities restoration (CM4) are based on hypothetical  
9 footprints and do not reflect actual impacts on vernal pool habitat considering the BDCP's  
10 commitment to design restoration projects to minimize or avoid effects on vernal pools (see AMM12  
11 and AMM30). As seen in Table 12-4-16, the effects of CM1 alone would be well within the near-term  
12 limits. As seen in Table 12-4-16, Alternative 4 would not meet the Plan's near-term biological goals  
13 and objectives for direct and indirect effects unless near-term tidal restoration projects are designed  
14 to ensure that they do not exceed these impact limits.

15 Typical NEPA and CEQA project-level mitigation ratios for loss of vernal pools affected by CM1  
16 would be 1:1 for restoration and 2:1 for protection. Typically, indirect conversion impacts are  
17 mitigated by protecting vernal pools at a 2:1 ratio. Using these typical ratios would indicate that 5  
18 wetted acres of vernal pool (or 33 acres of vernal pool complex) should be restored and 13 wetted  
19 acres (or 87 acres of vernal pool complex) protected to mitigate the CM1 direct and indirect effects  
20 on nonlisted vernal pool species habitat. However, with the implementation of AMM30 the effects on  
21 wetted acres of nonlisted vernal pool habitat from CM1 would be reduced by approximately 2.7  
22 acres (18 acres of modeled habitat) by redesigning the temporary transmission line west of Clifton  
23 Court Forebay. Assuming that the BDCP would apply the impact limits presented in Table 12-4-13  
24 and implement AMM30, impacts on wetted vernal pools resulting from tidal restoration in the near-  
25 term could not exceed 2.7 acres of direct effects on wetted vernal pool acreage and 9.5 wetted acres  
26 of indirect effects. The impacts based on the hypothetical tidal restoration footprints would exceed  
27 these limits. When and if these limits are met, the BDCP would need to restore up to 5 wetted acres  
28 (33 acres of vernal pool complex) and protect up to 30 wetted acres (200 acres of vernal pool  
29 complex) in the near-term to offset the effects of CM1 and CM4.

30 The BDCP has committed to near-term goal of protecting 400 acres of vernal pool complex (see  
31 Table 3-4 in Chapter 3, *Description of Alternatives*) by protecting at least 2 wetted acres of vernal  
32 pools for each wetted acre directly or indirectly affected. The BDCP has also committed to  
33 restoring/creating vernal pools such that there is no net loss of vernal pool acreage. The amount of  
34 restoration would be determined during implementation based on the following criteria.

- 35
- 36 • If restoration is completed (i.e., restored natural community meets all success criteria) prior to  
37 impacts, then 1.0 wetted acre of vernal pools would be restored for each wetted acre directly  
38 affected (1:1 ratio).
  - 39 • If restoration takes place concurrent with impacts (i.e., restoration construction is completed,  
40 but restored habitat has not met all success criteria, prior to impacts occurring), then 1.5 wetted  
41 acres of vernal pools would be restored for each wetted acre directly affected (1.5:1 ratio).

41 The species-specific biological goals and objectives would also inform the near-term protection and  
42 restoration efforts. These Plan goals represent performance standards for considering the  
43 effectiveness of restoration actions. The acres of protection and restoration contained in the near-

1 term Plan goals would keep pace with the loss of habitat and effects on nonlisted vernal pool  
2 invertebrates.

3 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
4 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
5 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
6 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
7 *Material*, and *AMM10 Restoration of Temporarily Affected Natural Communities*, *AMM30 Transmission*  
8 *Line Design*, and *Alignment Guidelines*, and *AMM37 Recreation*. *AMM12 Vernal Pool Crustaceans*,  
9 though developed for vernal pool crustaceans, includes measures to avoid and minimize direct and  
10 indirect effects on vernal pools and would thus be applicable to nonlisted vernal pool invertebrates  
11 as well. All of these AMMs include elements that avoid or minimize the risk of affecting habitats and  
12 species adjacent to work areas. The AMMs are described in detail in BDCP Appendix 3.C.

13 The natural community restoration and protection activities are expected to be concluded in the  
14 first 10 years of Plan implementation, which is close enough in time to the occurrence of impacts on  
15 constitute adequate mitigation for CEQA purposes. These commitments, implemented together with  
16 the AMMs and biological goals and objectives, are more than sufficient to support the conclusion  
17 that the near-term effects of Alternative 4 would be less than significant under CEQA.

#### 18 **Late Long-Term Timeframe**

19 The BDCP states that covered activities would not result in more than 10 wetted acres of direct loss  
20 and no more than 20 wetted acres of indirect effects on vernal pools by the late long-term (see  
21 Objective VPNC1.2 and AMM12). As seen in Table 12-4-16, the impacts of CM1 alone would be well  
22 within the near-term limits, but overall Alternative 4 would not meet the Plan's late long-term  
23 biological goals and objectives for direct and indirect effects unless near-term tidal restoration  
24 projects are designed to ensure that that they do not exceed these impact limits.

25 The Plan has committed to late long-term goal of protecting 600 acres of vernal pool complex in  
26 either Conservation Zones 1, 8, or 11, primarily in core vernal pool recovery areas (Objective  
27 VPNC1.1) by protecting at least 2 wetted acres of vernal pools protected for each wetted acre  
28 directly or indirectly affected. The Plan also includes a commitment to restore or create vernal pools  
29 such that the Plan results in no net loss of vernal pool acreage (Objective VPNC1.2). The protection  
30 and restoration would be achieved using the criteria presented above as well as by following the  
31 other specific biological goals and objectives, which include:

- 32 ● Increasing the size and connectivity of protected vernal pool complexes (Objective VPNC1.3)
- 33 ● Protecting the range of inundation characteristics that are currently represented by vernal pool  
34 throughout the Plan Area (Objective VPNC1.4)

35 The effects on nonlisted vernal pool invertebrate habitat from Alternative 4 would represent an  
36 adverse effect as a result of habitat modification of a special-status species and potential for direct  
37 mortality in the absence of other conservation actions. However, the BDCP has committed to impact  
38 limits for vernal pool habitat and to habitat protection, restoration, management and enhancement  
39 associated with CM3, CM9, and CM11. These conservation activities would be guided by goals and  
40 objectives, and by AMM1–AMM6, AMM10, AMM12, AMM30, and AMM37, which would be in place  
41 throughout the time period any construction activity would be occurring. Considering these  
42 commitments, Alternative 4 over the term of the BDCP would not result in a substantial adverse  
43 effect through habitat modifications and would not substantially reduce the number or restrict the

1 range of nonlisted vernal pool invertebrates. Therefore, Alternative 4 would have a less-than-  
2 significant impact on nonlisted vernal pool invertebrates.

3 **Impact BIO-39: Indirect Effects of Plan Implementation on Nonlisted Vernal Pool**  
4 **Invertebrates**

5 Construction and maintenance activities associated with water conveyance facilities, and restoration  
6 actions could indirectly affect nonlisted vernal pool invertebrates and their habitat in the vicinity of  
7 construction and restoration areas, and maintenance activities. These potential effects would be  
8 minimized or avoided through AMM1–AMM6, and AMM10, which would be in effect throughout the  
9 Plan’s construction phase.

10 **NEPA Effects:** Water conveyance facilities construction and restoration activities could indirectly  
11 affect nonlisted vernal pool invertebrates and their habitat in the vicinity of construction areas.  
12 Ground-disturbing activities, stockpiling of soils, and maintenance and refueling of heavy equipment  
13 could result in the inadvertent release of sediment and hazardous substances into this habitat.  
14 These potential effects would be avoided and minimized through AMM1–AMM6, which would be in  
15 effect throughout the Plan’s construction phase. Nonlisted vernal pool invertebrates and their  
16 habitat could be periodically indirectly affected by maintenance activities at water conveyance  
17 facilities. Embankment maintenance activities around Clifton Court Forebays could result in the  
18 inadvertent discharge of sediments and hazardous materials into vernal pool habitat that occurs  
19 along the southern and western boundaries of the forebays. These potential effects would be  
20 avoided and minimized through AMM1–AMM6, which would be in effect throughout the term of the  
21 Plan. The indirect effects of plan implementation under Alternative 4 would not be adverse.

22 **CEQA Conclusion:** Construction and maintenance activities associated with water conveyance  
23 facilities, and restoration actions could indirectly impact nonlisted vernal pool invertebrates and  
24 their habitat in the vicinity of construction and restoration areas, and maintenance activities. These  
25 potential impacts would be minimized or avoided through AMM1–AMM6, and AMM10, which would  
26 be in effect throughout the Plan’s construction phase. The indirect impacts of Alternative 4 would be  
27 less than significant.

28 **Impact BIO-40: Periodic Effects of Inundation of Nonlisted Vernal Pool Invertebrates’ Habitat**  
29 **as a Result of Implementation of Conservation Components**

30 Flooding of the Yolo Bypass under *CM2 Yolo Bypass Fisheries Enhancement* would periodically affect  
31 0 to 4 acres of modeled habitat for nonlisted vernal pool invertebrates (Table 12-4-15). There would  
32 be no periodic effects from *CM5 Seasonally Inundated Floodplain Restoration*

33 **NEPA Effects:** BDCP Appendix 5.J, *Effects on Natural Communities, Wildlife, and Plants*, describes the  
34 methods used to estimate periodic inundation effects in the Yolo Bypass. Based on this method,  
35 periodic inundation could affect nonlisted vernal pool invertebrates occupying areas ranging from 0  
36 acres of habitat during most notch flows to an estimated 4 acres during a notch flow of 6,000 cfs.  
37 BDCP-associated inundation of areas that would not otherwise have been inundated is expected to  
38 occur in no more than 30% of all years, because Fremont Weir is expected to overtop the remaining  
39 70% of all years, and during those years notch operations would not typically affect the maximum  
40 extent of inundation. In more than half of all years under Existing Conditions, an area greater than  
41 the BDCP-related inundation area already inundates in the bypass. Yolo Bypass flooding is expected  
42 to have a minimal effect on nonlisted vernal pool invertebrates and would thus not be adverse.

1 **CEQA Conclusion:** Alternative 4 would periodically inundate at most 4 acres of nonlisted vernal pool  
2 invertebrates' habitat during the maximum flows over the Fremont Weir. The periodic inundation is  
3 not anticipated to result in a conversion of nonlisted vernal pool invertebrates' habitat into different  
4 wetland habitat. BDCP-associated inundation of areas that would not otherwise have been  
5 inundated is expected to occur in no more than 30% of all years, because Fremont Weir is expected  
6 to overtop the remaining 70% of all years, and during those years notch operations would not  
7 typically affect the maximum extent of inundation. In more than half of all years under Existing  
8 Conditions, an area greater than the BDCP-related inundation area already inundates in the bypass.  
9 Yolo Bypass flooding is expected to have a minimal effect on nonlisted vernal pool invertebrates and  
10 would thus result in less-than-significant impacts on the species.

#### 11 **Sacramento and Antioch Dunes Anthicid Beetles**

12 This section describes the effects of Alternative 4, including water conveyance facilities construction  
13 and implementation of other conservation components, on Sacramento and Antioch Dunes anthicid  
14 beetles. Potential habitat in the study area includes the inland dune scrub at Antioch Dunes NWR,  
15 sand bars along the Sacramento and San Joaquin Rivers, and sandy dredge spoil piles (California  
16 Department of Fish and Game 2006c and 2006d).

17 The construction, and operations and maintenance of the water conveyance facilities under  
18 Alternative 4 would not likely affect Sacramento and Antioch Dunes anthicid beetles. The  
19 construction of the water conveyance structure and associated infrastructure would generally avoid  
20 affects to channel margins where sand bars are likely to form. Conveyance construction would not  
21 affect inland dune scrub habitat at Antioch Dunes NWR. No dredge spoil areas that could be  
22 occupied by Sacramento anthicid beetle were identified within conveyance facilities footprints  
23 during a review of Google Earth imagery. Also, a review of the locations of the Alternative 4 water  
24 intake facilities on aerial imagery did not reveal any sandbars along the channel margins. These  
25 portions of the Sacramento River have steep, riprap lined channel banks that are likely not  
26 conducive to the formation of sandbars.

27 Implementation of BDCP restoration based conservation measures could affect habitat for  
28 Sacramento and Antioch Dunes anthicid beetles. Both species are known to utilize interior sand  
29 dunes and sandbar habitat. The only interior sand dune habitat within the Plan Area is at Antioch  
30 Dunes, which would not be impacted by the Alternative 4 conservation measures. Both species are  
31 known to occur along the Sacramento River and San Joaquin Rivers. The implementation of BDCP  
32 restoration actions, and other covered activities could affect habitat for Sacramento and Antioch  
33 Dunes anthicid beetles along channels throughout the Plan Area; however the extent of these  
34 habitats in the Plan Area is unknown because these areas were not identified at the scale of mapping  
35 done within the study area. Because of current and historic channel modifications (channel  
36 straightening and dredging) and levee construction throughout the Delta, sandbar habitat is likely  
37 very limited and restricted to channel margins. The implementation of *CM4 Tidal Natural*  
38 *Communities Restoration*, *CM5 Seasonally Inundated Floodplain Restoration*, and *CM6 Channel Margin*  
39 *Enhancement* could impact sandbar habitat along the river channels and possibly sandy, dredge  
40 piles on Delta islands.

41 Over the term of the BDCP, Alternative 4 would likely result in beneficial effects on Sacramento and  
42 Antioch Dunes anthicid beetles. The following Alternative 4 objectives would generally increase  
43 opportunities for the formation of sandbars in the Plan Area.

- 44 • Restore 10,000 acres of seasonally inundated floodplain (Objective L2.11, associated with CM5),.

- 1 • Enhance 20 miles of channel margin habitat (Objective L2.12, associated with CM6),
- 2 • Restore 5,000 acres of riparian habitat, with at least 3,000 acres occurring on restored
- 3 seasonally inundated floodplain. (VFRNC1.1, associated with CM7).

4 These measures would improve shoreline conditions by creating benches along levees, shallow  
 5 habitat along margins and in floodplains, and increasing shoreline vegetation, all of which would  
 6 likely contribute to the formation of sandbars along Delta river channels where these measures  
 7 would be implemented. Increasing the structural diversity of Delta river channel margins and  
 8 floodplains would create opportunities for sand to be deposited and for sandbars to subsequently  
 9 form. As explained below, potential impacts on Sacramento and Antioch Dunes anthicid beetle  
 10 would not be adverse for NEPA purposes and would be less than significant for CEQA purposes.

11 **Table 12-4-17. Changes in Sacramento and Antioch Dunes Anthicid Beetles’ Habitat Associated**  
 12 **with Alternative 4 (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1		0	0	0	0	NA	NA
		0	0	0	0	NA	NA
<b>Total Impacts CM1</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>NA</b>	<b>NA</b>
CM2–CM18		0	0	0	0	0	0
		0	0	0	0	0	0
<b>Total Impacts CM2–CM18</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>TOTAL IMPACTS</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

<sup>a</sup> See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

13

14 **Impact BIO-41: Loss or Conversion of Habitat for and Direct Mortality of Sacramento and**  
 15 **Antioch Dunes Anthicid Beetles**

16 Implementation of Alternative 4 conservation measures could affect Sacramento and Antioch Dunes  
 17 anthicid beetles and their habitat. As mentioned above, the extent of this habitat in the study area is  
 18 unknown but it is assumed that sand bars likely occur along to some degree along the Sacramento  
 19 and San Joaquin Rivers and that some islands in the Delta may contain sandy dredge spoil piles. A  
 20 review of Google Earth imagery in the north Delta did identify three general areas that appear to  
 21 have accumulations of sandy soils (with some vegetation), possibly from dredge disposal, are  
 22 Decker Island, the western portion of Bradford Island, and the southwestern tip of Grand Island. A

1 review of Google Earth imagery in the south Delta did identify sandbar habitat along the San Joaquin  
2 River from the southern end of the Plan Area downstream to an area just west of Lathrop. An  
3 additional area along Paradise Cut was identified just north of I-5. Conservation measures that could  
4 result in impacts on Sacramento and Antioch Dunes anthonid beetles are tidal habitat restoration  
5 (CM4), floodplain restoration (CM5), and channel margin enhancement (CM6). In addition,  
6 maintenance activities associated with the long-term operation of the water conveyance facilities  
7 and other BDCP physical facilities could degrade or eliminate habitat for Sacramento and Antioch  
8 Dunes anthonid beetles. Each of these individual activities is described below. A summary statement  
9 of the combined impacts and NEPA and CEQA conclusions follows the individual conservation  
10 measure discussions.

- 11 • *CM4 Tidal Natural Communities Restoration:* Tidal natural communities restoration could impact  
12 the areas of sandy soils identified from aerial photographs on Decker Island, the western  
13 portion of Bradford Island, and on the southwestern tip of Grand Island because these areas fall  
14 within the West Delta Restoration Opportunity Area (ROA). The West Delta ROA has been  
15 identified in the BDCP (BDCP Chapter 3 *Conservation Strategy*, Section 3.4.4) as providing  
16 opportunities for creating subtidal aquatic and tidal marsh habitats. The methods and  
17 techniques identified in BDCP Chapter 3, Section 3.4.4.3.3 that may be used for tidal restoration  
18 include the recontouring of lands so that they have elevations suitable for the establishment of  
19 marsh plains and the eventual breaching of levees. There are three CNDDDB records of  
20 Sacramento anthonid beetle (just north of Rio Vista, one just south of Rio Vista along the west  
21 shore of the Sacramento River, and one on Grand Island) and one CNDDDB record of Antioch  
22 Dunes anthonid beetle (just north of Rio Vista) that fall within the West Delta ROA (California  
23 Department of Fish and Wildlife 2013). Tidal restoration actions in the West Delta ROA may  
24 eliminate potential habitat and impact occupied habitat of both Sacramento and Antioch Dunes  
25 anthonid beetles.
- 26 • *CM5 Seasonally Inundated Floodplain Restoration:* Seasonally inundated floodplain restoration  
27 could impact areas with sandbars that were identified in a review of aerial photographs. The  
28 sandbars identified along the San Joaquin River and Paradise Cut are within the conceptual  
29 corridors (Corridors 1a, 1b, 2a, and 4) identified in Figure 3.4-20 of the BDCP. There are four  
30 CNDDDB records for Sacramento anthonid beetle in the conceptual corridor along the San Joaquin  
31 River (California Department of Fish and Wildlife 2013). Floodplain restoration actions in these  
32 conceptual corridors could impact potential habitat for both these species and occupied habitat  
33 of Sacramento anthonid beetle.
- 34 • *CM6 Channel Margin Enhancement:* Channel margin enhancement could result in impacts on 20  
35 miles of channel margin that could contain sandbars.

36 The following paragraphs summarize the combined effects discussed above and describe other  
37 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA impact conclusions are  
38 also included.

39 Alternative 4 could result in substantial affects on Sacramento and Antioch Dunes anthonid beetles  
40 because all of the habitat identifiable from aerial photo review falls within either the West Delta  
41 ROA, which is being considered for tidal restoration (CM4), or within three of the conceptual  
42 corridors being considered for floodplain restoration (CM5). Furthermore, all seven of the records  
43 for Sacramento anthonid beetle within the study area fall within areas being considered for  
44 restoration (CM4 and CM5), which represent over half of the extant records for this species range  
45 wide (7 of 13), and the only extant record for Antioch Dunes anthonid beetle, which represent one of

1 five extant records range wide, falls within the West Delta ROA that is just north of Rio Vista. These  
2 occurrences could be affected by restoration if these areas are chosen as restoration projects.  
3 However, over the term of the BDCP, implementation of conservation components would likely  
4 benefit Sacramento and Antioch Dunes anthicid beetles. Under Alternative 4, CM5, CM6, and CM7,  
5 would generally contribute to the formation of sandbar habitat in the Plan Area. These measures  
6 would improve shoreline conditions by creating benches along levees (CM6), creating shallow  
7 margin and floodplain habitat (CM5), and increasing shoreline vegetation (CM7), all of which would  
8 likely contribute to the formation of sandbars along Delta river channels where these measures  
9 would be implemented. Increasing the structural diversity of Delta river channel margins would  
10 create areas of slow water that would allow for sand to be deposited and for sandbars to  
11 subsequently form. Other factors relevant to effects on Sacramento and Antioch Dunes anthicid  
12 beetles are listed below.

- 13 ● The actual extent of suitable and occupied habitat for these species in the plan is unknown.
- 14 ● The sandbar habitat occupied by Sacramento anthicid beetle along the San Joaquin River would  
15 likely not be directly impacted where floodplain restoration occurs because the physical  
16 disturbance would be to adjacent levees and agricultural areas. Though these actions would  
17 change hydrologic conditions that could overtime remove the existing sandbars, the expanded  
18 floodplain would create conditions suitable for the formation of new and possibly larger  
19 sandbars.
- 20 ● Floodplain restoration would be phased over a period of 30 years so that not all sandbar habitat  
21 within these areas would be affected at once. Furthermore, as floodplain restoration is being  
22 implemented new sandbar habitat would likely be forming prior and/or concurrent with future  
23 floodplain restoration projects that may affect sandbar habitat on the San Joaquin River and/or  
24 Paradise Cut.

25 **NEPA Effects:** The potential impacts on Sacramento and Antioch Dunes anthicid beetles associated  
26 with Alternative 4 as a whole would represent an adverse effect as a result of habitat modification of  
27 a special-status species and potential for direct mortality in the absence of other conservation  
28 actions. However, with implementation of restoration associated with CM5, CM6, and CM7, which  
29 would be phased throughout the time period when the impacts would be occurring, the effects of  
30 Alternative 4 as a whole on Sacramento and Antioch Dunes anthicid beetles would not be adverse  
31 under NEPA.

32 **CEQA Conclusion:** Alternative 4 would impact Sacramento and Antioch Dunes anthicid beetles'  
33 habitat and could impact seven occurrences of Sacramento anthicid beetle and one occurrence of  
34 Antioch Dunes anthicid beetle. However, over the term of the BDCP, implementation of conservation  
35 components would likely benefit Sacramento and Antioch Dunes anthicid beetles. BDCP  
36 conservation components, particularly conservation measures CM5, CM6, and CM7, would generally  
37 contribute to the formation of sandbar habitat in the Plan Area. Floodplain restoration (CM5) would  
38 be phased over a period of 30 years so that not all sandbar habitat within these areas would be  
39 affected at once. Furthermore, as floodplain restoration is being implemented new sandbar habitat  
40 would likely be forming prior and/or concurrent with future floodplain restoration projects that  
41 may affect sandbar habitat on the San Joaquin River and/or Paradise Cut.

42 Considering that floodplain (CM5), channel margin enhancement (CM6), and riparian restoration  
43 (CM7) would contribute to the replacement of and possible expansion of sandbar habitat in the  
44 Delta and be phased throughout the time period when the impacts would be occurring, the

1 implementation of Alternative 4 as a whole would not result in a substantial adverse effect though  
2 habitat modification and would not substantially reduce the number or restrict the range of these  
3 species. Therefore, the alternative would have a less-than-significant impact on Sacramento and  
4 Antioch Dunes anthicid beetles.

#### 5 **Delta Green Ground Beetle**

6 Suitable habitat in the study area would be vernal pool complexes and annual grasslands in the  
7 general Jepson Prairie area. The construction, and operations and maintenance of the water  
8 conveyance facilities under Alternative 4 would not affect delta green ground beetle because the  
9 facilities and construction area are outside the known range of the species. Implementation of  
10 Alternative 4 could affect delta green ground beetle through the protection of grasslands and vernal  
11 pool complex (CM3) in the vicinity of Jepson Prairie and the subsequent implementation of habitat  
12 enhancement and management actions and recreational trail construction (CM11) in these areas. In  
13 addition, tidal natural communities restoration (CM4) could result in potential impacts on delta  
14 green ground beetle and its habitat. Full implementation of Alternative 4 would likely result in  
15 beneficial effects on delta green ground beetle through the following conservation actions.

- 16 • Protect 2,000 acres of grassland in CZ 1 (Objective GNC1.1, associated with CM3).
- 17 • Protect 600 acres of vernal pool complex in CZs 1, 8, and 11 (Objective VPNC1.1, associated with  
18 CM3).
- 19 • Restore up to 67 acres of vernal pool complex in CZs 1, 8, and/or 11 (Objective VPNC1.2,  
20 associated with CM9).

21 These areas could contain currently occupied habitat for delta green ground beetle and/or create  
22 conditions suitable for eventual range expansion. As explained below, potential impacts on delta  
23 green ground beetle would be adverse for NEPA purposes and would be significant for CEQA  
24 purposes. Mitigation Measure BIO-42 would reduce the effects under NEPA and reduce the impacts  
25 to a less-than-significant level under CEQA.

1 **Table 12-4-18. Changes in Delta Green Ground Beetle Habitat Associated with Alternative 4**  
2 **(acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1		0	0	0	0	NA	NA
		0	0	0	0	NA	NA
<b>Total Impacts CM1</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>NA</b>	<b>NA</b>
CM2-CM18		0	0	0	0	0	0
		0	0	0	0	0	0
<b>Total Impacts CM2-CM18</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>TOTAL IMPACTS</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

<sup>a</sup> See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

3  
4 **Impact BIO-42: Loss or Conversion of Habitat for and Direct Mortality of Delta Green Ground**  
5 **Beetle**

6 Alternative 4 conservation measures could result in the conversion of habitat and/or direct  
7 mortality to delta green ground beetle. Conservation measure that could affect delta green ground  
8 beetle include tidal natural communities habitat restoration (CM4) and habitat enhancement and  
9 management activities (CM11) in CZ 1. CZ 1 is the only portion of the Plan Area that contains  
10 occupied and potential habitat for delta green ground beetle. The range of the delta green ground  
11 beetle is currently believed to be generally bound by Travis Air Force Base to the west, Highway 113  
12 to the east, Hay Road to the north, and Creed Road to the south (Arnold and Kavanaugh 2007;  
13 USFWS 2009). Further discussion of this potential effect is provided below, and NEPA and CEQA  
14 conclusions follow.

- 15 • *CM4 Tidal Natural Communities Restoration*: Tidal restoration in the Cache Slough ROA could  
16 result in the loss of delta green ground beetle habitat if restoration is planned in areas known to  
17 be or potentially occupied by the species. CM4 identifies 5,000 acres of freshwater tidal natural  
18 communities restoration in the Cache Slough ROA, and Lindsey Slough and Calhoun Cut have  
19 been identified as areas suitable for restoration. Lindsey Slough is just east of Jepson Prairie, and  
20 Calhoun Cut, which is off of Lindsey Slough (see Figure 12-1), goes into the general Jepson  
21 Prairie area and is adjacent to areas of potential habitat for delta green ground beetle. The tidal  
22 restoration methods and techniques identified in CM4 (see BDCP Chapter 3, Section 3.4.4.3.3)  
23 includes excavating channels; modifying ditches, cuts, and levees to encourage tidal circulation;  
24 and scalping higher elevation areas to create marsh plains. These disturbances could affect delta

1 green ground beetle through habitat modification, either directly or indirectly through  
2 hydrologic modifications, and/or result in direct mortality to the species. No CNDDDB records for  
3 delta green ground beetle are intersected by the hypothetical tidal restoration footprints being  
4 used by the BDCP.

- 5 • *CM11 Natural Communities Enhancement and Management*: As described in *CM3 Natural*  
6 *Communities Protection and Restoration*, up to 2,000 acres of grasslands would be protected in  
7 CZ 1 and a portion of the 600 acres of protection and possibly some of the up to 10 wetted acres  
8 of vernal pool restoration could also occur in CZ 1. Potential effects from CM11 could include  
9 direct mortality to larvae and adults from the implementation of grassland management  
10 techniques, which may include livestock grazing, prescribed burning, and mowing. In addition to  
11 these grassland and vernal pool complex management actions, CM11 also includes guidelines  
12 and techniques for invasive plant control, which may include manual control (hand-pulling and  
13 digging), mechanical control (large equipment), and chemical control, though some of these  
14 methods would be restricted in areas where rare plants occur or in critical habitat for vernal  
15 pool species. The creation of new recreation trails as part of CM11 would result in impacts on  
16 15.5 acres of grasslands within CZ 1, which could affect delta green ground beetle if present.

17 **NEPA Effects:** The protection of 2,000 acres of grassland in CZ 1 (CM3) and the protection of 600  
18 acres of vernal pool complex and up to 10 wetted acres of vernal pool complex restoration, some of  
19 which could occur in CZ 1 (CM3 and CM9) could benefit delta green ground beetle if these areas  
20 occur within the range of the species. The management of these grasslands and vernal pool  
21 complexes according to *CM11 Natural Communities Enhancement and Management* and the  
22 construction of recreational trails in CZ 1 has a potential to affect this species. AMM37 would ensure  
23 that new trails in vernal pool complexes be sited at least 250 feet from wetland features, or closer if  
24 site-specific information indicates that local watershed surrounding a vernal pools is not adversely  
25 affected. Direct mortality and/or the affects to delta green ground beetle habitat would be an  
26 adverse effect under NEPA. Implementation of mitigation measure BIO-42, *Avoid Impacts on Delta*  
27 *Green Ground Beetle and its Habitat*, would reduce this effect.

28 **CEQA Conclusion:** The implementation of grassland and vernal pool complex protection (CM3), tidal  
29 natural communities restoration (CM4), vernal pool restoration (CM9), and recreational trail  
30 construction and subsequent enhancement and management actions (CM11) could impact delta  
31 green ground beetle. Tidal restoration projects around Calhoun Cut and possible Lindsey Slough  
32 could affect habitat and result in direct mortality to the species from excavating channels; modifying  
33 ditches, cuts, and levees to encourage tidal circulation; and scalping higher elevation areas to create  
34 marsh plains. Potential impacts from CM11 could include direct mortality to larvae and adults  
35 resulting from the implementation of recreation trail construction in 15.5 acres of grassland in CZ 1  
36 and from grassland management techniques, which may include livestock grazing, prescribed  
37 burning, and mowing. AMM37 would ensure that new trails in vernal pool complexes be sited at  
38 least 250 feet from wetland features, or closer if site-specific information indicates that local  
39 watershed surrounding a vernal pools is not adversely affected. CM11 also includes guidelines and  
40 techniques for invasive plant control, which may include manual control (hand-pulling and digging),  
41 mechanical control (large equipment), and chemical control, though some of these methods would  
42 be restricted in areas where rare plants occur and in critical habitat for vernal pool species. These  
43 actions could result in adverse effects through habitat modification and a possible reduction in the  
44 number of the species or restrict its range, and therefore result in significant impacts on delta green  
45 ground beetle. Implementation of Mitigation Measure BIO-42, *Avoid Impacts on Delta Green Ground*  
46 *Beetle and its Habitat*, would reduce these potential impacts to a less-than-significant level.

## 1 Mitigation Measure BIO-42: Avoid Impacts on Delta Green Ground Beetle and its Habitat

2 As part of the design of recreational trails in CZ 1, the development of tidal restoration plans,  
3 and site-specific management plans on protected grasslands and vernal pool complexes, and the  
4 possible implementation of vernal pool restoration in the area of Jepson Prairie, BDCP  
5 proponents will implement the following measures to avoid effects on delta green ground  
6 beetle.

- 7 • If recreational trail construction, habitat restoration or protection is planned for the lands  
8 adjacent to Calhoun Cut and noncultivated lands on the western side of Lindsey Slough,  
9 these areas will be evaluated by a USFWS approved biologist for potential delta green ground  
10 beetle habitat (large playa pools, or other similar aquatic features, with low growing  
11 vegetation or bare soils around the perimeter). The biologist will have previous experience  
12 with identifying suitable habitat requirements for delta green ground beetle.
- 13 • Any suitable habitat identified by the biologist (with previous experience with delta green  
14 ground beetle) within the species current range will be considered potentially occupied and  
15 all ground disturbing covered activities in these areas will be avoided, which for the Plan  
16 Area is generally the area west of State Route 113.
- 17 • Any other areas identified as suitable habitat outside of the current range of the species will  
18 be surveyed by a biologist with previous experience in surveying for and identifying delta  
19 green ground beetle. No ground disturbing covered activities will occur in areas identified as  
20 occupied by delta green ground beetle.
- 21 • Based on the results of the habitat evaluations and surveys, recreational trail construction  
22 plans, and site-specific restoration and management plans will be developed so that they  
23 don't conflict with the recovery goals for delta green ground beetle in the USFWS's 2005  
24 *Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon* (U.S. Fish and  
25 Wildlife Service 2005). Plans will include measures to protect and manage for delta green  
26 ground beetle so that they continue to support existing populations or allow for future  
27 colonization.

## 28 Callippe Silverspot Butterfly

29 This section describes the effects of Alternative 4 on callippe silverspot butterfly. Suitable habitats  
30 are typically in areas influenced by coastal fog with hilltops that support the specie's host-plant,  
31 Johnny jump-ups. Preferred nectar flowers used by adults include thistles, blessed milk thistle, and  
32 coyote wild mint. Other native nectar sources include hairy false goldenaster, coast buckwheat,  
33 mourning bride, and California buckeye. The construction, and operations and maintenance of the  
34 water conveyance facilities under Alternative 4 would not result in impacts on callippe silverspot  
35 butterfly or its habitat. If Cordelia Hills and Potrero Hills are identified for grassland protection  
36 opportunities as part of *CM3 Natural Communities Protection and Restoration* and the subsequent  
37 implementation of *CM11 Natural Communities Enhancement and Management*, could affect callippe  
38 silverspot butterfly. Callippe silverspot butterfly has been documented in the western most portion  
39 of the Plan Area (CZ 11) in the Cordelia Hills (Solano County Water Agency 2009). Potential habitat  
40 for the species (grassy hills with *Viola pedunculata*) is present in the Potrero Hills, but it has not  
41 been observed there (EDAW 2005, California Department of Fish and Wildlife 2013). Though CZ 11  
42 has been identified as potential area for grassland restoration in *CM8 Grassland Natural Community*  
43 *Restoration*, the primary goal there is to restore small patches of grassland to connect to Jepson  
44 Prairie and/or the restoration of upland grasses adjacent to tidal brackish emergent wetland in

1 Suisun Marsh, both of which would not be areas suitable for callippe silverspot butterfly. The full  
2 implementation of Alternative 4 would protect up to 2,000 acres of grassland in CZ 11 (Objective  
3 GNC1.1, associated with CM3), some of which may contain habitat for callippe silverspot butterfly.  
4 As explained below, potential impacts on callippe silverspot would be adverse for NEPA purposes  
5 and would be significant for CEQA purposes. Mitigation Measure BIO-43 would reduce the effects  
6 under NEPA and reduce the impacts to a less-than-significant level under CEQA.

7 **Table 12-4-19. Changes in Callippe Silverspot Butterfly Habitat Associated with Alternative 4**  
8 **(acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1		0	0	0	0	NA	NA
		0	0	0	0	NA	NA
<b>Total Impacts CM1</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>NA</b>	<b>NA</b>
CM2-CM18		0	0	0	0	0	0
		0	0	0	0	0	0
<b>Total Impacts CM2-CM18</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>TOTAL IMPACTS</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

<sup>a</sup> See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

9

10 **Impact BIO-43: Loss or Conversion of Habitat for and Direct Mortality of Callippe Silverspot**  
11 **Butterfly**

12 Alternative 4 conservation measures could result in the conversion of habitat and/or direct  
13 mortality to callippe silverspot butterfly. Only one conservation measure was identified as  
14 potentially affecting Callippe silverspot butterfly, *CM11 Natural Communities Enhancement and*  
15 *Management*, which could result in the disturbance of callippe silverspot butterfly habitat if such  
16 areas are acquired as part of grassland protection under *CM3 Natural Communities Protection and*  
17 *Restoration*. Further discussion of this potential effect is provided below and NEPA and CEQA  
18 conclusions follow.

19 As described in *CM3 Natural Communities Protection and Restoration*, up to 2,000 acres of grasslands  
20 would be protected in CZ 11. If areas chosen for protection include Cordelia Hills or Potrero Hills,  
21 where there is known and potential habitat, respectively, then grassland enhancement and  
22 management actions could affect the callippe silverspot butterfly. Potential effects from CM11 could  
23 include the loss of larval host and nectar sources and direct mortality to larvae and adults from the

1 installation of artificial nesting burrows and structures and the implementation of grassland  
2 management techniques, which may include livestock grazing, prescribed burning, and mowing. In  
3 addition to these grassland management actions, CM11 also includes guidelines and techniques for  
4 invasive plant control, which may include manual control (hand-pulling and digging), mechanical  
5 control (large equipment), and chemical control. Several of the preferred nectar sources are thistles,  
6 some of which have been identified by the California Invasive Plant Council as having limited to  
7 moderate ecological impacts (California Invasive Plant Council 2006).

8 **NEPA Effects:** The protection of 2,000 acres of grassland within CZ 11 could benefit callippe  
9 silverspot butterfly if these protected areas include occupied and potential habitat on the hill tops in  
10 Cordelia Hills and Potrero Hills. The management of these grasslands according to *CM11 Natural*  
11 *Communities Enhancement and Management* has potential to adversely affect this species. Direct  
12 mortality and/or the removal of larval host plants and nectar sources for adults would be an adverse  
13 effect under NEPA. Implementation of Mitigation Measure BIO-43, *Avoid and Minimize Loss of*  
14 *Callippe Silverspot Butterfly Habitat*, would ensure the effect is not adverse.

15 **CEQA Conclusion:** If grasslands within the Cordelia Hills and Potrero Hills are protected as part of  
16 *CM3 Natural Communities Protection and Restoration* then the subsequent management of these  
17 grasslands according to *CM11 Natural Communities Enhancement and Management* has affect this  
18 species. Potential impacts from CM11 could include the loss of larval host and nectar sources and  
19 direct mortality to larvae and adults resulting from the installation of artificial nesting burrows and  
20 structures and the implementation of grassland management techniques, which may include  
21 livestock grazing, prescribed burning, and mowing. In addition to these grassland management  
22 actions, CM11 also includes guidelines and techniques for invasive plant control, which may include  
23 manual control (hand-pulling and digging), mechanical control (large equipment), and chemical  
24 control, which could result in direct and indirect effects on larval host plants and nectar plants.  
25 These actions could result in adverse effects through habitat modification and a possible reduction  
26 in the number of the species or restrict its range and would therefore result in significant impact on  
27 the species under CEQA. However, over the term of BDCP callippe silverspot butterfly could benefit  
28 from the protection of occupied and potential habitat for the species with the implementation of  
29 Mitigation Measure BIO-43, which would avoid and minimize effects from management actions and  
30 thus reduce the potential impact to a less-than-significant level.

### 31 **Mitigation Measures BIO-43: Avoid and Minimize Loss of Callippe Silverspot Butterfly** 32 **Habitat**

33 As part of the development of site-specific management plans on protected grasslands in the  
34 Cordelia Hills and/or Potrero Hills, BDCP proponents will implement the following measures to  
35 avoid and minimize the loss of callippe silverspot habitat.

- 36 • Hilltops in Cordelia Hills and Potrero Hills will be surveyed for callippe silverspot larval host  
37 plants (Johnny jump-ups) by a biologist familiar with identifying this plant species. These  
38 surveys should occur during the plant's blooming period (typically early January through  
39 April)
- 40 • If larval host plants are present, then presence/absence surveys for callippe silverspot  
41 butterfly larvae will be conducted according to the most recent USFWS approved survey  
42 methods by a biologist with previous experience in surveying for and identifying callippe  
43 larvae and/or signs of larval presence. These surveys should be conducted prior to the adult  
44 flight season, which usually starts in mid-May.

- 1 • If larvae are detected then no further surveys are necessary. If larvae are not detected then  
2 surveys for adults will be conducted by a biologist familiar with surveying for and  
3 identifying callippe silverspot. Surveys typically start in mid-May and continue weekly for 8  
4 to 10 weeks.
- 5 • If callippe silverspot butterflies are detected, then the site-specific management plans will  
6 be written to include measures to protect and manage for larval host plants and nectar  
7 sources so that they continue to support existing populations and/or allow for future  
8 colonization. Mapping of both larval host plants and nectar sources will be incorporated into  
9 the management plans.

## 10 **California Red-Legged Frog**

11 Modeled California red-legged frog habitat in the study area is restricted to freshwater aquatic and  
12 grassland habitat, and immediately adjacent cultivated lands along the study area's southwestern  
13 edge in CZ 7, CZ 8, CZ 9, and CZ 11. Pools in perennial and seasonal streams and stock ponds provide  
14 potential aquatic habitat for this species. While stock ponds are underrepresented as a modeled  
15 habitat, none is expected to be affected by BDCP actions.

16 Construction and restoration associated with Alternative 4 conservation measures would result in  
17 both temporary and permanent losses of California red-legged frog modeled habitat as indicated in  
18 Table 12-4-20. Factors considered in assessing the value of affected habitat for the California red-  
19 legged frog, to the extent that information is available, are presence of limiting habitat (aquatic  
20 breeding habitat), known occurrences and clusters of occurrences, proximity of the affected habitat  
21 to existing protected lands, and the overall degraded or fragmented nature of the habitat. The study  
22 area represents the extreme eastern edge of the species' coastal range, and species' occurrences are  
23 reported only from CZ 8 and CZ 11. Full implementation of Alternative 4 would also include the  
24 following biological objectives over the term of the BDCP to benefit the California red-legged frog  
25 (BDCP Chapter 3, *Conservation Strategy*).

- 26 • Increase native species diversity and relative cover of native plant species, and reduce the  
27 introduction and proliferation of nonnative species (Objective L2.6, associated with CM11,  
28 CM13, and CM20).
- 29 • Protect 8,000 acres of grassland (Objective GNC1.1, associated with CM3).
- 30 • Protect stock ponds and other aquatic features within protected grasslands to provide aquatic  
31 breeding habitat for native amphibians and aquatic reptiles (Objective GNC1.3, associated with  
32 CM3)
- 33 • Increase burrow availability for burrow-dependent species (Objective GNC2.3, associated with  
34 CM11).
- 35 • Maintain and enhance aquatic features in grasslands to provide suitable inundation depth and  
36 duration and suitable composition of vegetative cover to support breeding for covered  
37 amphibian and aquatic reptile species (Objective GNC2.5, associated with CM11).

38 As explained below, with the restoration and protection of these amounts of habitat, in addition to  
39 implementation of AMMs, impacts on California red-legged frog would not be adverse for NEPA  
40 purposes and would be less than significant for CEQA purposes.

1 **Table 12-4-20. Changes in California Red-Legged Frog Modeled Habitat Associated with**  
2 **Alternative 4 (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	Aquatic	1	1	0	0	NA	NA
	Upland	6	6	39	39	NA	NA
<b>Total Impacts CM1</b>		<b>7</b>	<b>7</b>	<b>39</b>	<b>39</b>	<b>NA</b>	<b>NA</b>
CM2-CM18	Aquatic	0	0	0	0	0	0
	Upland	8	24	0	0	0	0
<b>Total Impacts CM2-CM18</b>		<b>0</b>	<b>24</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>TOTAL IMPACTS</b>		<b>15</b>	<b>31</b>	<b>39</b>	<b>39</b>	<b>0</b>	<b>0</b>

<sup>a</sup> See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only.

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-44: Loss or Conversion of Habitat for and Direct Mortality of California Red-**  
5 **Legged Frog**

6 Alternative 4 conservation measures would result in the permanent and temporary loss combined  
7 of up to 1 acre of modeled aquatic habitat and 69 acres of modeled upland habitat for California red-  
8 legged frog (Table 12-4-20). There are eleven California red-legged frog occurrences that overlap  
9 with the Plan footprint in the area of temporary effects. Conservation measures that would result in  
10 these losses are conveyance facilities and transmission line construction (CM1) and recreational  
11 facility construction for CM11. Construction activities associated with the water conveyance  
12 facilities and recreational facilities, including operation of construction equipment, could result in  
13 temporary effects on, as well as injury and mortality of, California red-legged frogs. In addition,  
14 natural enhancement and management activities (CM11), which include ground disturbance or  
15 removal of nonnative vegetation, could result in local adverse habitat effects. In addition,  
16 maintenance activities associated with the long-term operation of the water conveyance facilities  
17 and other BDCP physical facilities could degrade or eliminate California red-legged frog habitat  
18 including injury and mortality of California red-legged frogs. Each of these individual activities is  
19 described below. A summary statement of the combined impacts and NEPA effects and a CEQA  
20 conclusion follow the individual conservation measure discussions.

- 21 • *CM1 Water Facilities and Operation*: Construction of Alternative 4, including transmission line  
22 construction, would result in the permanent loss of up to 1 acre of aquatic habitat and 6 acres of  
23 upland habitat for California red-legged frog in CZ 8 (Table 12-4-20). Permanent effects would  
24 be associated with RTM, borrow, and spoils areas, grading, paving, excavating, extension and  
25 installation of cross culverts, installation of structural hardscape, and installation and relocation

1 of utilities. Construction-related effects would temporarily disturb 39 acres of upland habitat for  
2 the California red-legged frog (Table 12-4-20). *CM11 Natural Communities Enhancement and*  
3 *Management*: Based on the recreation assumptions described in BDCP Chapter 4, *Covered*  
4 *Activities and Associated Federal Actions*, an estimated 24 acres of upland cover and dispersal  
5 habitat for the California red-legged frog would be removed as a result of constructing trails and  
6 associated recreational facilities. Passive recreation in the reserve system could result in  
7 trampling and disturbance of egg masses in water bodies, degradation of water quality through  
8 erosion and sedimentation, and trampling of sites adjacent to upland habitat used for cover and  
9 movement. However, *AMM37 Recreation* requires protection of water bodies from recreational  
10 activities and requires trail setbacks from wetlands. With these restrictions, recreation related  
11 effects on California red-legged frog are expected to be minimal.

12 Activities associated with natural communities enhancement and management in protected  
13 California red-legged frog habitat, such as ground disturbance or herbicide use to control  
14 nonnative vegetation, could result in local adverse habitat effects on, and injury or mortality of,  
15 California red-legged frogs. These effects would be avoided and minimized with implementation  
16 of the AMMs discussed below. Herbicides would only be used in California red-legged frog  
17 habitat in accordance with the written recommendation of a licensed, registered pest control  
18 advisor and in conformance with label precautions and federal, state, and local regulations in a  
19 manner that avoids or minimizes harm to the California red-legged frog.

- 20 ● Critical habitat: Several conservation measures would be implemented in California red-legged  
21 frog habitat and designated critical habitat in CZ 8 and CZ 11. Approximately 2,460 acres of  
22 designated critical habitat for the California red-legged frog overlaps with the study area along  
23 the western edge of CZ 11 in critical habitat unit SOL-1. An additional 862 acres of designated  
24 critical habitat is also present along the western edge of CZ 8 in critical habitat unit ALA-2.  
25 Conservation actions to protect and enhance grassland habitat for covered species, including  
26 California red-legged frog, in CZ 8 could include acquisition and enhancement of designated  
27 critical habitat for the California red-legged frog and California tiger salamander. Any habitat  
28 enhancement actions for these species in designated critical habitat are expected to enhance the  
29 value of any affected designated critical habitat for conservation of California red-legged frog.  
30 These actions would result in an overall benefit to California red-legged frog within the study  
31 area through protection and management of grasslands with associated intermittent stream  
32 habitat and through restoration of vernal pool complex habitat and its associated grassland  
33 habitat.
- 34 ● Operations and maintenance: Ongoing water conveyance facilities operation and maintenance is  
35 expected to have little if any adverse effect on the California red-legged frog. Postconstruction  
36 operation and maintenance of the above-ground water conveyance facilities could result in  
37 ongoing but periodic postconstruction disturbances that could affect California red-legged frog  
38 use of the surrounding habitat. Operation of maintenance equipment, including vehicle use  
39 along transmission corridors in CZ 8, could also result in injury or mortality of California red-  
40 legged frogs if present in work sites. Implementation conservation actions and AMM1–AMM6,  
41 AMM10, AMM14, and AMM37, would reduce these effects.
- 42 ● Injury and direct mortality: Construction activities associated with the water conveyance  
43 facilities, vernal pool complex restoration, and habitat and management enhancement-related  
44 activities, including operation of construction equipment, could result in injury or mortality of  
45 California red-legged frogs. Breeding, foraging, dispersal, and overwintering behavior may be  
46 altered during construction activities, resulting in injury or mortality of California red-legged

1 frog. Frogs occupying burrows could be trapped and crushed during ground-disturbing  
2 activities. Degradation and loss of estivation habitat is also anticipated to result from the  
3 removal of vegetative cover and collapsing of burrows. Injury or mortality would be avoided and  
4 minimized through implementation of seasonal constraints and preconstruction surveys in  
5 suitable habitat, collapsing unoccupied burrows, and relocating frogs outside of the construction  
6 area as described in AMM1–AMM6, AMM10, AMM14, and AMM37.

7 The following paragraphs summarize the combined effects discussed above and describe other  
8 BDCP conservation actions that offset or avoid these effects. NEPA effects and a CEQA conclusion are  
9 also included.

### 10 ***Near-Term Timeframe***

11 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
12 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
13 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
14 effects of construction would not be adverse under NEPA

15 Alternative 4 would permanently remove approximately 1 acre of aquatic habitat and 53 acres of  
16 upland terrestrial cover habitat for California red-legged frog. The effects would result from  
17 construction of the water conveyance facilities (CM1, 46 acres) and recreational facilities (CM11, 8  
18 acres).

19 Typical NEPA project-level mitigation ratios for those natural communities that would be affected  
20 and that are identified in the biological goals and objectives for California red-legged frog in Chapter  
21 3 of the BDCP would be 1:1 for restoration and 1:1 for protection of nontidal wetlands and 2:1 for  
22 protection of grassland habitats. Using these ratios would indicate that 1 acre of aquatic habitat  
23 should be restored, 1 acre of aquatic habitat should be protected, and 106 acres of grassland should  
24 be protected for California red-legged frog to mitigate the near-term losses.

25 The BDCP has committed to near-term protection of up to 2,000 acres grassland in the Plan Area  
26 (Table 3-4 in Chapter 3). Protection of at least 1,000 acres of grassland in CZ 8, west of Byron  
27 Highway, would benefit California red-legged frog by providing habitat in the portion of the Plan  
28 Area with the highest long-term conservation value for the species based on known species  
29 occurrences and large, contiguous habitat areas (Objective GNC1.1). Consistent with Objective  
30 GNC1.3, ponds and other aquatic features within the grasslands would be protected to provide  
31 aquatic habitat for this species, and surrounding grassland would provide dispersal and aestivation  
32 habitat which would compensate for the loss of 1 acre of aquatic habitat. In addition, aquatic  
33 features in grasslands would be maintained and enhanced to provide suitable inundation depth and  
34 duration to support breeding habitat for covered amphibians (Objective GNC2.5).

35 These conservation actions would occur in the same timeframe as the construction losses, thereby  
36 avoiding adverse effects of habitat loss on California red-legged frog. These Plan objectives  
37 represent performance standards for considering the effectiveness of CM3 protection and  
38 restoration actions. The acres of restoration and protection contained in the near-term Plan goals  
39 and the additional detail in the biological objectives for California red-legged frog satisfy the typical  
40 mitigation that would be applied to the project-level effects of CM1, as well as mitigate the near-  
41 term effects of the other conservation measures.

42 The plan also contains commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
43 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*

1 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
2 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
3 *Material, AMM10 Restoration of Temporarily Affected Natural Communities, AMM14 California Red-*  
4 *Legged Frog, and AMM37 Recreation. These AMMs include elements that avoid or minimize the risk*  
5 *of affecting individuals and species habitats adjacent to work areas and storage sites. The AMMs are*  
6 *described in detail in BDCP Appendix 3.C, Avoidance and Minimization Measures.*

### 7 **Late Long-Term Timeframe**

8 The habitat model indicates that the study area supports approximately 159 acres of aquatic 7,766  
9 acres of upland habitat for California red-legged frog. Alternative 4 as a whole would result in the  
10 permanent loss of and temporary effects on 1 acre of aquatic habitat and 69 acres of upland habitat  
11 for California red-legged frog for the term of the plan (less than 1% of the total aquatic habitat in the  
12 study area and less than 1% of the total upland habitat in the study area). The 1 acre of aquatic  
13 habitat that would be permanently lost is not known to be used for breeding. Most of the California  
14 red-legged frog upland habitat that would be removed consists of naturalized grassland or  
15 cultivated land in a highly disturbed or modified setting on lands immediately adjacent to Clifton  
16 Court Forebay. The removed upland cover and dispersal habitat is within 0.5 mile of a cluster of  
17 known California red-legged frog occurrences to the west. However, this habitat consists mostly of  
18 cultivated lands and small patches of grasslands, and past and current surveys in this area have not  
19 found any evidence that this habitat is being used (Appendix 12C, 2009 to 2011 Bay Delta  
20 *Conservation Plan EIR/EIS Environmental Data Report*).

21 The BDCP has committed to long-term protection of 8,000 acres grassland in the Plan Area (Table 3-  
22 4 in Chapter 3). Protection of at least 1,000 acres of grassland in CZ 8 west of Byron Highway would  
23 benefit the California red-legged frog by providing habitat in the portion of the study area with the  
24 highest long-term conservation value for the species based on known species occurrences and large,  
25 contiguous habitat areas (Objective GNC1.1). Consistent with Objective GNC1.3, ponds and other  
26 aquatic features in the grasslands would also be protected to provide aquatic habitat for this species,  
27 and the surrounding grassland would provide dispersal and aestivation habitat. Aquatic features in  
28 the protected grasslands in CZ 8 would be maintained and enhanced to provide suitable inundation  
29 depth and duration and suitable composition of vegetative cover to support breeding California red-  
30 legged frogs (Objective GNC2.5). Additionally, livestock exclusion from streams and ponds and other  
31 measures would be implemented as described in CM11 to promote growth of aquatic vegetation  
32 with appropriate cover characteristics favorable to California red-legged frogs. Lands protected in  
33 CZ 8 would connect with lands protected under the *East Contra Costa County HCP/NCCP* and the  
34 extensive Los Vaqueros Watershed lands, including grassland areas supporting this species. This  
35 objective would ensure that California red-legged frog upland and associated aquatic habitats would  
36 be protected and enhanced in the largest possible patch sizes adjacent to occupied habitat within  
37 and adjacent to the study area.

38 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6) estimates that the restoration  
39 and protection actions discussed above, as well as the restoration of tidal freshwater emergent  
40 wetland, grassland, valley/foothill riparian, and vernal pool complex that could overlap with the  
41 species model, would result in the restoration of 16 acres of aquatic and 351 acres of upland  
42 modeled habitat for California red-legged frog. In addition, protection of managed wetland,  
43 grassland, valley/foothill riparian, and vernal pool complex could overlap with the species model  
44 and would result in the protection of 3 acres of aquatic and 1,047 acres of upland California red-  
45 legged frog modeled habitat.

1 **NEPA Effects:** In the near-term, the loss of California red-legged frog habitat under Alternative 4  
2 would be not be adverse because the BDCP has committed to protecting and restoring the acreage  
3 required to meet the typical mitigation ratios described above. In the late long-term, the losses of  
4 California red-legged frog aquatic and upland habitat associated with Alternative 4, in the absence of  
5 other conservation actions, would represent an adverse effect as a result of habitat modification and  
6 potential direct mortality of a special-status species. However, with habitat protection and  
7 restoration associated with the conservation components, guided by landscape-scale goals and  
8 objectives and by AMM1–AMM6, AMM10, AMM14, and AMM37, the effects of Alternative 4 as a  
9 whole on California red-legged frog would not be adverse.

10 **CEQA Conclusion:**

11 **Near-Term Timeframe**

12 Because the water conveyance facilities construction is being evaluated at the project level, the near-  
13 term BDCP conservation strategy has been evaluated to determine whether it would provide  
14 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the impact of  
15 conveyance facilities construction would be less than significant under CEQA.

16 Alternative 4 would permanently remove approximately 1 acre of aquatic habitat and 53 acres of  
17 upland terrestrial cover habitat for California red-legged frog. The effects would result from  
18 construction of the water conveyance facilities (CM1, 46 acres and CM11, 8 acres).

19 Typical CEQA project-level mitigation ratios of 1:1 for restored and 1:1 protected for nontidal  
20 wetlands and a ratio of 2:1 for protected grassland habitats would indicate that 1 acre of aquatic  
21 habitat should be protected, 1 acre of aquatic habitat should be protected, and 106 acres of  
22 grassland should be protected in for California red-legged frog to mitigate the near-term losses.

23 The BDCP has committed to near-term protection of up to 2,000 acres grassland in the Plan Area  
24 (Table 3-4 in Chapter 3). Protection of at least 1,000 acres of grassland in CZ 8, west of Byron  
25 Highway, will benefit California red-legged frog by providing habitat in the portion of the Plan Area  
26 with the highest long-term conservation value for the species based on known species occurrences  
27 and large, contiguous habitat areas (Objective GNC1.1). Consistent with Objective GNC1.3, ponds and  
28 other aquatic features within the grasslands will be protected to provide aquatic habitat for this  
29 species, and surrounding grassland will provide dispersal and aestivation habitat which would  
30 compensate for the loss of 1 acre of aquatic habitat. In addition, aquatic features in grasslands would  
31 be maintained and enhanced to provide suitable inundation depth and duration to support breeding  
32 habitat for covered amphibians (Objective GNC2.5, BDCP Chapter 3, *Conservation Strategy*).

33 These conservation actions would occur in the same timeframe as the construction losses, thereby  
34 avoiding adverse effects of habitat loss on California red-legged frog. These Plan objectives  
35 represent performance standards for considering the effectiveness of CM3 protection and  
36 restoration actions. The acres of restoration and protection contained in the near-term Plan goals  
37 and the additional detail in the biological objectives for California red-legged frog satisfy the typical  
38 mitigation that would be applied to the project-level effects of CM1, as well as mitigate the near-  
39 term effects of the other conservation measures.

40 The BDCP also contains commitments to implement AMM1–AMM6, AMM10, AMM14, and AMM37.  
41 These AMMs include elements that avoid or minimize the risk of affecting individuals and species  
42 habitats adjacent to work areas and storage sites. The AMMs are described in detail in BDCP  
43 Appendix 3.C, *Avoidance and Minimization Measures*

1 These commitments are more than sufficient to support the conclusion that the near-term effects of  
2 Alternative 4 on California red-legged frog would be less than significant, because the number of  
3 acres required to meet the typical ratios described above would be only 1 acre of aquatic habitat  
4 restored, 1 acre of aquatic habitat protected, and 106 acres of upland communities protected.

5 ***Late Long-Term Timeframe***

6 The habitat model indicates that the study area supports approximately 159 acres of aquatic 7,766  
7 acres of upland habitat for California red-legged frog. Alternative 4 as a whole would result in the  
8 permanent loss of and temporary effects on 1 acre of aquatic habitat and 69 acres of upland habitat  
9 for California red-legged frog for the term of the plan (less than 1% of the total aquatic habitat in the  
10 study area and less than 1% of the total habitat in the study area). The 1 acre of aquatic habitat that  
11 would be permanently lost is not known to be used for breeding. Most of the California red-legged  
12 frog upland habitat that would be removed consists of naturalized grassland or cultivated land in a  
13 highly disturbed or modified setting on lands immediately adjacent to Clifton Court Forebay. The  
14 removed upland cover and dispersal habitat is within 0.5 mile of a cluster of known California red-  
15 legged frog occurrences to the west. However, this habitat consists mostly of cultivated lands and  
16 small patches of grasslands, and past and current surveys in this area have not found any evidence  
17 that this habitat is being used (Appendix 12C, *2009 to 2011 Bay Delta Conservation Plan EIR/EIS*  
18 *Environmental Data Report*).

19 The BDCP has committed to long-term protection of up to 8,000 acres grassland in the Plan Area  
20 (Table 3-4 in Chapter 3). Protection of at least 1,000 acres of grassland in CZ 8 west of Byron  
21 Highway would benefit the California red-legged frog by providing habitat in the portion of the  
22 study area with the highest long-term conservation value for the species based on known species  
23 occurrences and large, contiguous habitat areas (Objective GNC1.1). Consistent with Objective  
24 GNC1.3, ponds and other aquatic features in the grasslands would also be protected to provide  
25 aquatic habitat for this species, and the surrounding grassland would provide dispersal and  
26 aestivation habitat. Aquatic features in the protected grasslands in CZ 8 would be maintained and  
27 enhanced to provide suitable inundation depth and duration and suitable composition of vegetative  
28 cover to support breeding California red-legged frogs (Objective GNC2.5). Additionally, livestock  
29 exclusion from streams and ponds and other measures would be implemented as described in CM11  
30 to promote growth of aquatic vegetation with appropriate cover characteristics favorable to  
31 California red-legged frogs. Lands protected in CZ 8 would connect with lands protected under the  
32 *East Contra Costa County HCP/NCCP* and the extensive Los Vaqueros Watershed lands, including  
33 grassland areas supporting this species. This objective would ensure that California red-legged frog  
34 upland and associated aquatic habitats would be protected and enhanced in the largest possible  
35 patch sizes adjacent to occupied habitat within and adjacent to the Plan Area.

36 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6) estimates that the restoration  
37 and protection actions discussed above, as well as the restoration of tidal freshwater emergent  
38 wetland, grassland, valley/foothill riparian, and vernal pool complex that could overlap with the  
39 species model, would result in the restoration of 16 acres of aquatic and 351 acres of upland  
40 modeled habitat for California red-legged frog. In addition, protection of managed wetland,  
41 grassland, valley/foothill riparian, and vernal pool complex could overlap with the species model  
42 and would result in the protection of 3 acres of aquatic and 1,047 acres of upland California red-  
43 legged frog modeled habitat.

1 In the absence of other conservation actions, the losses of California red-legged frog aquatic and  
2 upland habitat associated with Alternative 4 would represent an adverse effect as a result of habitat  
3 modification and potential direct mortality of a special-status species. However, with habitat  
4 protection and restoration associated with the conservation components, guided by landscape-scale  
5 goals and objectives and AMM1–AMM6, AMM10, AMM14, and AMM37, the effects of Alternative 4  
6 would have a less-than-significant impact on California red-legged frog.

#### 7 **Impact BIO-45: Indirect Effects of Plan Implementation on California Red-Legged Frog**

8 Noise and visual disturbance outside the project footprint but within 500 feet of construction  
9 activities are indirect effects that could temporarily affect the use of California red-legged frog  
10 habitat, all of which is upland cover and dispersal habitat. The areas to be affected are near Clifton  
11 Court Forebay, and no California red-legged frogs were detected during recent surveys conducted in  
12 this area (Appendix 12C, *2009 to 2011 Bay Delta Conservation Plan EIR/EIS Environmental Data*  
13 *Report*).

14 Maintenance and refueling of heavy equipment could result in the inadvertent release of sediment  
15 and hazardous substances into species habitat. Increased sedimentation could reduce the suitability  
16 of California red-legged frog habitat downstream of the construction area by filling in pools and  
17 smothering eggs. Accidental spills of toxic fluids also could result in the subsequent loss of California  
18 red-legged frog if these materials enter the aquatic system. Hydrocarbon and heavy metal pollutants  
19 associated with roadside runoff also have the potential to enter the aquatic system, affecting water  
20 quality and California red-legged frog.

21 **NEPA Effects:** Implementation of AMM1–AMM6, AMM10, AMM14, and AMM37 as part of  
22 implementing Alternative 4 would avoid the potential for adverse effects on California red-legged  
23 frogs, either indirectly or through habitat modifications. These AMMs would also avoid and  
24 minimize effects that could substantially reduce the number of California red-legged frogs, or  
25 restrict the species' range. Therefore, the indirect effects of Alternative 4 would not have an adverse  
26 effect on California red-legged frog.

27 **CEQA Conclusion:** Indirect effects from conservation measure operations and maintenance, as well  
28 as construction-related noise and visual disturbances, could impact California red-legged frog in  
29 aquatic and upland habitats. The use of mechanical equipment during construction could cause the  
30 accidental release of petroleum or other contaminants that could impact California red-legged frog  
31 or its prey. The inadvertent discharge of sediment or excessive dust adjacent to California red-  
32 legged frog habitat could also have a negative impact on the species or its prey. With  
33 implementation of AMM1–AMM6, AMM10, AMM14, and AMM37., Alternative 4 construction,  
34 operation, and maintenance under Alternative 4 would avoid the potential for substantial adverse  
35 effects on California red-legged frog, either indirectly or through habitat modifications, and would  
36 not result in a substantial reduction in numbers or a restriction in the range of California red-legged  
37 frogs. The indirect effects of BDCP Alternative 4 would have a less-than-significant impact on  
38 California red-legged frogs.

#### 39 **California Tiger Salamander**

40 Modeled California tiger salamander habitat in the study area contains two habitat types: terrestrial  
41 cover and aestivation habitat, and aquatic breeding habitat and is restricted to CZ 1, CZ 2, CZ 4, CZ 5,  
42 CZ 7, CZ 8, and CZ 11 (Figure 12-14). Modeled terrestrial cover and aestivation habitat contains all  
43 grassland types and alkali seasonal wetland with a minimum patch size of 100 acres and within a

1 geographic area defined by species records and areas most likely to support the species. Patches of  
2 grassland that were below the 100-acre minimum patch size but were contiguous with grasslands  
3 outside of the study area boundary were included. Modeled aquatic breeding habitat for the  
4 California tiger salamander includes vernal pools and seasonal and perennial ponds.

5 Factors considered in assessing the value of affected habitat for California tiger salamander, to the  
6 extent that information is available, include presence of limiting habitat (aquatic breeding habitat),  
7 known occurrences and clusters of occurrences, proximity of the affected habitat to existing  
8 protected lands, and the overall degraded or fragmented nature of the habitat. While conservation  
9 measures implemented in other CZs could have potential effects on California tiger salamander,  
10 those activities in CZ 8 and CZ 11 are considered to have a proportionately larger effect due to their  
11 closer proximity to known occurrences of the species.

12 Alternative 4 is expected to result in the temporary, permanent, and periodic removal of upland  
13 habitat that California tiger salamander uses for cover and dispersal (Table 12-4-21). Potential  
14 aquatic habitat for this species would not be affected. While stock ponds are underrepresented as a  
15 modeled habitat, none is expected to be affected by BDCP actions. Full implementation of Alternative  
16 4 would also include the following biological objectives over the term of the BDCP to benefit the  
17 California tiger salamander (BDCP Chapter 3, *Conservation Strategy*).

- 18 • Increase the size and connectivity of the reserve system by acquiring lands adjacent to and  
19 between existing conservation lands (Objective L1.6, associated with CM3).
- 20 • Increase native species diversity and relative cover of native plant species, and reduce the  
21 introduction and proliferation of nonnative species (Objective L2.6, associated with CM11).
- 22 • Protect and improve habitat linkages that allow terrestrial covered and other native species to  
23 move between protected habitats within and adjacent to the Plan Area (Objective L3.1,  
24 associated with CM3, CM8, and CM11).
- 25 • Protect 150 acres of alkali seasonal wetland in CZ 1, CZ 8, and/or CZ 11 among a mosaic of  
26 protected grasslands and vernal pool complex (Objective ASWNC1.1, associated with CM3).
- 27 • Provide appropriate seasonal flooding characteristics for supporting and sustaining alkali  
28 seasonal wetland species (Objective ASWNC2.1, associated with CM3 and CM11).
- 29 • Increase burrow availability for burrow-dependent species in grasslands surrounding alkali  
30 seasonal wetlands within restored and protected alkali seasonal wetland complex (Objective  
31 ASWNC2.3, associated with CM11).
- 32 • Protect 600 acres of existing vernal pool complex in in CZ 1, CZ 8, and/or CZ 11, primarily in  
33 core vernal pool recovery areas identified in the *Recovery Plan for Vernal Pool Ecosystems of  
34 California and Southern Oregon* (U.S. Fish and Wildlife Service 2005) (Objective VPNC1.1,  
35 associated with CM3).
- 36 • Restore vernal pool complex in in CZ 1, CZ 8, and/or CZ 11 to achieve no net loss of vernal pool  
37 acreage (up to 67 acres of vernal pool complex restoration, assuming that all anticipated  
38 impacts [10 wetted acres] occur and that the restored vernal pool complex has 15% density of  
39 vernal pools) (Objective VPNC1.2, associated with CM3 and CM9).
- 40 • Increase the size and connectivity of protected vernal pool complex within the Plan Area and  
41 increase connectivity with protected vernal pool complex adjacent to the Plan Area (Objective  
42 VPNC1.3, associated with CM3).

- 1 • Protect the range of inundation characteristics that are currently represented by vernal pools  
2 throughout the Plan Area (Objective VPNC1.4, associated with CM3).
- 3 • Protect 8,000 acres of grassland (Objective GNC1.1, associated with CM3).
- 4 • Restore 2,000 acres of grasslands to connect fragmented patches of protected (Objective  
5 GNC1.2, associated with CM3 and CM8).
- 6 • Protect stock ponds and other aquatic features within protected grasslands to provide aquatic  
7 breeding habitat for native amphibians and aquatic reptiles (Objective GNC1.3, associated with  
8 CM3).
- 9 • Increase burrow availability for burrow-dependent species (Objective GNC2.3, associated with  
10 CM11).
- 11 • Maintain and enhance aquatic features in grasslands to provide suitable inundation depth and  
12 duration and suitable composition of vegetative cover to support breeding for covered  
13 amphibian and aquatic reptile species (Objective GNC2.5, associated with CM11).

14 As explained below, with the restoration or protection of these amounts of habitat, in addition to the  
15 implementation of AMMs, impacts on California tiger salamander would not be adverse for NEPA  
16 purposes and would be less than significant for CEQA purposes.

17 **Table 12-4-21. Changes in California Tiger Salamander Modeled Habitat Associated with**  
18 **Alternative 4 (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	Aquatic	0	0	0	0	NA	NA
	Upland	6	6	32	32	NA	NA
<b>Total Impacts CM1</b>		<b>6</b>	<b>6</b>	<b>32</b>	<b>32</b>	<b>NA</b>	<b>NA</b>
CM2-CM18	Aquatic	0	0	0	0	0	0
	Upland	292	634	0	0	191-639	0
<b>Total Impacts CM2-CM18</b>		<b>292</b>	<b>634</b>	<b>0</b>	<b>0</b>	<b>191-639</b>	<b>0</b>
<b>TOTAL IMPACTS</b>		<b>288</b>	<b>640</b>	<b>32</b>	<b>32</b>	<b>191-639</b>	<b>0</b>

<sup>a</sup> See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

19

1 **Impact BIO-46: Loss or Conversion of Habitat for and Direct Mortality of California Tiger**  
2 **Salamander**

3 Alternative 4 conservation measures would result in the permanent and temporary loss combined  
4 of up to 672 acres of modeled upland habitat for California tiger salamander (Table 12-4-21). There  
5 is one California tiger salamander occurrence that overlaps with the CM1 footprint. Conservation  
6 measures that would result in these losses are conveyance facilities and transmission line  
7 construction, and establishment and use of RTM, borrow, and spoils areas (CM1), Fremont  
8 Weir/Yolo Bypass improvements (CM2), tidal habitat restoration (CM4), construction of recreation  
9 facilities (CM11), and construction of a conservation fish hatchery (CM18). Habitat enhancement  
10 and management activities (CM11), which include ground disturbance or removal of nonnative  
11 vegetation, could result in local adverse habitat effects. In addition, maintenance activities  
12 associated with the long-term operation of the water conveyance facilities and other BDCP physical  
13 facilities could degrade or eliminate California tiger salamander habitat. Each of these individual  
14 activities is described below. A summary statement of the combined impacts and NEPA effects and a  
15 CEQA conclusion follow the individual conservation measure discussions.

- 16 • *CM1 Water Facilities and Operation:* Construction of Alternative 4 conveyance facilities,  
17 including transmission lines, would result in the permanent loss of 6 acres of upland habitat for  
18 California tiger salamander habitat, primarily in CZ 8 (Table 12-4-21). Permanent effects would  
19 be associated with RTM, borrow, and spoils areas, grading, paving, excavating, extension and  
20 installation of cross culverts, installation of structural hardscape, and installation and relocation  
21 of utilities. Construction-related effects would temporarily disturb 32 acres of upland habitat for  
22 the California tiger salamander (Table 12-4-21). In addition, there is one California tiger  
23 salamander occurrence just south of the City of Byron that overlaps with the area of temporary  
24 effects. The area that would be affected by conveyance facilities construction is south of Clifton  
25 Court Forebay, where modeled California tiger salamander habitat is of relatively low value in  
26 that it consists of fragmented patches of primarily terrestrial habitat surrounded by actively  
27 cultivated lands. The highest concentration of California tiger salamander occurrences are in CZ  
28 8 and west of the conveyance facilities alignment, while lands to the east consist primarily of  
29 actively cultivated lands that are not suitable for the species. Habitat loss in this area is not  
30 expected to contribute to habitat fragmentation or impede important California tiger  
31 salamander dispersal.
- 32 • *CM2 Yolo Bypass Fisheries Enhancement:* Improvements in the Yolo Bypass would result in the  
33 permanent removal of approximately 42 acres of terrestrial cover and aestivation habitat for the  
34 California tiger salamander in the late long-term. The modeled habitat in the Yolo Bypass is of  
35 low potential for California tiger salamander: There have been no observations of California  
36 tiger salamander in this area based on the results of a number of surveys for vernal pool  
37 invertebrates and plants and the bypass lacks vernal pool complexes with large, deep pools or  
38 large grassland areas with stock ponds and similar aquatic features that hold water long enough  
39 to provide potential breeding habitat for this species.
- 40 • *CM4 Tidal Natural Communities Restoration:* This activity would result in the permanent  
41 removal of approximately 517 acres of terrestrial cover and aestivation habitat in the study area  
42 in the late long-term. Tidal restoration in the Cache Slough area would result in habitat loss  
43 along the edges of Lindsey Slough and Duck Slough, and adjacent to cultivated land along the  
44 eastern edge of a block of modeled habitat. The modeled aquatic breeding habitat nearby the  
45 hypothetical tidal restoration footprint is of relatively high value, consisting of vernal pool  
46 complex along Lindsey Slough within the Jepson Prairie area in and near open space. The Jepson

1 Prairie area includes numerous California tiger salamander CNDDDB recorded occurrences and  
2 overlaps with Critical Habitat Unit 2, Jepson Prairie Unit, for this species. However, the  
3 hypothetical tidal restoration footprint does not overlap with critical habitat or recorded  
4 occurrences in this area. The tidal restoration at Lindsey Slough would occur along the  
5 northeastern edge of the Jepson Prairie block of habitat and would not contribute to  
6 fragmentation. Because the estimates of habitat loss resulting from tidal inundation are based  
7 on projections of where restoration may occur, actual effects are expected to be lower because  
8 of the ability to select sites that minimize effects on California tiger salamander.

- 9 • *CM11 Natural Communities Enhancement and Management*: Based on the recreation  
10 assumptions described in BDCP Chapter 4, *Covered Activities and Associated Federal Actions*, an  
11 estimated 40 acres of terrestrial cover and aestivation habitat for the California tiger  
12 salamander would be removed as a result of constructing trails and associated recreational  
13 facilities. Passive recreation in the reserve system could result in trampling and disturbance of  
14 eggs and larvae in water bodies, degradation of water quality through erosion and  
15 sedimentation, and trampling of sites adjacent to upland habitat used for cover and movement.  
16 However, *AMM37 Recreation* requires protection of water bodies from recreational activities  
17 and requires trail setbacks from wetlands. With these restrictions, recreation related effects on  
18 California tiger salamander are expected to be minimal.

19 Habitat enhancement- and management-related activities in protected California tiger  
20 salamander habitats would result in overall improvements to and maintenance of California  
21 tiger salamander habitat values over the term of the BDCP. Activities associated with natural  
22 communities enhancement and management over the term of the BDCP in protected California  
23 tiger salamander habitat, such as ground disturbance or herbicide use to control nonnative  
24 vegetation, could result in local adverse habitat effects and injury or mortality of California tiger  
25 salamander and disturbance effects if individuals are present in work sites. Implementation of  
26 AMM1–AMM6, AMM10, AMM13, and AMM37 would reduce these effects. Herbicides would only  
27 be used in California tiger salamander habitat in accordance with the written recommendation  
28 of a licensed, registered Pest Control Advisor and in conformance with label precautions and  
29 federal, state, and local regulations in a manner that avoids or minimizes harm to the California  
30 tiger salamander.

- 31 • *CM18 Conservation Hatcheries*: This activity could result in the permanent removal of  
32 approximately 35 acres of terrestrial cover and aestivation habitat for California tiger  
33 salamander in the Yolo Bypass area (CZ 2). The specifications and operations of this facility have  
34 not been developed, although the facility is expected to be constructed near Rio Vista on  
35 cultivated lands in low-value habitat for the species.
- 36 • *Critical habitat*: Approximately 1,781 acres of designated Critical Habitat Unit 2, Jepson Prairie  
37 Unit, for California tiger salamander overlap the study area in CZ 1. While this area is located  
38 within the Cache Slough Complex, it is not expected to be affected by BDCP tidal habitat  
39 restoration actions. Tidal habitat would be restored approximately 2 miles east of SR 113, with  
40 some restoration taking place along the Barker and Lindsey Slough channels west to  
41 approximately SR 113 and a small amount (0.4 acre) taking place along the Lindsey Slough  
42 Channel west of SR 113 into Critical Habitat Unit 2.
- 43 • *Operations and maintenance*: Ongoing facilities operation and maintenance is expected to have  
44 little if any adverse effect on the California tiger salamander. Postconstruction operation and  
45 maintenance of the above-ground water conveyance facilities could result in ongoing but

1 periodic disturbances that could affect California tiger salamander use of the surrounding  
2 habitat. Operation of maintenance equipment, including vehicle use along transmission  
3 corridors in CZ 8, could also result in injury or mortality of California tiger salamanders if  
4 present in work sites. These effects, however, would be minimized with implementation of the  
5 California tiger salamander measures described in AMM1–AMM6, AMM10, AMM13, and  
6 AMM37.

- 7 • Injury and direct mortality: Construction activities associated with the water conveyance  
8 facilities, vernal pool complex restoration, and habitat and management enhancement-related  
9 activities, including operation of construction equipment, could result in injury or mortality of  
10 California tiger salamanders. Foraging, dispersal, and overwintering behavior may be altered  
11 during construction activities, resulting in injury or mortality of California tiger salamander if  
12 the species is present. Salamanders occupying burrows could be trapped and crushed during  
13 ground-disturbing activities. Degradation and loss of estivation habitat is also anticipated to  
14 result from the removal of vegetative cover and collapsing of burrows. Injury or mortality would  
15 be avoided and minimized through implementation of seasonal constraints and preconstruction  
16 surveys in suitable habitat, collapsing unoccupied burrows, and relocating salamanders outside  
17 of the construction area as described in AMM1–AMM6, AMM10, AMM13, and AMM37.

18 The following paragraphs summarize the combined effects discussed above and describe other  
19 BDCP conservation actions that offset or avoid these effects. NEPA effects and CEQA conclusions are  
20 also included.

### 21 ***Near-Term Timeframe***

22 Because the water conveyance facilities construction is being evaluated at the project level, the near-  
23 term BDCP conservation strategy has been evaluated to determine whether it would provide  
24 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the effects of  
25 construction would not be adverse under NEPA.

26 Alternative 4 would permanently remove approximately 330 acres of upland terrestrial cover  
27 habitat for California tiger salamander. There would be no effects on aquatic habitat. The effects  
28 would result from construction of the water conveyance facilities (CM1, 38 acres), Yolo Bypass  
29 improvements (CM2, 42 acres), tidal habitat restoration (CM4, 203 acres), construction of  
30 recreational facilities (CM11, 12 acres), and construction of conservation hatcheries (CM18, 35  
31 acres).

32 Typical NEPA project-level mitigation ratios of 2:1 for protected grassland habitats would indicate  
33 that 636 acres of grassland should be protected in the near-term for California tiger salamander to  
34 mitigate the near-term losses.

35 The BDCP has committed to near-term restoration of up to 1,140 acres of upland habitat (Objective  
36 GNC1.2) and 40 acres of aquatic habitat and to protection of at least 520 acres of aquatic  
37 habitat (Objective ASWNC1.1 and Objective VPNC1.1) and 2,000 acres of upland habitat (Objective  
38 GNC1.1). The landscape-scale goals and objectives would inform the near-term protection and  
39 restoration efforts. The natural community restoration and protection activities are expected to be  
40 concluded during the first 10 years of plan implementation, which is close enough in time to the  
41 occurrence of impacts to constitute adequate mitigation for NEPA purposes.

42 In addition, the plan contains commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
43 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*

1 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
2 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
3 *Material, AMM10 Restoration of Temporarily Affected Natural Communities, AMM13 California Tiger*  
4 *Salamander, and AMM37 Recreation. These AMMs include elements that avoid or minimize the risk*  
5 *of affecting habitats and species adjacent to work areas and storage sites. The AMMs are described*  
6 *in detail in BDCP Appendix 3.C, Avoidance and Minimization Measures.*

### 7 **Late Long-Term Timeframe**

8 Based on the habitat model, the study area supports approximately 8,273 acres of aquatic and  
9 29,459 acres of upland modeled habitat for California tiger salamander. Alternative 4 as a whole  
10 would result in the permanent loss of, and temporary effects on, 672 acres of upland habitat for  
11 California tiger salamander for the term of the plan (less than 2% of the total upland habitat in the  
12 study area). The location of these losses is described above in the discussions of CM2, CM4, CM11,  
13 and CM18.

14 The BDCP has committed to long-term protection of 8,000 acres of grassland in the Plan Area (Table  
15 3-4 in Chapter 3). Protection of at least 1,000 acres of grassland in CZ 8 west of Byron Highway  
16 would benefit the California tiger salamander by providing habitat in the portion of the study area  
17 with the highest long-term conservation value for the species based on known species occurrences  
18 and large, contiguous habitat areas (Objective GNC1.1). Consistent with Objective GNC1.3, ponds and  
19 other aquatic features in the grasslands would also be protected to provide aquatic habitat for this  
20 species, and the surrounding grassland would provide dispersal and aestivation habitat. Aquatic  
21 features in the protected grasslands in CZ 8 would be maintained and enhanced to provide suitable  
22 inundation depth and duration and suitable composition of vegetative cover to support breeding  
23 California tiger salamanders (Objective GNC2.5). Additionally, livestock exclusion from streams and  
24 ponds and other measures would be implemented as described in CM11 to promote growth of  
25 aquatic vegetation with appropriate cover characteristics favorable to California tiger salamanders.  
26 Lands protected in CZ 8 would connect with lands protected under the *East Contra Costa County*  
27 *HCP/NCCP* and the extensive Los Vaqueros Watershed lands, including grassland areas supporting  
28 this species. This objective would ensure that California tiger salamander upland and associated  
29 aquatic habitats would be protected and enhanced in the largest possible patch sizes adjacent to  
30 occupied habitat within and adjacent to the study area.

31 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6) estimates that the restoration  
32 and protection actions discussed above, as well as the restoration of alkali seasonal wetland  
33 complex, vernal pool complex, and grassland that could overlap with the species model, would result  
34 in the restoration of 88 acres of aquatic and 598 acres of upland modeled habitat for California tiger  
35 salamander. In addition, protection of alkali seasonal wetland complex, vernal pool complex, and  
36 grassland that could overlap with the species model, would result in the protection of 750 acres of  
37 aquatic and 5,000 acres of upland California tiger salamander modeled habitat.

38 **NEPA Effects:** In the near-term, the loss of California tiger salamander habitat under Alternative 4  
39 would be not be adverse because the BDCP has committed to protecting the acreage required to  
40 meet the typical mitigation ratios described above. In the late long-term, the losses of California tiger  
41 salamander upland habitat associated with Alternative 4, in the absence of other conservation  
42 actions, would represent an adverse effect as a result of habitat modification and potential direct  
43 mortality of a special-status species. However, with habitat protection and restoration associated  
44 with the conservation components, guided by landscape-scale goals and objectives and by AMM1–

1 AMM6, AMM10, AMM13, and AMM37, the effects of Alternative 4 as a whole on California tiger  
2 salamander would not be adverse.

3 **CEQA Conclusion:**

4 **Near-Term Timeframe**

5 Because the water conveyance facilities construction is being evaluated at the project level, the near-  
6 term BDCP conservation strategy has been evaluated to determine whether it would provide  
7 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
8 construction impacts would be less than significant under CEQA.

9 Alternative 4 would permanently remove approximately 318 acres of upland terrestrial cover  
10 habitat for California tiger salamander. There would be no effects on aquatic habitat. The effects  
11 would result from construction of the water conveyance facilities (CM1, 38 acres), Yolo Bypass  
12 improvements (CM2, 42 acres), tidal habitat restoration (CM4, 203 acres) construction of  
13 conservation hatcheries (CM18, 35 acres), and construction of recreational facilities (CM11, 12  
14 acres).

15 Typical CEQA project-level mitigation ratios of 2:1 for protected grassland habitats would indicate  
16 that 636 acres of grassland should be protected in the near-term for California tiger salamander to  
17 mitigate the near-term losses.

18 The BDCP has committed to near-term restoration of 1,140 acres of upland habitat (Objective  
19 GNC1.2) and 40 acres of aquatic habitat and to protection of 520 acres of aquatic habitat (Objective  
20 ASWNC1.1 and Objective VPNC1.1) and 2,000 acres of upland habitat (Objective GNC1.1). The  
21 landscape-scale goals and objectives would inform the near-term protection and restoration efforts.  
22 The natural community restoration and protection activities are expected to be concluded during  
23 the first 10 years of plan implementation, which is close enough in time to the occurrence of impacts  
24 to constitute adequate mitigation for CEQA purposes.

25 In addition, the plan contains commitments to implement AMM1–6, AMM10, AMM13, and AMM37,  
26 which include elements that avoid or minimize the risk of affecting habitats and species adjacent to  
27 work areas and storage sites. The AMMs are described in detail in BDCP Appendix 3.C, *Avoidance  
28 and Minimization Measures*. These commitments are more than sufficient to support the conclusion  
29 that the near-term impacts of Alternative 4 on California tiger salamander would be less than  
30 significant, because the number of acres required to meet the typical ratios described above would  
31 be only 636 acres of upland communities protected.

32 **Late Long-Term Timeframe**

33 Based on the habitat model, the study area supports approximately 8,273 acres of aquatic and  
34 29,459 acres of upland habitat for California tiger salamander. Alternative 4 as a whole would result  
35 in the permanent loss of, and temporary effects on, 672 acres of upland habitat for California tiger  
36 salamander for the term of the plan (less than 2% of the total upland habitat in the study area). The  
37 location of these losses is described above in the discussions of CM1, CM2, CM4, and CM18.

38 Implementation of BDCP conservation components would result in protection of at least 8,000 acres  
39 of grasslands, 600 acres of vernal pool complex and 150 acres of alkali seasonal wetland complex in  
40 CZ 1, CZ 8, and CZ 11, and restoration of 2,000 acres of grasslands and 67 acres of vernal pool  
41 complex, all of which would benefit California tiger salamander. The protection and restoration

1 would provide habitat in the portions of the study area with the highest long-term conservation  
2 value for the species based on known species occurrences and large, contiguous habitat areas. Ponds  
3 and other aquatic features in the grasslands would be protected to provide aquatic habitat for this  
4 species, and surrounding grassland would provide dispersal and aestivation habitat. Protected  
5 grassland and vernal pool complex in CZ 8 would connect with the East Contra Costa County  
6 HCP/NCCP reserve system, including grassland areas supporting this species. Protected lands in CZ  
7 11 would connect with the future Solano County reserve system, including grassland and vernal  
8 pool complex areas supporting this species. The larger habitat area and improved connectivity  
9 would increase opportunities for genetic exchange and allow for colonization of restored habitats in  
10 areas where the species has been extirpated. Protecting seasonal ponds associated with grasslands  
11 would ensure that California tiger salamander aquatic habitat and associated uplands would be  
12 preserved and enhanced in the largest possible patch sizes adjacent to occupied habitat within and  
13 adjacent to the study area. Grassland restoration would focus specifically on connecting fragmented  
14 patches of protected grasslands, thereby increasing dispersal opportunities for the California tiger  
15 salamander. Grasslands would be enhanced to increase burrow availability to provide refugia and  
16 cover for aestivating and dispersing California tiger salamanders.

17 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6) estimates that the restoration  
18 and protection actions discussed above, as well as the restoration of alkali seasonal wetland  
19 complex, vernal pool complex, and grassland that could overlap with the species model, would result  
20 in the restoration of 88 acres of aquatic and 598 acres of upland modeled habitat for California tiger  
21 salamander. In addition, protection of alkali seasonal wetland complex, vernal pool complex, and  
22 grassland that could overlap with the species model, would result in the protection of 750 acres of  
23 aquatic and 5,000 acres of upland California tiger salamander modeled habitat. In the absence of  
24 other conservation actions, the losses of California tiger salamander upland habitat associated with  
25 Alternative 4 would represent an adverse effect as a result of habitat modification and potential  
26 direct mortality of a special-status species. However, with habitat protection and restoration  
27 associated with the conservation components, guided by landscape-scale goals and objectives and  
28 by AMM1-AMM6, AMM10, AMM13, and AMM37, which would be in place throughout the  
29 construction phase, the impacts of Alternative 4 as a whole on California tiger salamander would not  
30 be significant.

### 31 **Impact BIO-47: Indirect Effects of Plan Implementation on California Tiger Salamander**

32 Indirect effects could occur outside of the construction footprint but within 500 feet of California  
33 tiger salamander habitat. Activities associated with conservation component construction and  
34 ongoing habitat enhancement, as well as operation and maintenance of above-ground water  
35 conveyance facilities, including the transmission facilities, could result in ongoing but periodic  
36 postconstruction disturbances with localized effects on California tiger salamander and its habitat,  
37 and temporary noise and visual disturbances over the term of the BDCP. Most of the areas indirectly  
38 affected are associated with the construction of Byron Forebay and its borrow and spoil areas in CZ  
39 8.

40 Maintenance and refueling of heavy equipment could result in the inadvertent release of sediment  
41 and hazardous substances into species habitat. Increased sedimentation could reduce the suitability  
42 of California tiger salamander habitat downstream of the construction area by filling in pools and  
43 smothering eggs. Accidental spills of toxic fluids into the aquatic system could result in the  
44 subsequent loss of California tiger salamander habitat. Hydrocarbon and heavy metal pollutants

1 associated with roadside runoff also have the potential to enter the aquatic system, affecting water  
2 quality and California tiger salamander.

3 **NEPA Effects:** Implementation of AMM1–AMM6, AMM10, AMM13, and AMM37 under Alternative 4  
4 would avoid or minimize the potential for adverse effects on California tiger salamanders, either  
5 indirectly or through habitat modifications. These AMMs would also avoid and minimize effects that  
6 could substantially reduce the number of California tiger salamanders or restrict the species' range.  
7 Therefore, the indirect effects of Alternative 4 would not have an adverse effect on California tiger  
8 salamander.

9 **CEQA Conclusion:** Indirect effects resulting from conservation measure operations and maintenance  
10 as well as construction-related noise and visual disturbances could impact California tiger  
11 salamander in aquatic and upland habitats. The use of mechanical equipment during construction  
12 could cause the accidental release of petroleum or other contaminants that could impact California  
13 tiger salamander or its prey. The inadvertent discharge of sediment or excessive dust adjacent to  
14 California tiger salamander habitat could also have a negative impact on the species or its prey. With  
15 implementation of AMM1–AMM6, AMM10, AMM13, and AMM37 as part of Alternative 4, the BDCP  
16 would avoid the potential for substantial adverse effects on California tiger salamander, either  
17 indirectly or through habitat modifications, and would not result in a substantial reduction in  
18 numbers or a restriction in the range of California tiger salamanders. The indirect effects of  
19 Alternative 4 would have a less-than-significant impact on California tiger salamander.

#### 20 **Impact BIO-48: Periodic Effects of Inundation of California Tiger Salamander Habitat as a** 21 **Result of Implementation of Conservation Components**

22 *CM2 Yolo Bypass Fisheries Enhancement* is the only conservation measure expected to result in  
23 periodic inundation of California tiger salamander habitat. Periodic inundation of Yolo Bypass could  
24 affect from an estimated 191 acres of terrestrial habitat during a notch flow of 1,000 cfs, to an  
25 estimated 639 acres of terrestrial habitat during a notch flow of 4,000 cfs in CZ 1 (Table 12-4-21).  
26 This effect would only occur during an estimated maximum of 30% of years and in areas that are  
27 already inundated in more than half of all years; therefore, these areas are expected to provide only  
28 marginal terrestrial habitat for the California tiger salamander under Existing Conditions. No aquatic  
29 breeding habitat would be affected (Table 12-4-21): the modeled habitat in the Yolo Bypass, in the  
30 vicinity of terrestrial habitat is of low value in that there are no California tiger salamander records  
31 in this area and the bypass lacks vernal pool complexes with large, deep pools, or large grassland  
32 areas with stock ponds and similar aquatic features that provide the habitat of highest value for this  
33 species. Therefore, the terrestrial habitat that would be affected has a small likelihood of supporting  
34 California tiger salamanders, and Yolo Bypass operations are expected to have a minimal effect on  
35 the species, if any.

36 **NEPA Effects:** The effects of periodic inundation from Alternative 4 would not have an adverse effect  
37 on California tiger salamander.

38 **CEQA Conclusion:** Flooding of the Yolo Bypass from Fremont Weir operations would periodically  
39 increase the frequency and duration of inundation of 191–639 acres of terrestrial habitat for  
40 California tiger salamander. Because this area is considered low-value habitat and there are no  
41 California tiger salamander records in the area, and because of the lack of suitable breeding habitat  
42 in this area, the effects of periodic inundation of California tiger salamander habitat from Alternative  
43 4 would have a less-than-significant impact.

## 1 Giant Garter Snake

2 The habitat model used to assess effects for the giant garter snake is based on aquatic habitat and  
3 upland habitat. Modeled aquatic habitat is composed of tidal perennial aquatic (except in Suisun  
4 Marsh), tidal freshwater perennial emergent wetland, nontidal freshwater emergent wetland, and  
5 nontidal perennial aquatic natural communities; rice fields; and artificial canals and ditches.  
6 Modeled upland habitat is composed of all nonwetland and nonaquatic natural communities  
7 (primarily grassland and cropland) within 200 feet of modeled aquatic habitat features. The  
8 modeled upland habitat is ranked as high-, moderate-, or low-value based on giant garter snake  
9 associations between vegetation and cover types (U.S. Fish and Wildlife Service 2012) and historical  
10 and recent occurrence records (Appendix 12C, *2009 to 2011 Bay Delta Conservation Plan EIR/EIS*  
11 *Environmental Data Report*), and presence of features necessary to fulfill the species' life cycle  
12 requirements. Modeled habitat is expressed in acres for aquatic and upland habitats, and in miles for  
13 linear movement corridors in aquatic habitat. Other factors considered in assessing the value of  
14 affected habitat for the giant garter snake, to the extent that information is available, are proximity  
15 to conserved lands and recorded occurrences of the species, proximity to giant garter snake  
16 subpopulations (Yolo Basin/Willow Slough and Coldani Marsh/White Slough) in the study area that  
17 are identified in the draft recovery plan for this species (U.S. Fish and Wildlife Service 1999b), and  
18 contribution to connectivity between giant garter snake subpopulations. Construction and  
19 restoration associated with Alternative 4 conservation measures would result in both temporary  
20 and permanent losses of giant garter snake modeled habitat as indicated in Table 12-4-22. The  
21 majority of the losses would take place over an extended period of time as tidal marsh is restored in  
22 the study area. Full implementation of Alternative 4 would also include the following biological  
23 objectives over the term of the BDCP to benefit the giant garter snake (BDCP Chapter 3, *Conservation*  
24 *Strategy*).

- 25 • Increase native species diversity and relative cover of native plant species, and reduce the  
26 introduction and proliferation of nonnative species (Objective L2.6, associated with CM11).
- 27 • Within the 65,000 acres of tidal natural communities (L1.3), restore or create 24,000 acres of  
28 tidal freshwater emergent wetland in CZ 1, CZ 2, CZ 4, CZ 5, CZ 6, and/or CZ 7 (Objective  
29 TFEWNC1.1, associated with CM3 and CM4).
- 30 • Create at least 1,200 acres of nontidal marsh consisting of a mosaic of nontidal perennial aquatic  
31 and nontidal freshwater emergent wetland natural communities, with suitable habitat  
32 characteristics for giant garter snake and western pond turtle (Objective NFEW/NPANC1.1,  
33 associated with CM3 and CM10).
- 34 • Protect 48,625 acres of cultivated lands that provide suitable habitat for covered and other  
35 native wildlife species (Objective CLNC1.1, associated with CM3 and CM11).
- 36 • Target cultivated land conservation to provide connectivity between other conservation lands  
37 (Objective CLNC1.2, associated with CM3).
- 38 • Maintain and protect the small patches of important wildlife habitats associated with cultivated  
39 lands that occur in cultivated lands within the reserve system, including isolated valley oak  
40 trees, trees and shrubs along field borders and roadsides, remnant groves, riparian corridors,  
41 water conveyance channels, grasslands, ponds, and wetlands (Objective CLNC1.3, associated  
42 with CM3 and CM11).
- 43 • Of the at least 1,200 acres of nontidal marsh created under (Objective NFEW/NPANC1.1), create  
44 600 acres of aquatic habitat giant garter snake aquatic habitat that is connected to the 1,500

- 1 acres of rice land or equivalent-value habitat described below in Objective GGS1.4 (Objective  
2 GGS1.1, associated with CM3, CM4, and CM10).
- 3 ● Of the 8,000 acres of grassland protected under Objective GNC1.1 and 2,000 acres restored  
4 under Objective GNC1.2, create or protect 200 acres of high-value upland giant garter snake  
5 habitat adjacent to the at least 600 acres of nontidal perennial habitat being restored and/or  
6 created in CZ 4 and/or CZ 5 (Objective GGS1.2, associated with CM3 and CM8).
  - 7 ● Protect giant garter snakes on restored and protected nontidal marsh and adjacent uplands  
8 (Objectives GGS1.1 and GGS1.2) from incidental injury or mortality by establishing 200-foot  
9 buffers between protected giant garter snake habitat and roads (other than those roads  
10 primarily used to support adjacent cultivated lands and levees). Establish giant garter snake  
11 reserves at least 2,500 feet from urban areas or areas zoned for urban development (Objective  
12 GGS1.3, associated with CM3).
  - 13 ● Create connections from the White Slough population to other areas in the giant garter snake's  
14 historical range in the Stone Lakes vicinity by protecting, restoring, and/or creating at least  
15 1,500 acres of rice land or equivalent-value habitat (e.g., perennial wetland) for the giant garter  
16 snake in CZ 4 and/or CZ 5. Any portion of the 1,500 acres may consist of tidal freshwater  
17 emergent wetland and may overlap with the 24,000 acres of tidally restored freshwater  
18 emergent wetland if it meets specific giant garter snake habitat criteria described in CM4. Up to  
19 500 (33%) of the 1,500 acres may consist of suitable uplands adjacent to protected or restored  
20 aquatic habitat (Objective GGS1.4, associated with CM3 and CM4).
  - 21 ● Of the at least 1,200 acres of nontidal marsh created under Objective NFEW/NPANC1.1, create  
22 600 acres of connected aquatic giant garter snake habitat outside the Yolo Bypass in CZ 2  
23 (Objective GGS2.1, associated with CM3 and CM10).
  - 24 ● Of the 8,000 acres of grasslands protected under Objective GNC1.1 and the 2,000 acres restored  
25 under Objective GNC1.2, create or protect 200 acres of high-value upland habitat adjacent to the  
26 600 acres of nontidal marsh created in CZ 2 outside of Yolo Bypass (GGS2.1) (Objective GGS2.2,  
27 associated with CM3 and CM8).
  - 28 ● To expand upon and buffer the newly restored/created nontidal perennial habitat in CZ 2,  
29 protect 700 acres of cultivated lands, with 500 acres consisting of rice land and the remainder  
30 consisting of compatible cultivated land that can support giant garter snakes. The cultivated  
31 lands may be a subset of lands protected for the cultivated lands natural community and other  
32 covered species (Objective GGS2.3, associated with CM3).
  - 33 ● Protect giant garter snakes on created nontidal marsh (Objective GGS2.1) and created or  
34 protected adjacent uplands (Objective GGS2.2) from incidental injury or mortality by  
35 establishing 200-foot buffers between protected giant garter snake habitat and roads, and  
36 establishing giant garter snake reserves at least 2,500 feet from urban areas or areas zoned for  
37 urban development (Objective GGS2.4, associated with CM3).
  - 38 ● Protect, restore, and/or create 2,740 acres of rice land or equivalent-value habitat (e.g.,  
39 perennial wetland) for the giant garter snake in CZ 1, CZ 2, CZ 4, or CZ 5. Up to 500 acres may  
40 consist of tidal freshwater emergent wetland and may overlap with the at least 5,000 acres of  
41 tidally restored freshwater emergent wetland in the Cache Slough ROA if this portion meets  
42 giant garter snake habitat criteria specified in CM4. Up to 1,700 acres may consist of rice fields  
43 in the Yolo Bypass if this portion meets the criteria specified in CM3, *Reserve Design*  
44 *Requirements by Species*. Any remaining acreage will consist of rice land or equivalent-value

1 habitat outside the Yolo Bypass. Up to 915 (33%) of the 2,740 acres may consist of suitable  
2 uplands adjacent to protected or restored aquatic habitat (Objective GGS3.1, associated with  
3 CM3, CM4, and CM10).

4 As explained below, with the restoration or protection of these amounts of habitat, in addition to the  
5 implementation of AMMs, impacts on giant garter snake would not be adverse for NEPA purposes  
6 and would be less than significant for CEQA purposes.

7 **Table 12-4-22. Changes in Giant Garter Snake Modeled Habitat Associated with Alternative 4<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type <sup>c</sup>	Permanent		Temporary		Periodic <sup>e</sup>	
		NT	LLT <sup>d</sup>	NT	LLT <sup>d</sup>	CM2	CM5
CM1	Aquatic (acres)	83	83	68	68	NA	NA
	Upland (acres)	411	411	188	188	NA	NA
	Aquatic (miles)	13	13	6	6	NA	NA
<b>Total Impacts CM1 (acres)</b>		<b>494</b>	<b>494</b>	<b>256</b>	<b>256</b>	<b>NA</b>	<b>NA</b>
CM2–CM18	Aquatic (acres)	179	498	15	38	NA	NA
	Upland (acres)	1,467	2,443	219	261	582–1,402	606
	Aquatic (miles)	49	189	9	10	NA	NA
<b>Total Impacts CM2–CM18 (acres)</b>		<b>1,646</b>	<b>2,941</b>	<b>234</b>	<b>299</b>	<b>582–1,402</b>	<b>606</b>
<b>TOTAL IMPACTS CM1–CM18 (acres)</b>		<b>2,140</b>	<b>3,435</b>	<b>490</b>	<b>555</b>	<b>582–1,402</b>	<b>606</b>

<sup>a</sup> See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> Aquatic acres represent tidal and nontidal habitat combined, and upland acres represent low-, moderate-, and high-value acreages combined.

<sup>d</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>e</sup> Periodic effects were estimated for the late long-term only. CM2 periodic impacts on upland habitats only are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

8

9 **Impact BIO-49: Loss or Conversion of Habitat for and Direct Mortality of Giant Garter Snake**

10 Alternative 4 conservation measures would result in the permanent and temporary loss combined  
11 of up to 687 acres of modeled aquatic habitat (tidal and nontidal combined), up to 3,303 acres of  
12 modeled upland habitat, and up to 218 miles of channels providing aquatic movement habitat for  
13 the giant garter snake (Table 12-4-22). There are three giant garter snake occurrences that overlap  
14 with the Plan footprint. Conservation measures that would result in these losses are conveyance  
15 facilities and transmission line construction, and establishment and use of RTM, borrow, and spoils  
16 areas (CM1), Fremont Weir/Yolo Bypass improvements (CM2), tidal habitat restoration (CM4),  
17 floodplain restoration (CM5), and construction of a conservation fish hatchery (CM18). Habitat  
18 enhancement and management activities (CM11), which include ground disturbance or removal of

1 nonnative vegetation, could result in local adverse habitat effects. In addition, maintenance activities  
2 associated with the long-term operation of the water conveyance facilities and other BDCP physical  
3 facilities could degrade or eliminate giant garter snake habitat. Each of these individual activities is  
4 described below. Each of these individual activities is described below. A summary statement of the  
5 combined impacts and NEPA effects and a CEQA conclusion follow the individual conservation  
6 measure discussions.

- 7 • **CM1 Water Facilities and Operation:** Construction of Alternative 4 conveyance facilities would  
8 result in the permanent loss of approximately 494 acres of modeled giant garter snake habitat,  
9 composed of 83 acres of aquatic habitat and 411 acres of upland habitat (Table 12-4-22). The  
10 411 acres of upland habitat that would be removed for the construction of the conveyance  
11 facilities consists of 172 acres of high-, 221 acres of moderate-, and 18 acres of low-value  
12 habitat. In addition, approximately 13 miles of channels providing giant garter snake movement  
13 habitat would be removed as a result of conveyance facilities construction. Development of the  
14 water conveyance facilities would also result in the temporary removal of up to 68 acres of giant  
15 garter snake aquatic habitat and up to 188 acres of adjacent upland habitat in areas near  
16 construction in CZ 5 and CZ 6 (see Table 12-4-22 and Terrestrial Biology Map Book). In addition,  
17 approximately 6 miles of channels providing giant garter snake movement habitat would be  
18 temporarily removed as a result of conveyance facilities construction.

19 Most of the habitat to be lost is in CZ 6 on Mandeville Island. Refer to the Terrestrial Biology Map  
20 Book for a detailed view of Alternative 4 construction locations. Water facilities construction  
21 and operation is expected to have low to moderate potential for adverse effects on giant garter  
22 snake aquatic habitat on Mandeville Island because it is not located near or between populations  
23 identified in the draft recovery plan. An estimated 222 of the 496 acres would be lost as storage  
24 areas for reusable tunnel material, which would likely be moved to other sites for use in levee  
25 build-up and restoration, and the affected area would likely be restored: while this effect is  
26 categorized as permanent because there is no assurance that the material would eventually be  
27 moved, the effect would likely be temporary. Furthermore, the amount of storage area needed  
28 for reusable tunnel material is flexible and the footprint used in the effects analysis is based on a  
29 worst case scenario: the actual area to be affected by reusable tunnel material storage would  
30 likely be less than the estimated acreage.

- 31 • **CM2 Yolo Bypass Fisheries Enhancement:** Construction activity associated with fisheries  
32 improvements in the Yolo Bypass would result in the permanent and temporary removal of  
33 approximately 83 acres of aquatic habitat and 458 acres of upland habitat for the giant garter  
34 snake in the late long-term. The upland habitat that would be removed is composed of 336 acres  
35 of high-value, 121 acres of moderate-value, and 1 acre of low-value habitat. Approximately 14  
36 miles (less than 1% of total miles in Plan Area) of channels providing giant garter snake habitat  
37 for movements would be removed as a result of Fremont Weir/Yolo Bypass Improvements.  
38 Most of this habitat removal would occur at the north end of the Yolo Bypass, near Fremont  
39 Weir. Construction is expected to have adverse effects on giant garter snake aquatic habitat in  
40 the Yolo Bypass area because it is near the Yolo Basin/Willow Slough subpopulation.

41 In addition to habitat loss from construction related activities in Yolo Bypass, late season  
42 flooding in the bypass may result in loss of rice habitat (considered aquatic habitat for giant  
43 garter snake) by precluding the preparation and planting of rice fields. The methods for  
44 estimating loss of rice in the bypass and results are provided in BDCP Appendix 5.J, Attachment  
45 5J.E, *Estimation of BDCP Impact on Giant Garter Snake Summer Foraging Habitat in the Yolo*

1 *Bypass*. This analysis concludes that the estimated loss of rice is 1,662 acres which was  
2 considered to occur late long-term.

- 3 • *CM4 Tidal Natural Communities Restoration*: Tidal natural communities restoration would result  
4 in the permanent loss of approximately 395 acres of aquatic habitat and 2,123 acres of upland  
5 habitat for the giant garter snake to tidal marsh in the late long-term. The upland habitat  
6 affected by tidal inundation includes 594 acres of high-value, 1,375 acres of moderate-value, and  
7 154 acres of low-value habitat. In addition, approximately 138 miles of channels providing giant  
8 garter snake movement habitat would be removed as a result of tidal natural communities  
9 restoration.

10 Most of the effects of tidal natural communities restoration would occur in the Cache Slough and  
11 Yolo Bypass areas (CZ 1 and CZ 2). This aquatic habitat is of low to moderate value: it is in and  
12 near Category 1 open space but is not near any giant garter snake occurrences and is not near or  
13 between giant garter snake subpopulations identified in the draft recovery plan. Tidal natural  
14 communities restoration is expected to have little to no adverse effects on giant garter snake  
15 aquatic or upland habitat in the Cache Slough ROA. There are no giant garter snake occurrences  
16 in this area, which is already tidally influenced so it has limited value for the giant garter snake  
17 (giant garter snakes may occur in tidally muted areas but are not likely to use aquatic areas with  
18 a strong tidal influence).

- 19 • *CM5 Seasonally Inundated Floodplain Restoration*: Levee construction associated with floodplain  
20 restoration in the south Delta (CZ 7) would result in the permanent and temporary removal of  
21 approximately 60 acres of aquatic habitat and 89 acres of upland habitat for giant garter snake.  
22 The upland habitat to be removed is composed of 51 acres of moderate-value and 38 acres of  
23 low-value upland habitat. Approximately 2 miles of channels providing giant garter snake  
24 movement habitat would be removed as a result of floodplain restoration. Seasonally inundated  
25 floodplain restoration is expected to have little to no adverse effects on giant garter snake  
26 aquatic habitat because the site is not located near or between giant garter snake populations  
27 identified in the draft recovery plan. As with CM4, the estimates of the effect of seasonal  
28 floodplain levee construction and inundation are based on projections of where restoration may  
29 occur. Actual effects are expected to be lower because sites would be selected to minimize  
30 effects on giant garter snake habitat.

- 31 • *CM11 Natural Communities Enhancement and Management*: A variety of habitat management  
32 actions included in CM11 that are designed to enhance wildlife values in BDCP-protected  
33 habitats may result in localized ground disturbances that could temporarily remove small  
34 amounts of giant garter snake habitat. Ground-disturbing activities, such as removal of  
35 nonnative vegetation and road and other infrastructure maintenance, are expected to have  
36 minor effects on available giant garter snake habitat and are expected to result in overall  
37 improvements to and maintenance of giant garter snake habitat values over the term of the  
38 BDCP. These effects cannot be quantified, but are expected to be minimal and would be avoided  
39 and minimized by the AMMs listed below.

40 Passive recreation in the reserve system could result in human disturbance of giant garter  
41 snakes basking in upland areas and compaction of upland burrow sites used for brumation.  
42 However, AMM37, described in Appendix 3.C, *Avoidance and Minimization Measures*, requires  
43 setbacks for trails in giant garter snake habitat. With this measure in place, recreation related  
44 effects on giant garter snake are expected to be minimal.

- 1 • *CM18 Conservation Hatcheries*: Construction for conservation hatcheries could result in the  
2 permanent removal of 35 acres of moderate-value upland habitat for the giant garter snake in  
3 the Yolo Bypass area (CZ 2).
- 4 • Operations and maintenance: Postconstruction operation and maintenance of the above-ground  
5 water conveyance facilities and restoration infrastructure could result in ongoing but periodic  
6 disturbances that could affect giant garter snake use of the surrounding habitat in the Yolo  
7 Bypass, the Cache Slough area, and the north and south Delta (CZ 1, CZ 2, CZ 4, CZ 5, CZ 6, CZ 7,  
8 and CZ 8). Maintenance activities would include vegetation management, levee and structure  
9 repair, and regrading of roads and permanent work areas. These effects, however, would be  
10 reduced by AMMs and conservation actions as described below.
- 11 • Injury and direct mortality: Construction vehicle activity may cause injury or mortality of the  
12 giant garter snake. If snakes reside where activities take place (most likely in the vicinity of the  
13 two subpopulations: Yolo Basin/Willow Slough [CZ 2] and the Coldani Marsh/White Slough [CZ  
14 4]), the operation of equipment for land clearing, construction, conveyance facilities operation  
15 and maintenance, and habitat restoration, enhancement, and management could result in injury  
16 or mortality of giant garter snakes. This risk is highest from late fall through early spring, when  
17 the snakes are dormant. Increased vehicular traffic associated with BDCP actions could  
18 contribute to a higher incidence of road kill. However, preconstruction surveys would be  
19 implemented after the project planning phase and prior to any ground-disturbing activity. Any  
20 disturbance to suitable aquatic and upland sites in or near the project footprint would be  
21 avoided to the extent feasible, and the loss of aquatic habitat and grassland vegetation would be  
22 minimized through adjustments to project design, as practicable. Construction monitoring and  
23 other measures would be implemented to avoid and minimize injury or mortality of this species  
24 during construction as described in *AMM16 Giant Garter Snake*.

25 The following paragraphs summarize the combined effects discussed above and describe other  
26 BDCP conservation actions that offset or avoid these effects. NEPA effects and a CEQA conclusion are  
27 also included.

### 28 ***Near-Term Timeframe***

29 Because the water conveyance facilities construction is being evaluated at the project level, the near-  
30 term BDCP conservation strategy has been evaluated to determine whether it would provide  
31 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the effects of  
32 construction would not be adverse under NEPA.

33 Alternative 4 would permanently and temporarily remove 345 acres of aquatic habitat and 2,285 acres  
34 of upland habitat for giant garter snake in the study area during the near-term. These effects would  
35 result from the construction of the water conveyance facilities (CM1, 151 acres of aquatic and 599 acres  
36 of upland habitat), Yolo Bypass fisheries improvements (CM2, 83 acres of aquatic and 458 acres of  
37 upland habitat), from tidal restoration (CM4, 111 acres of aquatic and 1,193 acres of upland habitat),  
38 and conservation hatcheries (CM18, 35 acres of upland habitat). The aquatic habitat losses would occur  
39 in tidal and nontidal wetland natural communities and rice fields. The upland habitat losses would occur  
40 in cropland and grassland communities. In addition, approximately 77 miles of channels (irrigation and  
41 drainage canals) providing giant garter snake movement habitat would be removed. The habitat model  
42 likely overestimates the relative value of irrigation and drainage canals in the vicinity of White Slough  
43 and south due to its proximity to records that likely represent single displaced snakes, not viable  
44 populations.

1 Typical NEPA project-level mitigation ratios for those natural communities that would be affected  
2 and that are identified in the biological goals and objectives for giant garter snake in Chapter 3 of the  
3 BDCP would be 1:1 for restoration and 1:1 for protection of aquatic habitats and 2:1 for protection  
4 of upland habitats. Using these ratios would indicate that 345 acres of aquatic habitat should be  
5 restored, 345 acres of aquatic habitat should be protected, and 4,570 acres of upland habitat should  
6 be protected for giant garter snake to mitigate the near-term losses.

7 The BDCP has committed to near-term restoration of up to 8,100 acres of aquatic habitat and up to  
8 1,140 acres of upland habitat, and to protection of at least 16,900 acres of upland habitat. Lands to  
9 be protected and restored in the near-term specifically for the giant garter snake total 3,900 acres  
10 (400 acres nontidal marsh, 400 acres of grassland, 700 acres of cultivated lands including at least  
11 500 acres of rice in CZ 2, and acres of rice or habitat of equivalent value in CZ 2, CZ 4, and CZ 5.  
12 Additionally, 2,400 acres of rice or habitat equivalent (1,500 acres under Objective GGS1.4 and 900  
13 acres under Objective GGS3.1) would be restored or protected to create connections from the  
14 Coldani Marsh/White Slough population to other areas in the giant garter snake historical range.  
15 Additionally, 900 of the 2,400 acres of rice land or habitat of equivalent value would be protected  
16 and restored for the giant garter snake to achieve a 1:1 ratio of habitat conserved to habitat affected  
17 (habitat affected includes uplands periodically flooded and rice lost due to late season flooding in  
18 Yolo Bypass as a result of CM2) (Objective GGS3.1). An unknown number of irrigation and drainage  
19 ditches located in cultivated lands and suitable for giant garter snake movement would be  
20 maintained and protected within the reserve system, which would include isolated valley oak trees,  
21 trees and shrubs along field borders and roadsides, remnant groves, riparian corridors, water  
22 conveyance channels, grasslands, ponds, and wetlands (Objective CLNC1.3).

23 These habitat protection and restoration measures would benefit the giant garter snake and the  
24 plan's species-specific biological goals and objectives would inform the near-term protection and  
25 restoration efforts. Protecting and expanding existing giant garter snake subpopulations, and  
26 providing connectivity between protected areas, is considered the most effective approach to giant  
27 garter snake conservation in the Plan Area. The Coldani Marsh/White Slough and Yolo Basin/Willow  
28 Slough subpopulations are the only known populations of giant garter snakes in the Plan Area and  
29 are identified as important for the recovery of the species in the draft recovery plan for the species  
30 (U.S. Fish and Wildlife Service 1999b). Implementation actions that target giant garter snake habitat  
31 would focus on these two important subpopulations.

32 The species-specific biological goals and objectives would inform the near-term protection and  
33 restoration efforts. The natural community restoration and protection activities are expected to be  
34 concluded during the first 10 years of plan implementation, which is close enough in time to the  
35 occurrence of impacts to constitute adequate mitigation for NEPA purposes. These commitments are  
36 more than sufficient to support the conclusion that the near-term effects of Alternative 4 would be  
37 not be adverse under NEPA, because the number of acres required to meet the typical ratios  
38 described above would be only 345 acres of aquatic communities restored, 345 acres of aquatic  
39 communities protected, and 4,570 acres of upland communities protected.

40 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
41 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
42 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
43 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
44 *Material*, *AMM7 Barge Operations Plan*, *AMM10 Restoration of Temporarily Affected Natural*  
45 *Communities*, *AMM16 Giant Garter Snake*, and *AMM37 Recreation*. All of these AMMs include

1 elements that avoid or minimize the risk of BDCP activities affecting habitats and species adjacent to  
2 work areas and storage sites. The AMMs are described in detail in BDCP Appendix 3.C, *Avoidance*  
3 *and Minimization Measures*.

#### 4 **Late Long-Term Timeframe**

5 Based on modeled habitat, the study area supports approximately 31,281 acres of aquatic and  
6 53,285 acres of upland habitat for giant garter snake. Alternative 4 as a whole would result in the  
7 permanent loss of and temporary effects on 687 acres of aquatic habitat and to 3,303 acres of  
8 upland habitat for giant garter snake during the term of the plan (3% of the total aquatic habitat and  
9 6% of the total upland habitat in the study area). The locations of these losses are described above in  
10 the analyses of individual conservation measures.

11 The BDCP has committed to protecting 8,000 acres of grassland and 48,625 acres of cultivated lands  
12 in the study area, and restoring 25,100 acres tidal and nontidal wetlands and 2,000 acres of  
13 grasslands in the study area. Lands to be protected and restored specifically for the giant garter  
14 snake total 6,540 acres (1,200 acres nontidal marsh, 400 acres of grassland, 700 acres of cultivated  
15 lands including at least 500 acres of rice in CZ 2, and acres of rice or habitat of equivalent value in CZ  
16 2, CZ 4, and CZ 5. Additionally, 4,240 acres of rice or habitat equivalent (1,500 acres under Objective  
17 GGS1.4 and 2,740 acres under Objective GGS3.1) would be restored or protected to create  
18 connections from the Coldani Marsh/White Slough population to other areas in the giant garter  
19 snake historical range. Additionally, the 2,740 acres of rice land or habitat of equivalent value under  
20 Objective GGS3.1 would be protected and restored for the giant garter snake to achieve a 1:1 ratio of  
21 habitat conserved to habitat affected (habitat affected includes uplands periodically flooded and rice  
22 lost due to late season flooding in Yolo Bypass as a result of CM2) (Objective GGS3.1). In addition to  
23 the 6,540 acres of high value habitat targeted specifically for giant garter snake, the protection and  
24 restoration of other natural communities is expected to provide additional restoration of 4,430  
25 acres and protection of 3,733 acres of garter snake habitat.

26 Protection and management of cultivated lands (CM3 and CM11) would also benefit the giant garter  
27 snake by providing connectivity and maintaining irrigation and drainage channels that provide  
28 aquatic habitat for the snake. Assuming the length of canals and ditches providing giant garter snake  
29 movement habitat on the protected cultivated lands is proportional to the modeled habitat on  
30 cultivated lands in the Plan Area, the 48,625 acres of protected cultivated lands would support  
31 approximately 281 miles of movement habitat for the giant garter snake (2,784 miles multiplied by  
32 0.101 [48,625 acres protected of 481,909 acres in Plan Area]).

33 Giant garter snake habitat would be restored and protected specifically, to conserve and expand the  
34 Coldani Marsh/White Slough and Yolo Basin/Willow Slough subpopulations of the giant garter  
35 snake. Protecting and expanding existing giant garter snake subpopulations, and providing  
36 connectivity between protected areas, is considered the most effective approach to giant garter  
37 snake conservation in the Plan Area. The Coldani Marsh/White Slough and Yolo Basin/Willow  
38 Slough subpopulations are the only known subpopulations of giant garter snakes in the Plan Area  
39 and are identified as important for the recovery of the species in the draft recovery plan for the  
40 species (U.S. Fish and Wildlife Service 1999b). Implementation actions that target giant garter snake  
41 habitat would focus on these two important subpopulations.

42 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6) estimates that the restoration  
43 and protection actions discussed above, as well as the restoration of managed wetland, nontidal  
44 freshwater perennial emergent wetland, nontidal perennial aquatic, tidal freshwater emergent

1 wetland, alkali seasonal wetland, grassland, and vernal pool complex that could overlap with the  
2 species model, would result in the restoration of 3,450 acres of aquatic and 980 acres of upland  
3 modeled habitat for giant garter snake. In addition, protection of cultivated land, grassland, alkali  
4 seasonal wetland, and vernal pool complex could overlap with the species model and would result in  
5 the protection of 1,547 acres of aquatic and 2,185 acres of upland giant garter snake modeled  
6 habitat.

7 **NEPA Effects:** In the near-term, the loss of giant garter snake habitat under Alternative 4 would not  
8 be adverse because the BDCP has committed to protecting and restoring the acreage required to  
9 meet the typical mitigation ratios described above. In the late long-term, the losses of giant garter  
10 snake habitat associated with Alternative 4, in the absence of other conservation actions, would  
11 represent an adverse effect as a result of habitat modification and potential direct mortality of a  
12 special-status species. However, with habitat protection and restoration associated with the  
13 conservation components, guided by landscape-scale goals and objectives and by AMM1–AMM7,  
14 AMM10, AMM16, and AMM37, the effects of Alternative 4 as a whole on giant garter snake would  
15 not be adverse.

16 **CEQA Conclusion:**

17 **Near-Term Timeframe**

18 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
19 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
20 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
21 effects of construction would be less than significant under CEQA.

22 Alternative 4 would permanently and temporarily remove 345 acres of aquatic habitat and 2,285  
23 acres of upland habitat for giant garter snake in the study area during the near-term. These effects  
24 would result from the construction of the water conveyance facilities (CM1, 151 acres of aquatic and  
25 599 acres of upland habitat), Yolo Bypass fisheries improvements (CM2, 83 acres of aquatic and 458  
26 acres of upland habitat), from tidal restoration (CM4, 111 acres of aquatic and 1,193 acres of upland  
27 habitat), and conservation hatcheries (CM18, 35 acres of upland habitat). The aquatic habitat losses  
28 would occur in tidal and nontidal wetland natural communities and rice fields. The upland habitat  
29 losses would occur in cropland and grassland communities. In addition, approximately 77 miles of  
30 channels (irrigation and drainage canals) providing giant garter snake movement habitat would be  
31 removed. The habitat model likely overestimates the relative value of irrigation and drainage  
32 canals in the vicinity of White Slough and south due to its proximity to records that likely represent  
33 single displaced snakes, not viable populations.

34 Typical CEQA project-level mitigation ratios for those natural communities that would be affected  
35 and that are identified in the biological goals and objectives for giant garter snake in Chapter 3 of the  
36 BDCP would be 1:1 for restoration and 1:1 for protection of aquatic habitats and 2:1 for protection  
37 of upland habitats. Using these ratios would indicate that 345 acres of aquatic habitat should be  
38 restored, 345 acres of aquatic habitat should be protected, and 4,570 acres of upland habitat should  
39 be protected for giant garter snake to mitigate the near-term losses.

40 The BDCP has committed to near-term restoration of up to 8,100 acres of aquatic habitat and up to  
41 1,140 acres of upland habitat, and to protection of at least 16,900 acres of upland habitat. Lands to  
42 be protected and restored in the near term specifically for the giant garter snake total 3,900 acres  
43 (400 acres nontidal marsh, 400 acres of grassland, 700 acres of cultivated lands including at least

1 500 acres of rice in CZ 2, and acres of rice or habitat of equivalent value in CZ 2, CZ 4, and CZ 5.  
2 Additionally, 2,400 acres of rice or habitat equivalent (1,500 acres under Objective GGS1.4 and 900  
3 acres under Objective GGS3.1) would be restored or protected to create connections from the  
4 Coldani Marsh/White Slough population to other areas in the giant garter snake historical range.  
5 Additionally, 900 of the 2,400 acres of rice land or habitat of equivalent value would be protected  
6 and restored for the giant garter snake to achieve a 1:1 ratio of habitat conserved to habitat affected  
7 (habitat affected includes uplands periodically flooded and rice lost due to late season flooding in  
8 Yolo Bypass as a result of CM2) (Objective GGS3.1). An unknown number of irrigation and drainage  
9 ditches located in cultivated lands and suitable for giant garter snake movement would be  
10 maintained and protected within the reserve system, which would include isolated valley oak trees,  
11 trees and shrubs along field borders and roadsides, remnant groves, riparian corridors, water  
12 conveyance channels, grasslands, ponds, and wetlands (Objective CLNC1.3).

13 These habitat protection and restoration measures would benefit the giant garter snake and the  
14 plan's species-specific biological goals and objectives would inform the near-term protection and  
15 restoration efforts. Protecting and expanding existing giant garter snake subpopulations, and  
16 providing connectivity between protected areas, is considered the most effective approach to giant  
17 garter snake conservation in the Plan Area. The Coldani Marsh/White Slough and Yolo Basin/Willow  
18 Slough subpopulations are the only known subpopulations of giant garter snakes in the Plan Area  
19 and are identified as important for the recovery of the species in the draft recovery plan for the  
20 species (U.S. Fish and Wildlife Service 1999b). Implementation actions that target giant garter snake  
21 habitat would focus on these two important subpopulations.

22 The natural community restoration and protection activities are expected to be concluded during  
23 the first 10 years of plan implementation, which is close enough in time to the occurrence of impacts  
24 to constitute adequate mitigation for CEQA purposes. These commitments are more than sufficient  
25 to support the conclusion that the near-term effects of Alternative 4 would be less than significant  
26 under CEQA, because the number of acres required to meet the typical ratios described above would  
27 be only 345 acres of aquatic communities restored, 345 acres of aquatic communities protected, and  
28 4,570 acres of upland communities protected.

29 The Plan also includes commitments to implement AMM1-AMM7, AMM10, AMM16, and AMM37. All  
30 of these AMMs include elements that avoid or minimize the risk of BDCP activities affecting habitats  
31 and species adjacent to work areas and storage sites. The AMMs are described in detail in BDCP  
32 Appendix 3.C, *Avoidance and Minimization Measures*.

### 33 ***Late Long-Term Timeframe***

34 Based on modeled habitat, the study area supports approximately 31,281 acres of aquatic and  
35 53,285 acres of upland habitat for giant garter snake. Alternative 4 as a whole would result in the  
36 permanent loss of and temporary effects on 687 acres of aquatic habitat and to 3,303 acres of  
37 upland habitat for giant garter snake during the term of the plan (3% of the total aquatic habitat in  
38 the study area and 6% of the total upland habitat in the study area). The locations of these losses are  
39 described above in the analyses of individual conservation measures.

40 The BDCP has committed to protecting 8,000 acres of grassland and 48,625 acres of cultivated lands  
41 in the study area, and restoring 25,100 acres tidal and nontidal wetlands and 2,000 acres of  
42 grasslands in the study area. Lands to be protected and restored specifically for the giant garter  
43 snake total 6,540 acres (1,200 acres nontidal marsh, 400 acres of grassland, 700 acres of cultivated  
44 lands including at least 500 acres of rice in CZ 2, and acres of rice or habitat of equivalent value in CZ

1 2, CZ 4, and CZ 5. Additionally, 4,240 acres of rice or habitat equivalent (1,500 acres under Objective  
2 GGS1.4 and 2,740 acres under Objective GGS3.1) would be restored or protected to create  
3 connections from the Coldani Marsh/White Slough population to other areas in the giant garter  
4 snake historical range. Additionally, the 2,740 acres of rice land or habitat of equivalent value under  
5 Objective GGS3.1 would be protected and restored for the giant garter snake to achieve a 1:1 ratio of  
6 habitat conserved to habitat affected (habitat affected includes uplands periodically flooded and rice  
7 lost due to late season flooding in Yolo Bypass as a result of CM2). In addition to the 6,540 acres of  
8 high-value habitat targeted specifically for giant garter snake, the protection and restoration of  
9 other natural communities is expected to provide additional restoration of 4,430 acres and  
10 protection of 3,733 acres of garter snake habitat.

11 Protection and management of cultivated lands (*CM3 and CM11*) would also benefit the giant garter  
12 snake by providing connectivity and maintaining irrigation and drainage channels that provide  
13 aquatic habitat for the snake. Assuming the length of canals and ditches providing giant garter snake  
14 movement habitat on the protected cultivated lands is proportional to the modeled habitat on  
15 cultivated lands in the Plan Area, the 48,625 acres of protected cultivated lands would support  
16 approximately 281 miles of movement habitat for the giant garter snake (2,784 miles multiplied by  
17 0.101 [48,625 acres protected of 481,909 acres in Plan Area]).

18 Giant garter snake habitat would be restored and protected specifically, to conserve and expand the  
19 Coldani Marsh/White Slough and Yolo Basin/Willow Slough subpopulations of the giant garter  
20 snake. Protecting and expanding existing giant garter snake subpopulations, and providing  
21 connectivity between protected areas, is considered the most effective approach to giant garter  
22 snake conservation in the Plan Area. The Coldani Marsh/White Slough and Yolo Basin/Willow  
23 Slough subpopulations are the only known populations of giant garter snakes in the Plan Area and  
24 are identified as important for the recovery of the species in the draft recovery plan for the species  
25 (U.S. Fish and Wildlife Service 1999b). Implementation actions that target giant garter snake habitat  
26 would focus on these two important subpopulations.

27 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6) estimates that the restoration  
28 and protection actions discussed above, as well as the restoration of managed wetland, nontidal  
29 freshwater perennial emergent wetland, nontidal perennial aquatic, tidal freshwater emergent  
30 wetland, alkali seasonal wetland, grassland, and vernal pool complex that could overlap with the  
31 species model, would result in the restoration of 3,450 acres of aquatic and 980 acres of upland  
32 modeled habitat for giant garter snake. In addition, protection of cultivated land, grassland, alkali  
33 seasonal wetland, and vernal pool complex could overlap with the species model and would result in  
34 the protection of 1,547 acres of aquatic and 2,185 acres of upland giant garter snake modeled  
35 habitat.

36 The BDCP also includes AMM1-AMM7, AMM10, AMM16, and AMM37, which are directed at  
37 minimizing or avoiding potential impacts on adjacent habitats during construction and operation of  
38 the conservation measures. Considering the protection and restoration provisions, which would  
39 provide acreages of new or enhanced habitat in amounts greater than necessary to compensate for  
40 habitats lost to construction and restoration activities, implementation of Alternative 4 as a whole  
41 would not result in a substantial adverse effect through habitat modifications and would not  
42 substantially reduce the number or restrict the range of the species. Therefore, the loss of giant  
43 garter snake habitat and potential mortality of snakes would have a less-than-significant impact on  
44 giant garter snake under CEQA.

1 **Impact BIO-50: Indirect Effects of Plan Implementation on Giant Garter Snake**

2 Construction activities outside the project footprint but within 200 feet of construction associated  
3 with water conveyance facilities, conservation components and ongoing habitat enhancement, as  
4 well as operation and maintenance of above-ground water conveyance facilities, including the  
5 transmission facilities, could result in ongoing periodic postconstruction disturbances with localized  
6 effects on giant garter snake habitat, and temporary noise and visual disturbances over the term of  
7 the BDCP. These potential effects would be minimized or avoided through AMM1–AMM7, AMM10,  
8 AMM16, and AMM37, which would be in effect throughout the plan’s construction phase.

9 The use of mechanical equipment during water conveyance facilities construction could cause the  
10 accidental release of petroleum or other contaminants that could affect giant garter snake or its  
11 aquatic prey. The inadvertent discharge of sediment or excessive dust adjacent to giant garter snake  
12 habitat could also have a negative effect on the species or its prey. AMM1–AMM6 would minimize  
13 the likelihood of such spills and would ensure measures are in place to prevent runoff from the  
14 construction area and potential effects of sediment or dust on giant garter snake or its prey.

15 Covered activities have the potential to exacerbate bioaccumulation of mercury in covered species  
16 that feed on aquatic species, including giant garter snake. The operational impacts of new flows  
17 under CM1 were analyzed to assess potential effects on mercury concentration and bioavailability.  
18 Results indicated that changes in total mercury levels in water and fish tissues due to future  
19 operational conditions were insignificant (see BDCP Appendix 5.D, Tables 5D.4-3, 5D.4-4, and  
20 5D.4-5).

21 Marsh (tidal and nontidal) and floodplain restoration also have the potential to increase exposure to  
22 methylmercury. Mercury is transformed into the more bioavailable form of methylmercury in  
23 aquatic systems, especially areas subjected to regular wetting and drying such as tidal marshes and  
24 floodplains. Thus, BDCP restoration activities that create newly inundated areas could increase  
25 bioavailability of mercury. Increased methylmercury associated with natural community and  
26 floodplain restoration may indirectly affect giant garter snake, which feeds on small fishes, tadpoles,  
27 and small frogs, especially introduced species, such as small bullfrogs (*Rana catesbeiana*) and their  
28 larvae, carp (*Cyprinus carpio*), and mosquitofish (*Gambusia affinis*). In general, the highest  
29 methylation rates are associated with high tidal marshes that experience intermittent wetting and  
30 drying and associated anoxic conditions (Alpers et al. 2008). Along with minimization and  
31 mitigation measures and adaptive management and monitoring, *CM12 Methylmercury Management*  
32 is expected to reduce the amount of methylmercury resulting from the restoration of natural  
33 communities and floodplains.

34 Extant populations of giant garter snake within the study area are known only from the upper Yolo  
35 Basin and at the Coldani Marsh/White Slough area. Davis et al. (2007) found mercury  
36 concentrations in fish at White Slough (and the Central Delta in general) to be relatively low  
37 compared to other areas of the Delta. No restoration activities involving flooding (and subsequent  
38 methylation of mercury) are planned within the known range of the Coldani Marsh/White Slough  
39 giant garter snake population. Effects on giant garter snake from increased methylmercury  
40 exposures is more likely in the Yolo Basin, where some of the highest concentrations of mercury and  
41 methylmercury have been documented (Foe et al. 2008). Effects from exposure to methylmercury  
42 may include decreased predator avoidance, reduced success in prey capture, difficulty in shedding,  
43 and reduced ability to move between shelter and foraging or thermoregulation areas (Wylie et al.  
44 2009). Planned floodplain restoration activities in the Yolo Basin are expected to seasonally increase

1 methylmercury production, although production would be minimized by *CM12 Methylmercury*  
2 *Mitigation*. Further, the periods of production and increased exposure to methylmercury do not  
3 overlap with giant garter snake seasonal activity periods. This seasonal trend should help to  
4 decrease risk to the giant garter snake, although snakes could prey on individuals that have been  
5 exposed to methylmercury during the previous season.

6 The potential mobilization or creation of methylmercury within the study area varies with site-  
7 specific conditions and would need to be assessed at the project level. Measures described in *CM12*  
8 *Methylmercury Management* include provisions for project-specific Mercury Management Plans.  
9 Along with avoidance and minimization measures and adaptive management and monitoring, *CM12*  
10 is expected to reduce the effects of methylmercury resulting from BDCP natural communities and  
11 floodplain restoration on giant garter snake.

12 **NEPA Effects:** Implementation of the AMMs listed above as part of implementing Alternative 4  
13 would avoid the potential for substantial adverse effects on giant garter snakes, either indirectly or  
14 through habitat modifications. These AMMs would also avoid and minimize effects that could  
15 substantially reduce the number of giant garter snakes or restrict the species' range. Therefore, the  
16 indirect effects of Alternative 4 would not have an adverse effect on giant garter snake.

17 **CEQA Conclusion:** Indirect effects from conservation measure operations and maintenance as well  
18 as construction-related noise and visual disturbances could impact giant garter snake in aquatic and  
19 upland habitats. The use of mechanical equipment during construction could cause the accidental  
20 release of petroleum or other contaminants that could impact giant garter snake or its prey. The  
21 inadvertent discharge of sediment or excessive dust adjacent to giant garter snake habitat could also  
22 have a negative impact on the species or its prey. With implementation of AMM1-AMM7, AMM10,  
23 AMM16, and AMM37 as part of Alternative 4 construction, operation and maintenance, the BDCP  
24 would avoid the potential for substantial adverse effects on giant garter snakes, either indirectly or  
25 through habitat modifications. Alternative 4 would not result in a substantial reduction in numbers  
26 or a restriction in the range of giant garter snakes. Therefore, the indirect effects of BDCP  
27 Alternative 4 would have a less-than-significant impact on giant garter snakes.

28 Giant garter snake could experience indirect effects from increased exposure to methylmercury as a  
29 result of tidal habitat restoration (*CM4*). With implementation of *CM12*, the potential indirect effects  
30 of methylmercury would not result in a substantial reduction in numbers or a restriction in the  
31 range of giant garter snakes, and, therefore, would have a less-than-significant impact on giant  
32 garter snakes.

### 33 **Impact BIO-50a: Loss of Connectivity among Giant Garter Snakes in the Coldani Marsh/White** 34 **Slough Subpopulation, Stone Lakes National Wildlife Refuge, and the Delta**

35 Implementation of Alternative 4 would not introduce a substantial barrier to the movement among  
36 giant garter snakes in the Coldani Marsh/White Slough subpopulation, Stone Lakes National Wildlife  
37 Refuge, and the Delta in the study area.

38 **NEPA Effects:** Alternative 4 would not adversely affect connectivity among giant garter snakes in the  
39 Coldani Marsh/White Slough subpopulation, Stone Lakes National Wildlife Refuge, and the Delta in  
40 the study area.

41 **CEQA Conclusion:** Alternative 4 would have a less-than-significant impact on connectivity among  
42 giant garter snakes in the study area.

1 **Impact BIO-51: Periodic Effects of Inundation of Giant Garter Snake Habitat as a Result of**  
2 **Implementation of Conservation Components**

3 *CM2 Yolo Bypass Fisheries Enhancement:* The proposed changes in Fremont Weir operations would  
4 occur intermittently from as early as mid-November through as late as mid-May. The core  
5 operations would occur during the winter/spring period, which corresponds mostly with the giant  
6 garter snake's inactive season. During this time, snakes are overwintering underground. Giant garter  
7 snakes that occur in the bypass during the active season could overwinter in the bypass during the  
8 inactive season: these snakes may be vulnerable to inundation of the bypass and could be drowned  
9 or displaced from overwintering sites. However, most typically, Fremont Weir "notch" operations  
10 would occur on the shoulders of time periods in which the Sacramento River rises enough for  
11 Fremont Weir to overtop passively, without the proposed project. Project-associated inundation of  
12 areas that would not otherwise have been inundated is expected to occur in no more than 30% of all  
13 years, since Fremont Weir is expected to overtop the remaining estimated 70% of all years, and  
14 during those years notch operations would not typically affect the maximum extent of inundation.  
15 Currently, in more than half of all years, an area greater than the area that would be inundated as a  
16 result of covered activities is already inundated during the snake's inactive season (Kirkland pers.  
17 comm.). Duration of inundation may also be an important factor determining effects on  
18 overwintering giant garter snakes. Radiotelemetry studies have revealed giant garter snakes  
19 surviving in burrows that had been inundated for 2 to 3 weeks, but it is unknown what duration of  
20 inundation the snakes can survive while overwintering in their burrows.

21 BDCP Appendix 5.J, *Effects on Natural Communities, Wildlife, and Plants*, provides the method used to  
22 estimate periodic inundation effects in the Yolo Bypass. Based on this method, periodic inundation  
23 could affect giant garter snakes overwintering in upland areas ranging from an estimated 582 acres  
24 of upland habitat during notch flow of 1,000 cfs to an estimated 1,402 acres during a 4,000-cfs notch  
25 flow. The 4,000-cfs notch flow would affect an estimated 888 acres of high value habitat and 514  
26 acres of moderate value habitat.

27 As noted above under the discussion of habitat loss from construction-related activities in Yolo  
28 Bypass, late season flooding in the bypass may result in loss of rice habitat (considered aquatic  
29 habitat for giant garter snake) by precluding the preparation and planting of a maximum of 1,662  
30 acres of rice fields (BDCP Appendix 5.J, Attachment 5J.E, *Estimation of BDCP Impact on Giant Garter*  
31 *Snake Summer Foraging Habitat in the Yolo Bypass*). This analysis concludes that the estimated loss  
32 of rice is 1,662 acres which was considered to occur late long-term. Restoration and protection of  
33 2,740 acres of rice land or habitat of equivalent value for the giant garter snake would achieve a 1:1  
34 ratio of habitat conserved to habitat affected (habitat affected includes uplands periodically flooded  
35 and rice lost due to late season flooding in Yolo Bypass as a result of CM2).

36 *CM5 Seasonally Inundated Floodplain Restoration* would periodically inundate 606 acres of upland  
37 habitat for the giant garter snake in the south Delta (CZ 7). The upland habitat to be inundated  
38 contains 432 acres of moderate-value and 174 acres of low-value habitat. The area between existing  
39 levees would be breached and the newly constructed setback levees would be inundated through  
40 seasonal flooding. The restored floodplain will include a range of elevations from low-lying areas  
41 that flood frequently (e.g., every 1 to 2 years) to high-elevation areas that flood infrequently (e.g.,  
42 every 10 years or more). There are no records of giant garter snakes in the vicinity of where  
43 floodplain restoration is expected to occur.

1 Based on modeled habitat for the giant garter snake, the study area supports approximately 53,285  
2 acres of upland habitat for giant garter snake. Approximately 2,008 acres of giant garter snake  
3 upland habitat (4% of total upland habitat in the study area) may be adversely affected by periodic  
4 flooding as a consequence of floodplain restoration and the operation of the Fremont Weir.

5 **NEPA Effects:** Periodic effects on upland habitat for giant garter snake associated with  
6 implementing Alternative 4 are not expected to result in substantial adverse effects on giant garter  
7 snakes, either directly or through habitat modifications, as it would not result in a substantial  
8 reduction in numbers or a restriction in the range of giant garter snakes. Therefore, Alternative 4  
9 would not adversely affect the species.

10 **CEQA Conclusion:** Flooding of the Yolo Bypass and creation of seasonally inundated floodplain in  
11 various parts of the study area would periodically affect a total of approximately 2,008 acres of  
12 upland habitat for giant garter snake. The inundation could affect overwintering snakes. Project-  
13 associated inundation of areas that would not otherwise have been inundated is expected to occur in  
14 no more than 30% of all years, since Fremont Weir is expected to overtop the remaining estimated  
15 70% of all years, and during those years notch operations would not typically affect the maximum  
16 extent of inundation. Currently, in more than half of all years, an area greater than the area that will  
17 be inundated as a result of covered activities is already inundated during the snake's inactive season  
18 (Kirkland pers. comm.).

19 Therefore, increased inundation in the Yolo Bypass as a result of BDCP is expected to have a minimal  
20 effect on the Yolo Basin/Willow Slough population. Therefore, implementing Alternative 4, including  
21 AMM1-AMM7, AMM10, and AMM16, would not be expected to result in substantial adverse effects  
22 on giant garter snakes, either directly or through habitat modifications, because it would not result  
23 in a substantial reduction in numbers or a restriction in the range of giant garter snakes. Periodic  
24 effects of inundation under Alternative 4 would have a less-than-significant impact on the species.

## 25 **Western Pond Turtle**

26 The habitat model used to assess effects on the western pond turtle is based on aquatic and upland  
27 nesting and overwintering habitat. Further details regarding the habitat model, including  
28 assumptions on which the model is based, are provided in BDCP Appendix 2A, Section 2A.30,  
29 *Western Pond Turtle*. The model quantified two types of upland nesting and overwintering habitat,  
30 including upland habitat in natural communities as well as upland in agricultural areas adjacent to  
31 aquatic habitats. Both of these upland habitat types are combined for this analysis. Factors  
32 considered in assessing the value of affected aquatic habitat are natural community type and  
33 availability of adjacent nesting and overwintering habitat. The highest value aquatic habitat types in  
34 the study area consist of nontidal freshwater perennial emergent wetlands and ponds adjacent to  
35 suitable nesting and overwintering habitat (Patterson pers. comm.). Less detail is provided on  
36 effects on dispersal habitat because, although dispersal habitat is important for maintaining and  
37 increasing distribution and genetic diversity, turtles have been known to travel over many different  
38 land cover types; therefore, this habitat type is not considered limiting. The value of dispersal  
39 habitat depends less on the habitat type itself than on the proximity of that habitat type to high-  
40 value aquatic and nesting and overwintering habitat.

41 Construction and restoration associated with Alternative 4 conservation measures would result in  
42 both temporary and permanent losses of western pond turtle modeled habitat, as indicated in Table  
43 12-4-23. The majority of these losses would take place over an extended period of time as tidal  
44 marsh is restored in the study area.

1 Full implementation of Alternative 4 would also include the following biological objectives over the  
2 term of the BDCP to benefit the western pond turtle (BDCP Chapter 3, *Conservation Strategy*).

- 3 • Protect or restore 142,200 acres of high-value natural communities and covered species  
4 habitats (Objective L1.1, associated with CM3).
- 5 • Restore and protect 65,000 acres of tidal natural communities and transitional uplands to  
6 accommodate sea level rise. Minimum restoration targets for tidal natural communities in  
7 each ROA are 7,000 acres in Suisun Marsh ROA, 5,000 acres in Cache Slough ROA, 1,500 acres in  
8 Cosumnes/Mokelumne ROA, 2,100 acres in West Delta ROA, and 5,000 acres in South Delta ROA  
9 (Objective L1.3, associated with CM2, CM3, and CM4).
- 10 • Within the 65,000 acres of tidal natural communities and transitional uplands (Objective L1.3),  
11 include sufficient transitional uplands along the fringes of restored brackish and freshwater  
12 tidal emergent wetlands to accommodate up to 3 feet of sea level rise where possible and allow  
13 for the future upslope establishment of tidal emergent wetland communities (Objective L1.7,  
14 associated with CM3, CM4, and CM8).
- 15 • Allow floods to promote fluvial processes, such that bare mineral soils are available for natural  
16 recolonization of vegetation, desirable natural community vegetation is regenerated, and  
17 structural diversity is promoted, or implement management actions that mimic those natural  
18 disturbances (Objective L2.1, associated with CM3, CM5, and CM11).
- 19 • Allow lateral river channel migration (Objective L2.2, associated with CM3 and CM5).
- 20 • Within the 65,000 acres of tidal natural communities (L1.3), restore or create 24,000 acres of  
21 tidal freshwater emergent wetland in CZ 1, CZ 2, CZ 4, CZ 5, CZ 6, and/or CZ 7 (Objective  
22 TFEWNC1.1, associated with CM3 and CM4).
- 23 • Create at least 1,200 acres of nontidal marsh consisting of a mosaic of nontidal perennial aquatic  
24 and nontidal freshwater emergent wetland natural communities, with suitable habitat  
25 characteristics for giant garter snake and western pond turtle (Objective NFEW/NPANC1.1,  
26 associated with CM3 and CM10).
- 27 • Protect and enhance 8,100 acres of managed wetland, 1,500 acres of which are in the Grizzly  
28 Island Marsh Complex (Objective MWNC1.1, associated with CM3 and CM11).
- 29 • Protect 8,000 acres of grassland (Objective GNC1.1, associated with CM3).
- 30 • Protect stock ponds and other aquatic features within protected grasslands to provide aquatic  
31 breeding habitat for native amphibians and aquatic reptiles (Objective GNC1.3, associated with  
32 CM3).
- 33 • Maintain and protect the small patches of important wildlife habitats associated with cultivated  
34 lands that occur in cultivated lands within the reserve system, including isolated valley oak  
35 trees, trees and shrubs along field borders and roadsides, remnant groves, riparian corridors,  
36 water conveyance channels, grasslands, ponds, and wetlands (Objective CLNC1.3, associated  
37 with CM3 and CM11).

38 As explained below, with the restoration and protection of these amounts of habitat, in addition to  
39 implementation of AMMs, impacts on western pond turtle would not be adverse for NEPA purposes  
40 and would be less than significant for CEQA purposes.

1 **Table 12-4-23. Changes in Western Pond Turtle Modeled Habitat Associated with Alternative 4<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	Aquatic (acres)	237	237	2,098	2,098	NA	NA
	Upland (acres) <sup>e</sup>	279	279	68	68	NA	NA
	Aquatic (miles)	9	9	3	3	NA	NA
<b>Total Impacts CM1 (acres)</b>		<b>516</b>	<b>516</b>	<b>2,166</b>	<b>2,166</b>	NA	NA
CM2–CM18	Aquatic (acres)	82	114	23	44	NA	NA
	Upland (acres) <sup>e</sup>	414	1,028	119	136	283–798	331
	Aquatic (miles)	25	109	3	4	0	0
<b>Total Impacts CM2–CM18 (acres)</b>		<b>496</b>	<b>1,142</b>	<b>142</b>	<b>180</b>	<b>283–798</b>	<b>331</b>
<b>TOTAL IMPACTS CM1–CM18 (acres)</b>		<b>1,012</b>	<b>1,658</b>	<b>2,308</b>	<b>2,346</b>	<b>283–798</b>	<b>331</b>

<sup>a</sup> See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

<sup>e</sup> Upland acres represent upland nesting and overwintering habitat acreages combined for both natural communities and agricultural lands adjacent to aquatic habitats.

NT = near-term

LLT = late long-term

NA = not applicable

2

3 **Impact BIO-52: Loss or Conversion of Habitat for and Direct Mortality of Western Pond Turtle**

4 Alternative 4 conservation measures would result in the permanent and temporary loss of up to  
5 2,493 acres of aquatic habitat and 1,511 acres of upland nesting and overwintering habitat (Table  
6 12-4-23). There are three western pond turtle occurrences that overlap with the CM1 footprint and  
7 a number of additional occurrences within the vicinity (Figure 12-16). Activities that would result in  
8 the temporary and permanent loss of western pond turtle modeled habitat are conveyance facilities  
9 and transmission line construction, and establishment and use of RTM, borrow, and spoils areas  
10 (CM1), Yolo Bypass improvements (CM2), tidal habitat restoration (CM4) floodplain restoration  
11 (CM5), and riparian habitat restoration (CM7). Habitat enhancement and management activities  
12 (CM11), such as ground disturbance or removal of nonnative vegetation, could result in local  
13 adverse habitat effects. In addition, maintenance activities associated with the long-term operation  
14 of the water conveyance facilities and other BDCP physical facilities could degrade or eliminate  
15 western pond turtle habitat. The activity accounting for most (80%) of the habitat loss or conversion  
16 would be *CM4 Tidal Natural Communities Restoration*. Each of these individual activities is described  
17 below. A summary statement of the combined impacts and NEPA effects and a CEQA conclusion  
18 follow the individual conservation measure discussions.

- 1       • *CM1 Water Facilities and Operation*: Construction of Alternative 4 conveyance facilities would  
2 result in the permanent loss of approximately 237 acres of aquatic habitat and 279 acres of  
3 upland nesting and overwintering habitat for the western pond turtle in the study area (Table  
4 12-4-23). Development of the water conveyance facilities would also result in the temporary  
5 removal of up to 2,098 acres of aquatic habitat and 68 acres of nesting and overwintering  
6 habitat for the western pond turtle in the study area (see Table 12-4-23). Approximately 17  
7 miles of channels providing western pond turtle movement habitat would be removed and 24  
8 miles would be temporarily disturbed. There are three western pond turtle occurrences that  
9 overlap with the CM1 footprint in CZ 2 around Clifton Court Forebay and in CZ 5 scattered  
10 throughout the Delta. The majority of the permanent loss of aquatic habitat and nesting and  
11 overwintering habitat would be near Clifton Court Forebay in CZ 8. Refer to the Terrestrial  
12 Biology Map Book for a detailed view of Alternative 4 construction locations. The aquatic habitat  
13 in the Clifton Court Forebay area is considered to be of reasonably high-value because it consists  
14 of agricultural ditches in or near known species occurrences. The nesting and overwintering and  
15 dispersal habitat that would be lost consists primarily of cultivated lands with some small  
16 portion of ruderal grassland habitat. Except for remnant, uncultivated patches, the cultivated  
17 lands are not suitable for nesting and overwintering unless left fallow. Construction of the water  
18 conveyance facilities would also affect dispersal habitat, which is primarily cultivated lands.  
19 While there are western pond turtle occurrences scattered throughout CZ 3, CZ 4, CZ 5, and CZ 6,  
20 this effect is widely dispersed because of the long, linear nature of the pipeline footprint.

21       An estimated 201 of the total 516 acres and 6 of the 9 miles would be lost as storage areas for  
22 reusable tunnel material, which would likely be moved to other sites for use in levee build-up  
23 and restoration, and the affected area would likely be restored: while this effect is categorized as  
24 permanent because there is no assurance that the material would eventually be moved, the  
25 effect would likely be temporary. Furthermore, the amount of storage area needed for reusable  
26 tunnel material is flexible and the footprint used in the effects analysis is based on a worst case  
27 scenario: the actual area to be affected by reusable tunnel material storage would likely be less  
28 than the estimated acreage.

- 29       • *CM2 Yolo Bypass Fisheries Enhancement*: Improvements in the Yolo Bypass would result in the  
30 permanent and temporary removal of approximately 60 acres of aquatic habitat and 249 acres  
31 of upland nesting and overwintering habitat for the western pond turtle. Approximately 4 miles  
32 of channels providing western pond turtle movement habitat would be permanently or  
33 temporarily removed as a result of Yolo Bypass improvements. Although there are no CNDDDB  
34 occurrences for western pond turtle in the Yolo Bypass, the species is known to be present in  
35 the Yolo Bypass Wildlife Area (California Department of Fish and Game 2012z).

- 36       • *CM4 Tidal Natural Communities Restoration*: Tidal natural communities restoration would result  
37 in the conversion of approximately 45 acres of aquatic habitat and 872 acres of upland nesting  
38 and overwintering habitat for western pond turtle to tidal marsh. Approximately 106 miles of  
39 channels providing western pond turtle movement habitat would be removed as a result of  
40 restoration. Tidal habitat restoration is expected to change existing salinity and flow conditions  
41 rather than lead to complete loss of aquatic habitat. Restoration of tidal flow where habitat  
42 consists of the calm waters of managed freshwater ponds and wetlands could have an adverse  
43 effect on the western pond turtle. Tidal restoration outside Suisun Marsh is likely to create  
44 suitable, slow-moving freshwater slough and marsh habitat.

45       Although the aquatic habitat model includes all tidal perennial aquatic, tidal brackish emergent  
46 wetland, and managed wetland as habitat, almost of the Suisun Marsh pond turtle observations

1 have been in the interior drainage ditches or near water control structures not hydrologically  
2 connected to Suisun Marsh (Patterson pers. comm.). While the model does not include an  
3 aquatic class type called *drainage ditches* and therefore an effect on this habitat type cannot be  
4 calculated, it is likely that this general type of habitat accounts for a very small portion of the  
5 total modeled aquatic effects; almost certainly less than 5%, or less than 287 acres of the  
6 modeled aquatic habitat affected by tidal restoration. The suitable nesting and overwintering  
7 habitat that would be affected in the interior of Suisun Marsh is limited, because the levees likely  
8 function as the primary nesting and overwintering habitat. The nesting and overwintering  
9 habitat of highest value to be affected is on the fringe of the marsh where the aquatic habitat is  
10 adjacent to undeveloped grassland habitat.

11 The habitat affected in the interior Delta (West Delta and South Delta) is of low value, consisting  
12 of levees and intensively farmed cultivated lands, while the Cache Slough and Cosumnes-  
13 Mokelumne ROAs are less intensively farmed and have higher-value habitat for the turtle.  
14 Because the estimates of the effect of tidal inundation are based on projections of where  
15 restoration may occur, actual effects are expected to be lower because sites would be selected to  
16 minimize effects on western pond turtle habitat (see AMM17 in BDCP Appendix 3.C).

- 17 ● *CM5 Seasonally Inundated Floodplain Restoration*: Levee construction associated with floodplain  
18 restoration in the south Delta (CZ 7) would result in the permanent and temporary removal of  
19 approximately 53 acres of aquatic habitat and 33 acres of upland habitat for western pond  
20 turtle. Approximately 3 miles of channels providing western pond turtle movement habitat  
21 would be removed as a result of floodplain restoration. Although there are no CNDDB  
22 occurrences of the western pond turtle in the areas where floodplain restoration is likely to  
23 occur, the species is known to occur along the San Joaquin River to the south in the San Joaquin  
24 River National Wildlife Refuge. As with CM4, the estimates of the effect of seasonal floodplain  
25 levee construction and inundation are based on projections of where restoration may occur.  
26 Actual effects are expected to be lower because sites would be selected to minimize effects on  
27 western pond turtle habitat.
- 28 ● *CM7 Riparian Natural Community Restoration*: Riparian restoration that is part of tidal natural  
29 communities restoration in CZ 1 and CZ 2, would result in the permanent removal of 10 acres of  
30 upland nesting and overwintering habitat for western pond turtle.
- 31 ● *CM11 Natural Communities Enhancement and Management*: A variety of habitat management  
32 actions included in CM11 that are designed to enhance wildlife values in BDCP protected  
33 habitats may result in localized ground disturbances that could temporarily remove small  
34 amounts of western pond turtle habitat. Ground-disturbing activities, such as removal of  
35 nonnative vegetation and road and other infrastructure maintenance, are expected to have  
36 minor adverse effects on available western pond turtle habitat and are expected to result in  
37 overall improvements to and maintenance of western pond turtle habitat values over the term  
38 of the BDCP. In addition, effects would be avoided and minimized by the AMMs listed below.

39 Management of the 6,600 acres of managed wetlands to be protected for waterfowl and  
40 shorebirds is not expected to result in overall adverse effects for the western pond turtle.  
41 Management actions that would improve wetland quality and diversity on managed wetlands  
42 include control and eradication of invasive plants; maintenance of a diversity of vegetation types  
43 and elevations, including upland areas to provide flood refugia; water management and leaching  
44 to reduce salinity; and enhancement of water management infrastructure (improvements to  
45 enhance drainage capacity, levee maintenance). These management actions could benefit the

1 western pond turtle. The 6,600 acres of protected managed wetlands would be monitored and  
2 adaptively managed to ensure that management options are implemented to avoid adverse  
3 effects on the western pond turtle.

- 4 ● Operations and maintenance: Ongoing maintenance of BDCP facilities is expected to have little if  
5 any adverse effect on the western pond turtle. Postconstruction operation and maintenance of  
6 the above-ground water conveyance facilities and restoration infrastructure could result in  
7 ongoing but periodic disturbances that could affect western pond turtle use where there is  
8 suitable habitat in the study area. Maintenance activities would include vegetation management,  
9 levee and structure repair, and regrading of roads and permanent work areas. These effects,  
10 however, would be minimized by AMMs and conservation actions described below.
- 11 ● Injury and direct mortality: Construction vehicle activity may cause injury to or mortality of  
12 western pond turtles. If turtles reside where conservation measures are implemented (most  
13 likely in the vicinity of aquatic habitats in the study area), the operation of equipment for land  
14 clearing, construction, conveyance facilities operation and maintenance, and habitat restoration,  
15 enhancement, and management could result in injury or mortality of western pond turtles.  
16 However, to avoid injury or mortality, preconstruction surveys would be conducted in suitable  
17 aquatic or upland habitat for the western pond turtle, and turtles found would be relocated  
18 outside the construction areas, as required by the AMMs listed below.

19 The following paragraphs summarize the combined effects discussed above and describe other  
20 BDCP conservation actions that offset or avoid these effects. NEPA effects and a CEQA conclusion are  
21 also included.

### 22 ***Near-Term Timeframe***

23 Because the water conveyance facilities construction is being evaluated at the project level, the near-  
24 term BDCP conservation strategy has been evaluated to determine whether it would provide  
25 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the effects of  
26 construction would not be adverse under NEPA.

27 Alternative 4 would temporarily and permanently remove 2,440 acres of aquatic habitat and 880  
28 acres of upland nesting and overwintering habitat for western pond turtle in the near-term. These  
29 effects would result from water conveyance facilities construction (CM1, 2,335 acres of aquatic and  
30 347 acres of upland habitats), Yolo Bypass improvements (CM2, 60 acres of aquatic and 249 acres of  
31 upland habitats), tidal habitat restoration (CM4, 45 acres of aquatic and 280 acres of upland  
32 habitats), and riparian restoration (CM7, 4 acres of upland habitat).

33 Typical project-level mitigation ratios for those natural communities that would be affected and that  
34 are identified in the biological goals and objectives for western pond turtle in Chapter 3 of the BDCP  
35 would be 1:1 for restoration and 1:1 for protection of aquatic habitats and 2:1 for protection of  
36 upland habitats. Using these ratios would indicate that 2,440 acres of aquatic habitat should be  
37 restored, 2,440 acres of aquatic habitat should be protected, and 1,760 acres of upland habitat  
38 should be protected for western pond turtle to mitigate the near-term losses.

39 The conservation strategy for western pond turtle involves restoration and protection of aquatic  
40 and adjacent upland habitat, and establishment of an interconnected reserve system that provides  
41 for western pond turtle dispersal. The habitat protection and restoration needs for this species are  
42 addressed at the landscape and natural community levels. The BDCP has committed to near-term  
43 restoration and creation of up to 24,350 acres of aquatic habitat (Objective L1.1, Objective L1.3,

1 Objective NFEW/NPANC1.1, MWNC1.1)and up to 2,000 acres of upland habitat (Objective GNC1.1).  
2 In addition, the protection and management of existing managed wetland habitat in Suisun Marsh  
3 may increase the value of aquatic habitat. The most beneficial restoration would occur in freshwater  
4 emergent wetland consisting of slow-moving slough and marsh adjacent to protected, undisturbed  
5 grassland. Additionally, basking platforms will be installed as needed in restored freshwater marsh  
6 to benefit the western pond turtle.

7 The natural community restoration and protection activities would be concluded in the first 10  
8 years of plan implementation, which is close enough in time to the impacts of construction to  
9 constitute adequate mitigation. Because the number of acres required to meet the typical ratios  
10 described above would be only 2,440 acres of aquatic communities protected, 2,440 acres restored,  
11 and 1,760 acres of upland communities protected, the 24,350 acres of aquatic and 2,000 acres of  
12 upland habitats restored or created in the near-term Plan goals, and the additional detail in the  
13 biological goals for western pond turtle, are more than sufficient to support the conclusion that the  
14 near-term impacts of habitat loss and direct mortality under Alternative 4 on western pond turtles  
15 would not be adverse.

16 The plan also contains commitments to implement *AMM1 Worker Awareness Training, AMM2*  
17 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*  
18 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
19 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
20 *Material, AMM10 Restoration of Temporarily Affected Natural Communities, and AMM17 Western*  
21 *Pond Turtle. These AMMs include elements that would avoid or minimize the risk of affecting*  
22 *habitats and species adjacent to work areas and storage sites. The AMMs are described in detail in*  
23 *BDCP Appendix 3.C, Avoidance and Minimization Measures.*

#### 24 **Late Long-Term Timeframe**

25 Based on the habitat model, the study area supports approximately 81,666 acres of aquatic and  
26 28,864 acres of upland habitat for western pond turtle. Alternative 4 would remove 2,493 acres of  
27 aquatic habitat and 1,511 acres of upland nesting and overwintering habitat for western pond turtle  
28 in the late long-term.

29 Implementation of Alternative 4 as a whole would increase the extent and distribution of high-value  
30 aquatic and upland nesting and overwintering habitat for western pond turtle in the study area.  
31 While the extent of dispersal habitat is expected to be reduced by approximately 9%, this habitat is  
32 abundant in the study area (composed primarily of cultivated lands), is not believed to be a factor  
33 limiting the turtle, and would be replaced with higher-value habitats for western pond turtle.

34 The conservation strategy for western pond turtle involves restoration and protection of aquatic  
35 and adjacent upland habitat, and establishment of an interconnected reserve system that provides  
36 for western pond turtle dispersal. The habitat protection and restoration needs for this species are  
37 addressed at the landscape and natural community levels. The BDCP has committed to late long-  
38 term restoration and creation of up to 74,300 acres of aquatic habitat (Objective L1.1, Objective  
39 L1.3, Objective NFEW/NPANC1.1, MWNC1.1)and up to 8,000 acres of upland habitat (Objective  
40 GNC1.1). In addition, the protection and management of existing managed wetland habitat in Suisun  
41 Marsh may increase the value of aquatic habitat. The most beneficial restoration would occur in  
42 freshwater emergent wetland consisting of slow-moving slough and marsh adjacent to protected,  
43 undisturbed grassland. Aquatic features (e.g., ditches and ponds) and adjacent uplands that are  
44 preserved and managed as part of the 48,625 acres of protected cultivated lands described above for

1 giant garter snake are also expected to benefit the species. Additionally, basking platforms would be  
2 installed as needed in restored freshwater marsh to benefit the western pond turtle.

3 Riparian and floodplain restoration would potentially increase the quantity and value of aquatic and  
4 nesting and overwintering habitat. Where the floodplain is widened and restored, this would allow  
5 oxbows and slow-moving side channels to form, providing suitable aquatic habitat for this species  
6 (Bury and Germano 2008; Ernst and Lovich 2009). Where riparian vegetation is restored adjacent to  
7 slower-moving channels, sloughs, and ponds, downed trees can provide important basking habitat  
8 and cover habitat for turtles. Riparian restoration in those more interior portions of Old and Middle  
9 Rivers that would be managed for riparian brush rabbit habitat have potential to benefit resident  
10 western pond turtles as riparian-adjacent grassland is an important habitat characteristic for the  
11 rabbit.

12 The study area represents only a small portion of the range of the western pond turtle in California  
13 (which includes most all the Pacific drainages) and southern Oregon. Effects from permanent and  
14 temporary loss or conversion of habitat for the western pond turtle, and other effects described  
15 above, are not expected to result in an adverse effect on the long-term survival and recovery of  
16 western pond turtle because for the following reasons.

- 17 • The study area represents a small portion of the species' entire range.
- 18 • Only 1% of the habitat in the study area would be removed or converted.

19 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6) estimates that the restoration  
20 and protection actions discussed above, as well as the restoration of managed wetland, nontidal  
21 freshwater perennial emergent wetland, nontidal perennial aquatic, tidal brackish emergent  
22 wetland, tidal freshwater emergent wetland, grassland, valley foothill riparian, that could overlap  
23 with the species model, would result in the restoration of 29,738 acres of aquatic and 1,421 acres of  
24 upland modeled habitat for western pond turtle. In addition, protection of cultivated land, managed  
25 wetland, grassland, and valley/foothill riparian could overlap with the species model and would  
26 result in the protection of 1,281 acres of aquatic and 4,993 acres of upland western pond turtle  
27 modeled habitat.

28 **NEPA Effects:** In the near-term, the loss of western pond turtle habitat under Alternative 4 would  
29 not be adverse because the BDCP has committed to protecting and restoring the acreage required to  
30 meet the typical mitigation ratios described above. In the late long-term, the losses of western pond  
31 turtle habitat associated with Alternative 4, in the absence of other conservation actions, would  
32 represent an adverse effect as a result of habitat modification and potential direct mortality of a  
33 special-status species. However, with habitat protection and restoration associated with the  
34 conservation components, guided by landscape-scale goals and objectives and by AMM1–AMM6,  
35 AMM10, and AMM17, the effects of Alternative 4 as a whole on western pond turtle would not be  
36 adverse.

### 37 **CEQA Conclusion:**

#### 38 **Near-Term Timeframe**

39 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
40 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
41 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
42 effects of construction would be less than significant under CEQA.

1 Alternative 4 would temporarily and permanently remove 2,440 acres of aquatic habitat and 880  
2 acres of upland nesting and overwintering habitat for western pond turtle in the near-term. These  
3 effects would result from water conveyance facilities construction (CM1, 2,335 acres of aquatic and  
4 347 acres of upland habitats), Yolo Bypass improvements (CM2, 60 acres of aquatic and 249 acres of  
5 upland habitats), tidal habitat restoration (CM4, 45 acres of aquatic and 280 acres of upland  
6 habitats) and riparian restoration (CM7, 4 acres of upland habitat) (Table 12-4-23).

7 Typical CEQA project-level mitigation ratios for those natural communities that would be affected  
8 and that are identified in the biological goals and objectives for western pond turtle in Chapter 3 of  
9 the BDCP would be 1:1 for restoration and 1:1 for protection of aquatic habitats and 2:1 for  
10 protection of upland habitats. Using these ratios would indicate that 2,440 acres of aquatic habitat  
11 should be restored, 2,440 acres of aquatic habitat should be protected, and 1,760 acres of upland  
12 habitat should be protected for western pond turtle to mitigate the near-term losses.

13 The conservation strategy for western pond turtle involves restoration and protection of aquatic  
14 and adjacent upland habitat, and establishment of an interconnected reserve system that provides  
15 for western pond turtle dispersal. The habitat protection and restoration needs for this species are  
16 addressed at the landscape and natural community levels. The BDCP has committed to near-term  
17 restoration and creation of up to 24,350 acres of aquatic habitat (Objective L1.1, Objective L1.3,  
18 Objective NFEW/NPANC1.1, MWNC1.1) and up to 2,000 acres of upland habitat (Objective GNC1.1).  
19 In addition, the protection and management of existing managed wetland habitat in Suisun Marsh  
20 may increase the value of aquatic habitat. The most beneficial restoration would occur in freshwater  
21 emergent wetland consisting of slow-moving slough and marsh adjacent to protected, undisturbed  
22 grassland. Additionally, basking platforms will be installed as needed in restored freshwater marsh  
23 to benefit the western pond turtle.

24 The natural community restoration and protection activities would be concluded in the first 10  
25 years of plan implementation, which is close enough in time to the impacts of construction to  
26 constitute adequate mitigation for CEQA purposes. Because the number of acres required to meet  
27 the typical ratios described above would be only 2,440 acres of aquatic communities protected,  
28 2,440 acres of aquatic communities, and 1,760 acres of upland communities protected, the 24,350  
29 acres of aquatic and 2,000 acres of upland habitats restored or created in the near-term Plan goals,  
30 and the additional detail in the biological goals for western pond turtle, are more than sufficient to  
31 support the conclusion that the near-term impacts of habitat loss and direct mortality under  
32 Alternative 4 on western pond turtles would be less than significant.

33 In addition, the plan also contains commitments to implement AMM1–AMM6, AMM10, and AMM17,  
34 which include elements that would avoid or minimize the risk of directly and indirectly affecting  
35 habitats and species habitats adjacent to work areas and storage sites. The AMMs are described in  
36 detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

### 37 **Late Long-Term Timeframe**

38 Based on the habitat model, the study area supports approximately 81,666 acres of aquatic and  
39 28,864 acres of upland habitat for western pond turtle. Alternative 4 would remove 2,493 acres of  
40 aquatic habitat and 1,511 acres of upland nesting and overwintering habitat for western pond turtle  
41 in the late long-term.

42 Implementation of Alternative 4 as a whole would increase the extent and distribution of high-value  
43 aquatic and upland nesting and overwintering habitat for western pond turtle in the study area.

1 While the extent of dispersal habitat is expected to be reduced by approximately 1%, this habitat is  
2 abundant in the study area (composed primarily of cultivated lands), is not believed to be a factor  
3 limiting the turtle, and would be replaced with higher-value habitats for western pond turtle.

4 The conservation strategy for western pond turtle involves restoration and protection of aquatic  
5 and adjacent upland habitat, and establishment of an interconnected reserve system that provides  
6 for western pond turtle dispersal. The habitat protection and restoration needs for this species are  
7 addressed at the landscape and natural community levels. The BDCP has committed to late long-  
8 term restoration and creation of up to 74,300 acres of aquatic habitat (Objective L1.1, Objective  
9 L1.3, Objective NFEW/NPANC1.1, MWNC1.1) and up to 8,000 acres of upland habitat (Objective  
10 GNC1.1). In addition, the protection and management of existing managed wetland habitat in Suisun  
11 Marsh may increase the value of aquatic habitat. The most beneficial restoration would occur in  
12 freshwater emergent wetland consisting of slow-moving slough and marsh adjacent to protected,  
13 undisturbed grassland. Aquatic features (e.g., ditches and ponds) and adjacent uplands that are  
14 preserved and managed as part of the 48,625 acres of protected cultivated lands described above for  
15 giant garter snake are also expected to benefit the species. Additionally, basking platforms will be  
16 installed as needed in restored freshwater marsh to benefit the western pond turtle.

17 Riparian and floodplain restoration would potentially increase the quantity and value of aquatic and  
18 nesting and overwintering habitat. Where the floodplain is widened and restored, this would allow  
19 oxbows and slow-moving side channels to form, providing suitable aquatic habitat for this species  
20 (Bury and Germano 2008; Ernst and Lovich 2009). Where riparian vegetation is restored adjacent to  
21 slower-moving channels, sloughs, and ponds, downed trees can provide important basking habitat  
22 and cover habitat for turtles. Riparian restoration in those more interior portions of Old and Middle  
23 Rivers that would be managed for riparian brush rabbit habitat have potential to benefit resident  
24 western pond turtles because riparian-adjacent grassland is an important habitat characteristic for  
25 the rabbit.

26 The study area represents only a small portion of the range of the western pond turtle in California  
27 (which includes most all the Pacific drainages) and southern Oregon. Effects from permanent and  
28 temporary loss or conversion of habitat for the western pond turtle, and other effects described  
29 above, are not expected to result in an adverse effect on the long-term survival and recovery of  
30 western pond turtle because for the following reasons.

- 31 • The study area represents a small portion of the species' entire range.
- 32 • Only 1% of the habitat in the study area would be removed or converted.

33 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6) estimates that the restoration  
34 and protection actions discussed above, as well as the restoration of managed wetland, nontidal  
35 freshwater perennial emergent wetland, nontidal perennial aquatic, tidal brackish emergent  
36 wetland, tidal freshwater emergent wetland, grassland, valley foothill riparian, that could overlap  
37 with the species model, would result in the restoration of 29,738 acres of aquatic and 1,421 acres of  
38 upland modeled habitat for western pond turtle. In addition, protection of cultivated land, managed  
39 wetland, grassland, and valley/foothill riparian could overlap with the species model and would  
40 result in the protection of 1,281 acres of aquatic and 4,993 acres of upland western pond turtle  
41 modeled habitat.

42 The loss of western pond turtle habitat associated with Alternative 4 would represent an adverse  
43 effect as a result of special-status species habitat modification and the potential for direct mortality  
44 of turtles. However, considering the habitat restoration and protection associated with the

1 conservation components, guided by landscape-scale goals and objectives and by AMM1–AMM6,  
2 AMM10, and AMM17, which would be in place throughout the construction phase, the loss of habitat  
3 and potential mortality would not have an adverse effect on western pond turtle. Therefore, the loss  
4 of western pond turtle habitat and potential mortality of turtles from Alternative 4 would have a  
5 less-than-significant impact on western pond turtle.

### 6 **Impact BIO-53: Indirect Effects of Plan Implementation on Western Pond Turtle**

7 Indirect effects on western pond turtle within 200 feet of construction activities could temporarily  
8 affect the use of aquatic habitat and upland nesting, overwintering, and dispersal habitat for the  
9 western pond turtle. Construction activities outside the construction footprint but within 200 feet of  
10 water conveyance facilities, conservation components, and ongoing habitat enhancement, as well as  
11 operation and maintenance of above-ground water conveyance facilities, including the transmission  
12 facilities, could result in ongoing periodic postconstruction disturbances with localized impacts on  
13 western pond turtle habitat, and temporary noise and visual disturbances over the term of the  
14 BDCP.

15 The use of mechanical equipment during water conveyance facilities construction could cause the  
16 accidental release of petroleum or other contaminants that could affect western pond turtle or its  
17 aquatic prey. The inadvertent discharge of sediment or excessive dust adjacent to western pond  
18 turtle aquatic habitat could also have a negative effect on the species or its prey. AMM1–AMM6, and  
19 AMM10 would minimize the likelihood of such spills and would ensure measures are in place to  
20 prevent runoff from the construction area and potential effects of sediment or dust on western pond  
21 turtle or its prey.

22 Water operations would affect salinity gradients in Suisun Marsh. This effect mechanism cannot be  
23 disaggregated from tidal natural community restoration in Suisun Marsh. It is expected that the  
24 salinity of water in Suisun Marsh would generally increase as a result of water operations and  
25 operation of salinity control gates to mimic a more natural water flow. Results of modeling for full  
26 implementation of the BDCP show salinity to double by the late long-term compared with current  
27 conditions during late fall and winter months. Changes in salinity would not be uniform across  
28 Suisun Marsh, as salinity would likely be more pronounced in some tidal channels and sloughs than  
29 others, and most of the salinity increase would occur during the fall and winter. Western pond  
30 turtles are primarily a freshwater species, although they can also be found in brackish marsh, and  
31 could respond negatively to increased salinity in Suisun Marsh. However, most of the Suisun Marsh  
32 pond turtle observations have been in the interior drainage ditches or near water control structures  
33 not connected to tidal channels and sloughs in Suisun Marsh which is where increases in salinity  
34 would occur. Therefore, the potential effects associated with changes in salinity are not expected to  
35 adversely affect western pond turtles.

36 **NEPA Effects:** With implementation of AMM1–AMM6, AMM10, and AMM17 as part of Alternative 4,  
37 the BDPC would avoid the potential for substantial adverse effects on western pond turtles, either  
38 directly or through habitat modifications. These AMMs would also avoid and minimize effects that  
39 could substantially reduce the number of western pond turtles or restrict the species range.  
40 Therefore, the indirect effects of Alternative 4 would not have an adverse effect on western pond  
41 turtle.

42 **CEQA Conclusion:** Indirect effects resulting from conservation measure operations and maintenance  
43 as well as construction-related noise and visual disturbances could impact western pond turtle in  
44 aquatic and upland habitats. The use of mechanical equipment during construction could cause the

1 accidental release of petroleum or other contaminants that could affect western pond turtle or its  
2 prey. The inadvertent discharge of sediment or excessive dust adjacent to western pond turtle  
3 habitat could also have a negative effect on the species or its prey. Changes in water salinity would  
4 have a less-than-significant impact on western pond turtles because most of the salinity increases  
5 would occur in areas not used extensively by western pond turtles.

6 With implementation of AMM1–AMM6, AMM10, and AMM17 as part of Alternative 4 construction,  
7 operation, and maintenance, the BDCP would avoid the potential for substantial adverse effects on  
8 western pond turtles, either indirectly or through habitat modifications, and would not result in a  
9 substantial reduction in numbers or a restriction in the range of western pond turtles. The indirect  
10 effects of BDCP Alternative 4 would have a less-than-significant impact on western pond turtles.

### 11 **Impact BIO-54: Periodic Effects of Inundation of Western Pond Turtle Habitat as a Result of** 12 **Implementation of Conservation Components**

13 *CM2 Yolo Bypass Fisheries Enhancement* would result in periodic inundation that could affect  
14 western pond turtle and its upland habitat. BDCP Appendix 5.J, *Effects on Natural Communities,*  
15 *Wildlife, and Plants*, provides the method used to estimate periodic inundation effects in the Yolo  
16 Bypass. Based on this method, periodic inundation could affect from an estimated 283 acres of  
17 habitat during 1,000 cfs notch flow to an estimated 798 acres of habitat during 4,000 cfs notch flow  
18 (Table 12-4-23). This effect would occur during an estimated maximum of 30% of years, in areas  
19 that are already inundated in more than half of all years; therefore, these areas are expected to  
20 provide only marginal overwintering habitat for the western pond turtle under Existing Conditions.  
21 Furthermore, Yolo Bypass inundation is not expected to affect nesting western pond turtles because  
22 operations would not occur during the nesting season (approximately May through October).  
23 Therefore, Yolo Bypass operations are expect to have a minimal effect, if any, on western pond  
24 turtles in the Yolo Bypass.

25 *CM5 Seasonally Inundated Floodplain Restoration* would periodically inundate 331 acres of upland  
26 habitat for the western pond turtle in the south Delta (CZ 7). Seasonal flooding in restored  
27 floodplains is not expected to adversely affect aquatic and dispersal habitat, because these habitat  
28 functions are expected to remain in the seasonally inundated floodplains. Floodplains are not  
29 expected to be inundated during the nesting season, however, turtle hatchlings may overwinter in  
30 the nest and could be affected by flooding. Restored floodplains would transition for areas that flood  
31 frequently (e.g., every 1 to 2 years) to areas that flood infrequently (e.g., every 10 years or more);  
32 adverse effects on turtle hatchlings are most likely at the lower elevations of the restored floodplain,  
33 where frequent flooding occurs.

34 **NEPA Effects:** Periodic effects on upland habitat for western pond turtle from CM2 and CM5  
35 associated with implementing Alternative 4 are not expected to result in substantial adverse effects  
36 either directly or through habitat modifications, as it would not result in a substantial reduction in  
37 numbers or a restriction in the range of western pond turtles. Therefore, Alternative 4 would not  
38 adversely affect the species.

39 **CEQA Conclusion:** Flooding of the Yolo Bypass and creation of seasonally inundated floodplain in  
40 various parts of the study area would periodically affect 283-798 acres from CM2 and approximately  
41 331 acres from CM5 of upland habitat for western pond turtle. These acreages represent only 1% of  
42 the total upland western pond turtle habitat in the study area. Most of the increase in inundation  
43 would occur in the winter and early spring months, when western pond turtles may be in the water  
44 or overwintering and occupying upland habitats. Therefore, implementing Alternative 4, including

1 AMM1–AMM6, AMM10, and AMM17, would not be expected to result in substantial adverse effects  
2 on western pond turtle, either directly or through habitat modifications, because it would not result  
3 in a substantial reduction in numbers or a restriction in the range of western pond turtles. Periodic  
4 effects of inundation under Alternative 4 would have a less-than-significant impact on the species.

#### 5 **Silvery Legless Lizard, San Joaquin Coachwhip, and Blainville’s Horned Lizard**

6 This section describes the effects of Alternative 4 on the silvery legless lizard, San Joaquin  
7 coachwhip and Blainville’s horned lizard (special-status reptiles). The habitat types used to assess  
8 effects on silvery legless lizard are limited to inland sand dunes near Antioch (CZ 9 and CZ 10),  
9 which would not be affected by construction or restoration activities. This species is not discussed  
10 any further.

11 The habitat types used to assess effects on the San Joaquin coachwhip are alkali seasonal wetland  
12 complex, grassland, and inland dune scrub west of Byron Highway (CZ 7) and west of Old River and  
13 West Canal (CZ 8). The habitat types used to assess effects on the Blainville’s horned lizard are the  
14 same as those for the whipsnake in CZ 7 and CZ 8. There is also potential habitat for the horned  
15 lizard to occur in grassland habitat around Stone Lake (CZ 4) Although the expected range for San  
16 Joaquin coachwhip and Blainville’s horned lizard extends into the study area, there are no records  
17 for either of these species within the study area (California Department of Fish and Wildlife 2013

18 Alternative 4 is expected to result in the temporary and permanent removal of habitat that special-  
19 status reptiles uses for cover and dispersal (Table 12-4-24). BDCP actions that could affect this  
20 habitat are limited to construction and maintenance of the water conveyance facilities in the vicinity  
21 of Clifton Court Forebay, and grassland restoration, protection and management. Full  
22 implementation of Alternative 4 would also include the following biological objectives over the term  
23 of the BDCP that would also benefit special-status reptiles (BDCP Chapter 3, *Conservation Strategy*).

- 24 ● Increase the size and connectivity of the reserve system by acquiring lands adjacent to and  
25 between existing conservation lands (Objective L1.6, associated with CM3).
- 26 ● Increase native species diversity and relative cover of native plant species, and reduce the  
27 introduction and proliferation of nonnative species (Objective L2.6, associated with CM11).
- 28 ● Protect and improve habitat linkages that allow terrestrial covered and other native species to  
29 move between protected habitats within and adjacent to the Plan Area (Objective L3.1,  
30 associated with CM3, CM8, and CM11).
- 31 ● Protect 8,000 acres of grassland (Objective GNC1.1, associated with CM3).
- 32 ● Restore 2,000 acres of grasslands to connect fragmented patches of protected grassland  
33 (Objective GNC1.2, associated with CM3 and CM8).

34 As explained below, with the restoration or protection of these amounts of habitat, in addition to  
35 implementation of AMMs, impacts on special-status reptiles would not be adverse for NEPA  
36 purposes and would be less than significant for CEQA purposes.

1 **Table 12-4-24. Changes in Special-Status Reptile Habitat Associated with Alternative 4 (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type <sup>c</sup>	Permanent		Temporary		Periodic <sup>e</sup>	
		NT	LLT <sup>d</sup>	NT	LLT <sup>d</sup>	CM2	CM5
CM1	Grassland	52	52	249	249	NA	NA
<b>Total Impacts CM1</b>		<b>52</b>	<b>52</b>	<b>249</b>	<b>249</b>	<b>NA</b>	<b>NA</b>
CM2-CM18	Grassland	0	0	0	0	0	0
<b>Total Impacts CM2-CM18</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>TOTAL IMPACTS</b>		<b>52</b>	<b>52</b>	<b>249</b>	<b>249</b>	<b>0</b>	<b>0</b>

<sup>a</sup> See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> Grassland impacts include alkali seasonal wetland complex, grassland, and inland dune scrub natural communities.

<sup>d</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>e</sup> Periodic effects were estimated for the late long-term only.

NT = near-term

LLT = late long-term

NA = not applicable

2

3 **Impact BIO-55: Loss or Conversion of Habitat for and Direct Mortality of Special-Status**  
4 **Reptiles**

5 Alternative 4 conservation measures would result in the permanent and temporary loss of 301 acres  
6 of habitat for special-status reptiles (Table 12-4-24). Water conveyance facilities and transmission  
7 line construction, including establishment and use of RTM, borrow, and spoils areas, (CM1) would  
8 cause the loss of special-status reptile habitat. In addition, habitat enhancement and management  
9 activities (CM11), such as ground disturbance or removal of nonnative vegetation, could result in  
10 local adverse habitat effects for special-status reptiles. For purposes of this analysis, the acres of  
11 total effects are considered the same for both San Joaquin coachwhip and Blainville's horned lizard,  
12 even though there would be slightly more acres of temporary effect on the Blainville's horned lizard  
13 resulting from activities in CZ 4.

14 In addition to habitat loss and conversion, construction activities, such as grading, the movement of  
15 construction vehicles or heavy equipment, and the installation of water conveyance facilities  
16 components and new transmission lines, may result in the direct mortality, injury, or harassment of  
17 special-status reptiles, including the potential crushing of individuals and disruption of essential  
18 behaviors. Construction of access roads could fragment suitable habitat, impede upland movements  
19 in some areas, and increase the risk of road mortality. Construction activities related to conservation  
20 components could have similar effects. Each of these individual activities is described below. A  
21 summary statement of the combined impacts and NEPA effects and a CEQA conclusion follow the  
22 individual conservation measure discussions.

- 23 • *CM1 Water Facilities and Operation*: Development of the conveyance facilities would result in the  
24 permanent loss of approximately 52 acres of habitat for special-status reptiles in the vicinity of

1 Clifton Court Forebay. Construction-related effects would temporarily disturb 249 acres of  
2 suitable habitat for special-status reptiles in the study area.

- 3 • *CM11 Natural Communities Enhancement and Management*: A variety of habitat management  
4 actions included in *CM11* that are designed to enhance wildlife values in BDCP-protected  
5 habitats may result in localized ground disturbances that could temporarily remove small  
6 amounts of special-status reptile habitat. Ground-disturbing activities, such as removal of  
7 nonnative vegetation and road and other infrastructure maintenance, are expected to have  
8 minor adverse effects on available special-status reptile habitat and are expected to result in  
9 overall improvements to and maintenance of species habitat values over the term of the BDCP.  
10 These effects cannot be quantified, but are expected to be minimal and would be reduced  
11 through implementation of Mitigation Measure BIO-55 *Conduct Preconstruction Surveys for*  
12 *Noncovered Special-Status Reptiles and Implement Applicable CM22 Measures*.
- 13 • *Operations and maintenance*: Ongoing facilities operation and maintenance is expected to have  
14 little if any adverse effect on special-status reptiles. Postconstruction operation and  
15 maintenance of the above-ground water conveyance facilities could result in ongoing but  
16 periodic disturbances that could affect special-status reptiles' use of suitable habitat in the study  
17 area. These effects, however, would be minimized with implementation of Mitigation Measure  
18 BIO-55.
- 19 • *Injury and direct mortality*: Construction vehicles may cause injury to or mortality of special-  
20 status reptiles. The operation of equipment for land clearing, construction, operation and  
21 maintenance, and restoration, enhancement, and management activities could result in injury or  
22 mortality. This risk is highest from late fall through early spring, when special-status reptiles are  
23 not as active. Increased vehicular traffic associated with BDCP actions could contribute to a  
24 higher incidence of road kill. However, conducting construction during the late-spring through  
25 early fall periods when feasible and implementation of Mitigation Measure BIO-55 would avoid  
26 and minimize injury or mortality of special-status reptiles during construction.

27 The following paragraphs summarize the combined effects discussed above and describe other  
28 BDCP conservation actions that offset or avoid these effects. NEPA effects and a CEQA conclusion are  
29 also included.

### 30 ***Near-Term Timeframe***

31 Because the water conveyance facilities construction is being evaluated at the project level, the near-  
32 term BDCP conservation strategy has been evaluated to determine whether it would provide  
33 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
34 construction effects would not be adverse under NEPA. Alternative 4 would remove 301 acres of  
35 grassland habitat for special-status reptiles as a result of CM1.

36 The typical NEPA mitigation ratio (2:1 for protection) for this natural community would indicate  
37 that 602 acres should be protected in the near-term to offset CM1 losses.

38 The BDCP has committed to near-term restoration of 1,140 acres of grassland (CM8) and protection  
39 of up to 2,000 acres of grassland in the Plan Area (CM3). These conservation actions are all  
40 associated with CM3 and CM8 and would occur in the same timeframe as CM1 construction and  
41 early restoration losses, thereby avoiding adverse effects on special-status reptiles.

1 Considering the BDCP conservation strategy and the implementation of Mitigation Measure BIO-55.  
2 to avoid and minimize injury or mortality of special-status reptiles during construction, the  
3 permanent and temporary loss of special-status reptile habitat and the potential mortality of either  
4 species from Alternative 4 would not be an adverse effect.

5 ***Late Long-Term Timeframe***

6 Alternative 4 as a whole would result in the permanent loss of 301 acres of habitat for special-status  
7 reptiles over the life of the plan.

8 Effects of water conveyance facilities construction would be offset through the plan's long-term  
9 commitment to protect 8,000 acres of grassland, and grassland associated with alkali seasonal  
10 wetlands and vernal pool complexes, and to restore 2,000 acres of grassland in the Plan Area.  
11 Grassland protection would focus in particular on acquiring the largest remaining contiguous  
12 patches of unprotected grassland habitat, which are located south of SR 4 in CZ 8 (Objective GNC1.1  
13 and GNC1.2). This area connects to more than 620 acres of existing habitat that is protected under  
14 the East Contra Costa County HCP/NCCP.

15 Other effects would be reduced through implementation of Mitigation Measure BIO-55, *Conduct*  
16 *Preconstruction Surveys for Noncovered Special-Status Reptiles and Implement Applicable CM22*  
17 *Measures*. The plan as a whole is expected to benefit special-status reptiles that could be present by  
18 protecting potential habitat from loss or degradation that otherwise could occur with future changes  
19 in existing land use. To the extent that grassland habitat is restored in CZ 8, restoration would  
20 replace unsuitable special-status reptile habitat, such as cultivated land, with high-value cover,  
21 foraging, and dispersal habitat. The overall effect would be beneficial because Alternative 4 would  
22 result in a net increase in acreage of grassland habitat in the study area.

23 BDCP's commitment to protect the largest remaining contiguous habitat patches (including  
24 grasslands and the grassland component of alkali seasonal wetland and vernal pool complexes) in  
25 CZ 8 would sufficiently offset the adverse effects resulting from water conveyance facilities  
26 construction.

27 ***NEPA Effects:*** In the near-term and late long-term, the loss of special-status reptile habitat under  
28 Alternative 4 would be not be adverse because the BDCP has committed to protecting the acreage  
29 required to meet the typical mitigation ratios described above and because of the implementation of  
30 Mitigation Measure BIO-55.

31 ***CEQA Conclusion:***

32 ***Near-Term Timeframe***

33 Because the water conveyance facilities construction is being evaluated at the project level, the near-  
34 term BDCP conservation strategy has been evaluated to determine whether it would provide  
35 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
36 construction impacts would be less than significant under CEQA. Alternative 4 would remove 301  
37 acres of grassland habitat for special-status reptiles as a result of CM1.

38 The typical CEQA mitigation ratio (2:1 for protection) for this natural community would indicate  
39 that 602 acres should be protected in the near-term to offset CM1 losses.

40 The BDCP has committed to near-term restoration of 1,140 acres of grassland (CM8) and protection  
41 of up to 2,000 acres of grassland in the Plan Area (CM3). These conservation actions are all

1 associated with CM3 and CM8 and would occur in the same timeframe as CM1 construction and  
2 early restoration losses, thereby avoiding adverse effects on special-status reptiles.

3 The natural community restoration and protection activities are expected to be concluded during  
4 the first 10 years of plan implementation, which would be close enough to the timing of construction  
5 impacts to constitute mitigation for CEQA purposes. Considering the BDCP conservation strategy  
6 and the implementation of Mitigation Measure BIO-55, the permanent and temporary loss of  
7 special-status reptile habitat and the potential mortality of either species would be a less-than-  
8 significant impact under CEQA.

### 9 ***Late Long-Term Timeframe***

10 Alternative 4 as a whole would result in the permanent loss of 301 acres of habitat for special-status  
11 reptiles over the life of the plan.

12 Effects of water conveyance facilities construction would be offset through the plan's long-term  
13 commitment to protect up to 8,000 acres of grassland, and grassland associated with alkali seasonal  
14 wetlands and vernal pool complexes, and to restore 2,000 acres of grassland in the Plan Area  
15 (Objective GNC1.1 and Objective GNC1.2). Grassland protection would focus in particular on  
16 acquiring the largest remaining contiguous patches of unprotected grassland habitat, which are  
17 located south of SR 4 in CZ 8 (Objective GNC1.1). This area connects to more than 620 acres of  
18 existing habitat that is protected under the East Contra Costa County HCP/NCCP.

19 Other effects would be reduced through implementation of Mitigation Measure BIO-55. The plan as a  
20 whole is expected to benefit special-status reptiles that could be present by protecting potential  
21 habitat from loss or degradation that otherwise could occur with future changes in existing land use.  
22 To the extent that grassland habitat is restored in CZ 8, restoration would replace unsuitable special-  
23 status reptile habitat, such as cultivated land, with high-value cover, foraging, and dispersal habitat.  
24 The overall effect would be beneficial because Alternative 4 would result in a net increase in acreage  
25 of grassland habitat in the study area.

26 BDCP's commitment to protect the largest remaining contiguous habitat patches (including  
27 grasslands and the grassland component of alkali seasonal wetland and vernal pool complexes) in  
28 CZ 8 would sufficiently offset the adverse effects resulting from water conveyance facilities  
29 construction. Considering the BDCP conservation strategy and the implementation of Mitigation  
30 Measure BIO-55, the permanent and temporary loss of special-status reptile habitat and the  
31 potential mortality of either species under Alternative 4 would not result in a significant impact  
32 under CEQA.

### 33 **Mitigation Measure BIO-55: Conduct Preconstruction Surveys for Noncovered Special- 34 Status Reptiles and Implement Applicable CM22 Measures**

35 DWR will retain a qualified biologist to conduct a habitat assessment in areas that are relatively  
36 undisturbed or have a moderate to high potential to support noncovered special-status reptiles  
37 (Blainville's horned lizard and San Joaquin coachwhip) in CZ 4, CZ 7, and CZ 8. The qualified  
38 biologist will survey for noncovered special-status reptiles in areas of suitable habitat  
39 concurrent with the preconstruction surveys for covered species in CZ 4, CZ 7, and CZ 8. If  
40 special-status reptiles are detected, the biologist will passively relocate the species out of the  
41 work area prior to construction if feasible.

1 In addition, *CM22 Avoidance and Minimization Measures*, specifically *AMM1 Worker Awareness*  
2 *Training*, *AMM2 Construction Best Management Practices and Monitoring*, *AMM6 Disposal and*  
3 *Reuse of Spoils*, *Reusable Tunnel Material*, and *Dredged Material*, and *AMM10 Restoration of*  
4 *Temporarily Affected Natural Communities*, will be implemented for all noncovered special-  
5 status reptiles adversely affected by the BDCP to avoid, minimize, or compensate for impacts.

#### 6 **Impact BIO-56: Indirect Effects of Plan Implementation on Special-Status Reptile Species**

7 Construction activities associated with water conveyance facilities, conservation components and  
8 ongoing habitat enhancement, as well as operations and maintenance of above-ground water  
9 conveyance facilities, including the transmission facilities, could result in ongoing periodic  
10 postconstruction disturbances and noise with localized effects on special-status reptiles and their  
11 habitat over the term of the BDCP.

12 In addition, construction activities could indirectly affect special-status reptiles if construction  
13 resulted in the introduction of invasive weeds that create vegetative cover that is too dense for the  
14 species to navigate. Construction vehicles and equipment can transport in their tires and various  
15 parts under the vehicles invasive weed seeds and vegetative parts from other regions to  
16 construction sites, resulting in habitat degradation. These potential effects would be reduced  
17 through implementation of AMM10. Water conveyance facilities operations and maintenance  
18 activities would include vegetation and weed control, ground squirrel control, canal maintenance,  
19 infrastructure and road maintenance, levee maintenance, and maintenance and upgrade of electrical  
20 systems. While maintenance activities are not expected to remove special-status reptile habitat,  
21 operation of equipment could disturb small areas of vegetation around maintained structures and  
22 could result in injury or mortality of individual special-status reptiles, if present.

23 **NEPA Effects:** Implementation of the Mitigation Measure BIO-55, *Conduct Preconstruction Surveys*  
24 *for Noncovered Special-Status Reptiles and Implement Applicable CM22 Measures* would avoid the  
25 potential for substantial adverse effects on these species, either indirectly or through habitat  
26 modifications. The mitigation measure would also avoid and minimize effects that could  
27 substantially reduce the number of special-status reptiles, or restrict either species' range.  
28 Therefore, with implementation of Mitigation Measure BIO-55, the indirect effects of Alternative 4  
29 on special-status reptiles would not be adverse under NEPA.

30 **CEQA Conclusion:** Indirect effects from conservation measure operations and maintenance as well  
31 as construction-related noise and visual disturbances could impact special-status reptiles. In  
32 addition, construction activities could indirectly affect special-status reptiles if construction resulted  
33 in the introduction of invasive weeds that create vegetative cover that is too dense for the species to  
34 navigate. Water conveyance facilities operations and maintenance activities, such as vegetation and  
35 weed control, and road maintenance, are not expected to remove special-status reptile habitat, but  
36 operation of equipment could disturb small areas of vegetation around maintained structures and  
37 could result in injury or mortality of individual special-status reptiles, if present.

38 With implementation of Mitigation Measure BIO-55, *Conduct Preconstruction Surveys for Noncovered*  
39 *Special-Status Reptiles and Implement Applicable CM22 Measures* as part of Alternative 4  
40 construction, operation, and maintenance, the BDCP would avoid the potential for significant effects  
41 on special-status reptile species, either indirectly or through habitat modifications, and would not  
42 result in a substantial reduction in numbers or a restriction in the range of either species. With  
43 implementation of Mitigation Measure BIO-55, the indirect effects of BDCP Alternative 4 would have  
44 a less-than-significant impact on special-status reptiles.

1           **Mitigation Measure BIO-55: Conduct Preconstruction Surveys for Noncovered Special-**  
2           **Status Reptiles and Implement Applicable CM22 Measures**

3           See description of Mitigation Measure BIO-55 under Impact BIO-55.

4           **California Black Rail**

5           This section describes the effects of Alternative 4, including water conveyance facilities construction  
6           and implementation of other conservation components, on California black rail. The habitat model  
7           used to assess effects for the California black rail is based on primary breeding habitat and  
8           secondary habitat. Primary (breeding) habitat for this species within the Delta includes all  
9           *Schoenoplectus* and *Typha*-dominated tidal and nontidal freshwater emergent wetland in patches  
10          greater than 0.55 acre (essentially instream islands of the San Joaquin River and its tributaries and  
11          White Slough Wildlife Area). In Suisun Marsh, primary habitat includes all *Schoenoplectus* and  
12          *Typha*-dominated, and *Salicornia*-dominated patches greater than 0.55 acre, with the exception that  
13          all low marsh habitats dominated by *Schoenoplectus acutus* and *S. californicus* and all managed  
14          wetlands, in general, are considered secondary habitat with lesser ecological value. Upland  
15          transitional zones, providing refugia during high tides, within 150 feet of the tidal wetland edge  
16          were also included as secondary habitat. Secondary habitats generally provide only a few ecological  
17          functions such as foraging (low marsh and managed wetlands) or extreme high tide refuge (upland  
18          transition zones), while primary habitats provide multiple functions, including breeding, effective  
19          predator cover, and valuable foraging opportunities.

20          Construction and restoration associated with Alternative 4 conservation measures would result in  
21          both temporary and permanent losses of California black rail modeled habitat as indicated in Table  
22          12-4-25. Full implementation of Alternative 4 would also include the following conservation actions  
23          over the term of the BDCP to benefit the California black rail (BDCP Chapter 3, Section 3.3, *Biological*  
24          *Goals and Objectives*).

- 25          ● Restore or create at least 6,000 acres of tidal brackish emergent wetland in CZ 11, including at  
26          least 1,500 acres of middle and high marsh (Objectives TBEWNC1.1 and TBEWNC1.2, associated  
27          with CM4).
- 28          ● Restore or create at least 24,000 acres of tidal freshwater emergent wetland in CZs 1, 2, 4, 5, 6,  
29          and/or 7 (Objective TFEWNC1.1, associated with CM4).
- 30          ● Protect and enhance at least 8,100 acres of managed wetland, at least 1,500 acres of which are  
31          in the Grizzly Island Marsh Complex (Objective MWNC1.1, associated with CM3).
- 32          ● Create 1,700 acres of black rail habitat between restored tidal freshwater emergent wetlands  
33          and transitional uplands to provide upland refugia (Objective CBR1.1, associated with CM4).
- 34          ● Create topographic heterogeneity in restored tidal brackish and freshwater emergent wetlands  
35          (Objectives TBEWNC1.4 and TFEWNC2.2, associated with CM4).
- 36          ● Limit perennial pepperweed to no more than 10% cover in the tidal brackish emergent wetland  
37          natural community within the reserve system (Objective TBEWNC2.1, associated with CM11).

38          As explained below, with the restoration and protection of these amounts of habitat, in addition to  
39          natural community enhancement and management commitments (including *CM12 Methylmercury*  
40          *Management*) and implementation of *AMM1–AMM7*, *AMM18 California Clapper Rail and California*  
41          *Black Rail*, and *AMM27 Selenium Management*, impacts on the California black rail would not be  
42          adverse for NEPA purposes and would be less than significant for CEQA purposes.

1 **Table 12-4-25. Changes in California Black Rail Modeled Habitat Associated with Alternative 4**  
2 **(acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	Primary	0	0	18	18	NA	NA
	Secondary	0	0	0	0	NA	NA
<b>Total Impacts CM1</b>		<b>0</b>	<b>0</b>	<b>18</b>	<b>18</b>	<b>NA</b>	<b>NA</b>
CM2–CM18	Primary	76	84	0	0	0-9	0
	Secondary	986	3,044	0	0	0	6
<b>Total Impacts CM2–CM18</b>		<b>1,062</b>	<b>3,128</b>	<b>0</b>	<b>0</b>	<b>0-9</b>	<b>6</b>
<b>TOTAL IMPACTS</b>		<b>1,062</b>	<b>3,128</b>	<b>18</b>	<b>18</b>	<b>0</b>	<b>0</b>

<sup>a</sup> See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

3  
4 **Impact BIO-57: Loss or Conversion of Habitat for and Direct Mortality of California Black Rail**

5 Alternative 4 conservation measures would result in the combined permanent and temporary loss  
6 of up to 102 acres of modeled primary habitat, and up to 3,044 acres of modeled secondary habitat  
7 for California black rail (Table 12-4-25). Conservation measures that would result in these losses are  
8 conveyance facilities and transmission line construction, and establishment and use of borrow and  
9 spoil areas (CM1) and tidal habitat restoration (CM4). Habitat enhancement and management  
10 activities (CM11) which include ground disturbance or removal of nonnative vegetation, could result  
11 in local adverse habitat effects. In addition, maintenance activities associated with the long-term  
12 operation of the water conveyance facilities and other BDCP physical facilities could degrade or  
13 eliminate California black rail habitat. Each of these individual activities is described below. A  
14 summary statement of the combined NEPA effects, and a CEQA conclusion follow the individual  
15 conservation measure discussions.

- 16 • *CM1 Water Facilities and Operation*: Construction of Alternative 4 conveyance facilities would  
17 result in the temporary loss of up to 18 acres of modeled primary California black rail habitat  
18 (Table 12-4-25). Activities that would impact modeled habitat consists of tunnel construction,  
19 temporary access roads, and construction of transmission lines in the central Delta in CZ 5  
20 (between Bouldin and Venice Islands), CZ 6 (east of Bacon Island), and CZ 8 (at the north end of  
21 Coney Island). The CM1 footprint intersects with one California black rail occurrence on  
22 Mandeville Island, from the footprint of a temporary transmission line. The implementation of  
23 *AMM19 California Clapper Rail and California Black Rail* (BDCP Appendix 3.C, *Avoidance and*  
24 *Minimization Measures*) would minimize the effects of construction on adjacent rails if present in

1 the area. Refer to the Terrestrial Biology Map Book for a detailed view of Alternative 4  
2 construction locations. Impacts from CM1 would occur within the first 10 years of Alternative 4  
3 implementation.

- 4 ● *CM2 Yolo Bypass Fisheries Enhancement*: Construction or channel modification from fish passage  
5 improvements associated with the Yolo Bypass would result in the permanent removal of  
6 approximately 5 acres of primary California black rail habitat in CZ 2. There are no occurrences  
7 of California black rail that intersect with the CM1 footprint. The loss is expected to occur during  
8 the first 10 years of Alternative 4 implementation.
- 9 ● *CM4 Tidal Natural Communities Restoration*: California black rail modeled habitat would be  
10 affected by tidal marsh restoration. Some California black rail modeled habitat would be  
11 permanently lost such that it no longer serves as habitat, while other modeled habitat would  
12 change value through conversion from one habitat type to another. Tidal habitat restoration site  
13 preparation and inundation would result in the permanent loss of 79 acres of primary habitat  
14 and 3,044 acres of secondary habitat for California black rail. Of the 79 acres of primary habitat  
15 lost, an estimated 76 acres would be converted to low marsh, or secondary habitat, for the  
16 species due to increased water elevations.

17 The majority of the effects of tidal natural communities restoration would occur in Suisun Marsh  
18 (CZ 11). Much of the natural wetland habitat that would be removed occurs in isolated patches  
19 and would be replaced by larger continuous areas of tidal wetlands that are expected to support  
20 higher habitat functions for the rail than the impacted wetlands. As described in the BDCP,  
21 restoration of up to 24,000 acres of tidal freshwater emergent wetland in the Delta and at least  
22 6,000 acres of tidal brackish emergent wetland natural communities in CZ 11 by the late long-  
23 term would benefit California black rail. The primary habitat for the species in the Delta consists  
24 of inchannel islands, which are in areas that are most vulnerable to the effects of sea level rise in  
25 the study area. Tidal restoration under CM4 would ensure that land is protected adjacent to  
26 current habitat in the delta with the consideration of sea level rise. Tidal restoration projects  
27 would include an ecotone between wetlands and transitional uplands which would provide  
28 upland refugia for the species.

29 The tidal natural communities restoration would be phased through the course of the BDCP  
30 restoration program to allow for recovery of some areas before the initiation of restoration  
31 actions in other areas. However, California black rails have a greater use of mature tidal marshes  
32 and, therefore, it would be years before the newly restored marshes provided suitable habitat  
33 for the species. In the long-term, tidal natural communities restoration is expected to have little  
34 to no adverse effects on California black rail habitat because the habitat removed would be  
35 replaced by a greater acreage of high-value tidal wetland and, thus, is expected to provide a  
36 benefit for California black rail.

- 37 ● *CM11 Natural Communities Enhancement and Management*: A variety of habitat management  
38 actions contained in *CM11 Natural Communities Enhancement and Management* that are  
39 designed to enhance wildlife values in restored and protected tidal wetland habitats may result  
40 in localized ground disturbances that could temporarily remove small amounts of California  
41 black rail habitat. Ground-disturbing activities, such as removal of nonnative vegetation and  
42 road and other infrastructure maintenance activities, are expected to have minor adverse effects  
43 on available California black rail habitat and are expected to result in overall improvements and  
44 maintenance of California black rail habitat values over the term of the BDCP. Noise and visual  
45 disturbances during implementation of habitat management actions could also result in

1 temporary disturbances that affect California black rail use of the surrounding habitat. These  
2 effects cannot be quantified, but would be avoided and minimized by the AMMs listed below.  
3 Additional actions under CM11 include the control of nonnative predators to reduce nest  
4 predation as needed.

- 5 ● Operations and Maintenance: Postconstruction operation and maintenance of the above-ground  
6 water conveyance facilities and restoration infrastructure could result in ongoing but periodic  
7 disturbances that could affect California black rail use of the surrounding habitat in Suisun and  
8 the central Delta. Maintenance activities would include vegetation management, levee and  
9 structure repair, and re-grading of roads and permanent work areas. These effects, however,  
10 would be reduced by AMMs and conservation actions as described below.
- 11 ● Injury and Direct Mortality: Construction vehicle activity may cause injury or mortality to  
12 California black rail. If rails are present adjacent to covered activities, the operation of  
13 equipment for land clearing, construction, conveyance facilities operation and maintenance, and  
14 habitat restoration, enhancement, and management could result in injury or mortality of  
15 California black rail. Increased vehicular traffic associated with BDCP actions could contribute to  
16 a higher incidence of road kill. However, conducting construction outside of the breeding season  
17 where feasible (reducing the risk of impacting active nests), construction monitoring, and other  
18 measures would be implemented to avoid and minimize injury or mortality of the species during  
19 construction, as required by AMM1–AMM7 and *AMM19 California Clapper Rail and California*  
20 *Black Rail*.

21 The following paragraphs summarize the combined effects discussed above and describe other  
22 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also  
23 included.

#### 24 ***Near-Term Timeframe***

25 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
26 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
27 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
28 effects of construction would not be adverse under NEPA. With Alternative 4 implementation, there  
29 would be a loss of 1,080 acres of modeled habitat for California black rail in the study area in the  
30 near-term. These effects would result from the construction of the water conveyance facilities (CM1,  
31 18 acres of primary habitat), and implementing other conservation measures (*CM2 Yolo Bypass*  
32 *Fisheries Enhancement* and *CM4 Tidal Natural Communities Restoration*–76 acres of primary habitat,  
33 986 acres of secondary habitat).

34 The typical NEPA and CEQA project-level mitigation ratio for those natural communities that would  
35 be affected and that are identified in the biological goals and objectives for California black rail in  
36 Chapter 3 of the BDCP would be 1:1 for restoration/creation of wetland natural communities such  
37 as tidal freshwater emergent wetland, tidal brackish emergent wetland, and managed wetland.  
38 Using this ratio would indicate that 18 acres of tidal natural communities should be  
39 restored/created to compensate for the CM1 losses of California black rail habitat. The near-term  
40 effects of other conservation actions would remove 1,062 acres of tidal natural communities,  
41 therefore requiring 1,062 acres of tidal natural communities restoration using the same typical  
42 NEPA and CEQA ratio (1:1 for restoration).

1 The BDCP has committed to near-term goals of restoring 2,000 acres of tidal brackish emergent  
 2 wetland, 8,850 acres of tidal freshwater emergent wetland, and 4,800 acres of managed wetland in  
 3 the Plan Area (Table 3-4 in Chapter 3, *Description of Alternatives*). These conservation actions are all  
 4 associated with CM4 and would occur in the same timeframe as the construction and early  
 5 restoration losses, thereby avoiding adverse effects of habitat loss on California black rail. The tidal  
 6 brackish emergent wetland would be restored in CZ 11 among the Western Suisun/Hill Slough  
 7 Marsh Complex, the Suisun Slough/Cutoff Slough Marsh Complex, and the Nurse Slough/Denverton  
 8 Marsh complex (Objective TBEWNC1.1 in BDCP Chapter 3, *Conservation Strategy*) and the tidal  
 9 freshwater emergent wetland would be restored in CZ 1, CZ 2, CZ 4, CZ 5, CZ 6, and/or CZ 7  
 10 (Objective TFEWNC1.1). In addition, tidal brackish and tidal freshwater emergent wetlands would  
 11 be restored in a way that creates topographic heterogeneity and in areas that increase connectivity  
 12 among protected lands (Objectives TBEWNC1.4 and TFEWNC2.2). Portions of the 4,800 acres of  
 13 managed wetland protected and enhanced in CZ 11 would benefit the California black rail through  
 14 the enhancement of degraded areas (such as areas of bare ground or marsh where the predominant  
 15 vegetation consists of invasive species such as perennial pepperweed) to vegetation such as  
 16 pickleweed-alkali heath-American bulrush plant associations (Objective MWNC1.1). These Plan  
 17 objectives represent performance standards for considering the effectiveness of CM4 restoration  
 18 actions. The acres of restoration and protection contained in the near-term Plan goals and the  
 19 additional detail in the biological objectives for California black rail satisfy the typical mitigation that  
 20 would be applied to the project-level effects of CM1, as well as mitigate the near-term effects of the  
 21 other conservation measures.

22 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
 23 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
 24 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
 25 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
 26 *Material*, *AMM7 Barge Operations Plan*, and *AMM19 California Clapper Rail and California Black Rail*.  
 27 All of these AMMs include elements that would avoid or minimize the risk of affecting individuals  
 28 and species habitats adjacent to work areas. The AMMs are described in detail in BDCP Appendix  
 29 3.C, *Avoidance and Minimization Measures*.

30 ***Late Long-Term Timeframe***

31 The study area supports approximately 7,467 acres of primary and 17,915 acres of secondary  
 32 habitat for California black rail. Alternative 4 as a whole would result in the permanent loss of and  
 33 temporary effects on 102 acres of primary habitat and 3,044 acres of secondary habitat for  
 34 California black rail during the term of the Plan (1% of the total primary habitat in the study area  
 35 and 17% of the total secondary habitat in the study area). The locations of these losses are described  
 36 above in the analyses of individual conservation measures. The Plan includes conservation  
 37 commitments through *CM4 Tidal Natural Communities Restoration* to restore or create at least 6,000  
 38 acres of tidal brackish emergent wetland in CZ 11 (Objective TBEWNC1.1) and at least 24,000 acres  
 39 of tidal freshwater emergent wetland in CZs 1, 2, 4, 5, 6, and/or 7 (Objective TFEWNC1.1). These  
 40 tidal wetlands would be restored as a mosaic of large, interconnected and biologically diverse  
 41 patches, and at least 1,500 acres of restored marsh would consist of middle-and high-marsh  
 42 vegetation with dense, tall stands of pickleweed and bulrush cover serving as primary habitat for  
 43 California black rail in Suisun Marsh (Objective TBEWNC1.1). In the Delta, at least 1,700 acres of  
 44 upland refugia for California black rail would be created between the restored tidal freshwater  
 45 emergent wetlands and transitional uplands to provide cover from predators (Objectives  
 46 TBEWNC1.4, TFEWNC2.2, and CBR1.1). Portions of the 8,100 acres of managed wetland protected

1 and enhanced in CZ 11 as part of *CM3 Natural Communities Protection and Restoration* would benefit  
2 the California black rail through the enhancement of degraded areas (such as areas of bare ground  
3 or marsh where the predominant vegetation consists of invasive species such as perennial  
4 pepperweed) to vegetation such as pickleweed-alkali heath-American bulrush plant associations  
5 (Objective MWNC1.1). Additional pressures on the species such as loss of habitat from invasive  
6 species and mortality from nest predators would also be addressed through the BDCP. Perennial  
7 pepperweed, which outcompetes suitable nesting habitat for California black rail (such as  
8 pickleweed) would be reduced to no more than 10% cover in the tidal brackish emergent wetland  
9 natural community within CZ 11 (Objective TBEWNC2.1). In addition, nonnative predators would be  
10 controlled to reduce nest predation if necessary through *CM11 Natural Communities Enhancement*  
11 *and Management*.

12 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*  
13 *Plant Species*) estimates that the restoration and protection actions discussed above would result in  
14 the restoration of 3,579 acres of primary habitat and 12,115 acres of secondary habitat for  
15 California black rail and the protection of 275 acres of secondary habitat for the species.

16 **NEPA Effects:** The loss of California black rail habitat and potential direct mortality of this special-  
17 status species under Alternative 4 would represent an adverse effect in the absence of other  
18 conservation actions. However, with habitat protection and restoration associated with CM4, guided  
19 by the biological objectives for the species and by *AMM1 Worker Awareness Training, AMM2*  
20 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*  
21 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
22 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
23 *Material, AMM7 Barge Operations Plan, and AMM19 California Clapper Rail and California Black Rail,*  
24 which would be in place throughout the construction period, the effects of Alternative 4 as a whole  
25 on California black rail would not be adverse under NEPA.

26 **CEQA Conclusion:**

27 **Near-Term Timeframe**

28 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
29 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
30 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
31 effects of construction would be less than significant under CEQA. With Alternative 4  
32 implementation, there would be a loss of 1,080 acres of modeled habitat for California black rail in  
33 the study area in the near-term. These effects would result from the construction of the water  
34 conveyance facilities (CM1, 18 acres of primary habitat), and implementing other conservation  
35 measures (*CM2 Yolo Bypass Fisheries Enhancement* and *CM4 Tidal Natural Communities Restoration-*  
36 *76 acres of primary habitat, 986 acres of secondary habitat*).

37 The typical NEPA and CEQA project-level mitigation ratio for those natural communities that would  
38 be affected and that are identified in the biological goals and objectives for California black rail in  
39 Chapter 3 of the BDCP would be 1:1 for restoration/creation of wetland natural communities such  
40 as tidal freshwater emergent wetland, tidal brackish emergent wetland, and managed wetland.  
41 Using this ratio would indicate that 18 acres of tidal natural communities should be  
42 restored/created to mitigate the CM1 losses of California black rail habitat. The near-term effects of  
43 other conservation actions would remove 1,062 acres of tidal natural communities, therefore

1 requiring 1,062 acres of tidal natural communities restoration using the same typical NEPA and  
2 CEQA ratio (1:1 for restoration).

3 The BDCP has committed to near-term goals of restoring 2,000 acres of tidal brackish emergent  
4 wetland, 8,850 acres of tidal freshwater emergent wetland, and 4,800 acres of managed wetland in  
5 the Plan Area (Table 3-4 in Chapter 3, *Description of Alternatives*). These conservation actions are all  
6 associated with CM4 and would occur in the same timeframe as the construction and early  
7 restoration losses, thereby avoiding adverse effects of habitat loss on California black rail. The tidal  
8 brackish emergent wetland would be restored in CZ 11 among the Western Suisun/Hill Slough  
9 Marsh Complex, the Suisun Slough/Cutoff Slough Marsh Complex, and the Nurse Slough/Denverton  
10 Marsh complex (Objective TBEWNC1.1) and the tidal freshwater emergent wetland would be  
11 restored in CZ 1, CZ 2, CZ 4, CZ 5, CZ 6, and/or CZ 7 (Objective TFEWNC1.1). In addition, tidal  
12 brackish and tidal freshwater emergent wetlands would be restored in a way that creates  
13 topographic heterogeneity and in areas that increase connectivity among protected lands  
14 (Objectives TBEWNC1.4 and TFEWNC2.2). Portions of the 4,800 acres of managed wetland  
15 protected and enhanced in CZ 11 would benefit the California black rail through the enhancement of  
16 degraded areas (such as areas of bare ground or marsh where the predominant vegetation consists  
17 of invasive species such as perennial pepperweed) to vegetation such as pickleweed-alkali heath-  
18 American bulrush plant associations (Objective MWNC1.1). These Plan objectives represent  
19 performance standards for considering the effectiveness of CM4 restoration actions.

20 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
21 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
22 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
23 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
24 *Material*, *AMM7 Barge Operations Plan*, and *AMM19 California Clapper Rail and California Black Rail*.  
25 All of these AMMs include elements that would avoid or minimize the risk of affecting individuals  
26 and species habitats adjacent to work areas. The AMMs are described in detail in BDCP Appendix  
27 3.C, *Avoidance and Minimization Measures*.

28 The natural community restoration and protection activities would be concluded in the first 10  
29 years of Plan implementation, which is close enough in time to the occurrence of impacts to  
30 constitute adequate mitigation for CEQA purposes. In addition, *AMM19 California Clapper Rail and*  
31 *California Black Rail* and *AMM1-AMM7* would avoid and minimize potential impacts on the species  
32 from construction-related habitat loss and noise and disturbance. Because the number of acres  
33 required to meet the typical mitigation ratio described above would be only 3,608 acres of  
34 restored/created tidal natural communities, the 10,850 acres of tidal brackish and tidal freshwater  
35 emergent wetland restoration and the 4,100 acres of managed wetland protection and enhancement  
36 contained in the near-term Plan goals, and the additional detail in the biological objectives for  
37 California black rail, are more than sufficient to support the conclusion that the near-term impacts of  
38 habitat loss and direct mortality under Alternative 4 would be less than significant under CEQA.

### 39 ***Late Long-Term Timeframe***

40 The study area supports approximately 7,467 acres of primary and 17,915 acres of secondary  
41 habitat for California black rail. Alternative 4 as a whole would result in the permanent loss of and  
42 temporary effects on 102 acres of primary habitat and 3,044 acres of secondary habitat for  
43 California black rail during the term of the Plan (1% of the total primary habitat in the study area  
44 and 17% of the total secondary habitat in the study area). The locations of these losses are described

1 above in the analyses of individual conservation measures. The Plan includes conservation  
2 commitments through *CM4 Tidal Natural Communities Restoration* to restore or create at least 6,000  
3 acres of tidal brackish emergent wetland in CZ 11 (Objective TBEWNC1.1) and at least 24,000 acres  
4 of tidal freshwater emergent wetland in CZs 1, 2, 4, 5, 6, and/or 7 (TFEWNC1.1). These tidal  
5 wetlands would be restored as a mosaic of large, interconnected and biologically diverse patches  
6 and much of the restored marsh would consist of middle-and high-marsh vegetation with dense, tall  
7 stands of pickleweed and bulrush cover, serving as primary habitat for California black rail in Suisun  
8 Marsh (Objective TBEWNC1.1). In the Delta, at least 1,700 acres of upland refugia for California  
9 black rail would be created between the restored tidal freshwater emergent wetlands and  
10 transitional uplands to provide cover from predators (Objectives TBEWNC1.4, TFEWNC2.2, and  
11 CBR1.1). Portions of the 8,100 acres of managed wetland protected and enhanced in CZ 11 as part of  
12 *CM3 Natural Communities Protection and Restoration* would benefit the California black rail through  
13 the enhancement of degraded areas (such as areas of bare ground or marsh where the predominant  
14 vegetation consists of invasive species such as perennial pepperweed) to vegetation such as  
15 pickleweed-alkali heath-American bulrush plant associations (Objective MWNC1.1). Additional  
16 pressures on the species such as loss of habitat from invasive species and mortality from nest  
17 predators would also be addressed through the BDCP. Perennial pepperweed, which outcompetes  
18 suitable nesting habitat for California black rail (such as pickleweed) would be reduced to no more  
19 than 10% cover in the tidal brackish emergent wetland natural community within CZ 11  
20 (TBEWNC2.1). In addition, nonnative predators would be controlled to reduce nest predation if  
21 necessary through *CM11 Natural Communities Enhancement and Management*.

22 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
23 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
24 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
25 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
26 *Material*, *AMM7 Barge Operations Plan*, and *AMM19 California Clapper Rail and California Black Rail*.  
27 All of these AMMs include elements that would avoid or minimize the risk of affecting individuals  
28 and species habitats adjacent to work areas. The AMMs are described in detail in BDCP Appendix  
29 3.C, *Avoidance and Minimization Measures*.

30 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*  
31 *Plant Species*) estimates that the restoration and protection actions discussed above would result in  
32 the restoration of 3,579 acres of primary habitat and 12,115 acres of secondary habitat for  
33 California black rail and the protection of 275 acres of secondary habitat for the species.

34 Considering these protection and restoration provisions, which would provide acreages of new or  
35 enhanced habitat in amounts greater than necessary to compensate for habitats lost to construction  
36 and restoration activities, loss of habitat or direct mortality through implementation of Alternative 4  
37 would not result in a substantial adverse effect through habitat modifications and would not  
38 substantially reduce the number or restrict the range of the species. Therefore, the alternative  
39 would have a less-than-significant impact on California black rail.

#### 40 **Impact BIO-58: Effects on California Black Rail Associated with Electrical Transmission** 41 **Facilities**

42 New transmission lines would increase the risk for bird-power line strikes, which could result in  
43 injury or mortality of California black rail. Black rails are known to suffer mortality from  
44 transmission line collision, likely associated with migration and flights between foraging areas

1 (Eddleman et al 1994). Due to their wing shape and body size, rails have low to moderate flight  
2 maneuverability (Bevanger 1998), increasing susceptibility to collision mortality. However, there  
3 are relatively few records of California black rail collisions with overhead wires. California black  
4 rails exhibit daytime site fidelity and a lack of long-distance night migration, two factors which are  
5 associated with low collision risk in avian species (Eddleman et al. 1994). California black rail  
6 movements in the study area are likely short, seasonal, and at low altitudes, typically less than 16  
7 feet (5 meters) (Eddleman et al 1994). While the species may have low to moderate flight  
8 maneuverability, the bird's behavior (e.g., sedentary, nonmigratory, ground-nesting and foraging,  
9 solitary, no flocking, secretive) reduces potential exposure to overhead wires and vulnerability to  
10 collision mortality (BDCP Appendix 5.J, Attachment 5J.C, *Analysis of Potential Bird Collisions at*  
11 *Proposed BDCP Powerlines*).

12 Transmission line poles and towers also provide perching substrate for raptors, which could result  
13 in increased predation pressure on local black rails. Little is currently known about the seasonal  
14 movements of black rails or the potential for increased predation on rails near power poles.  
15 However, transmission facilities are expected to have few adverse effects on the black rail  
16 population.

17 **NEPA Effects:** The construction and presence of new transmission lines would not represent an  
18 adverse effect because the risk of bird strike is considered to be minimal based on the species' flight  
19 behaviors. In addition, *AMM20 Greater Sandhill Crane* contains the commitment to place bird strike  
20 diverters on all new powerlines and select existing powerlines, which would further minimize risk  
21 of bird strike for California black rails in the Delta. Transmission line structures could increase  
22 predation on local black rails by providing perching structures for raptors. However, these impacts  
23 on the California black rail population are not expected to be adverse.

24 **CEQA Conclusion:** The construction and presence of new transmission lines would have a less-than-  
25 significant impact on California black rail because the risk of bird strike is considered to be minimal  
26 based on the species' flight behaviors. In addition, *AMM20 Greater Sandhill Crane* contains the  
27 commitment to place bird strike diverters on all new powerlines and select existing powerlines,  
28 which would further minimize risk of bird strike for California black rails in the Delta. Transmission  
29 line structures could increase predation on local black rails by providing perching structures for  
30 raptors. However, these impacts on the California black rail population are expected to be less than  
31 significant.

## 32 **Impact BIO-59: Indirect Effects of Plan Implementation on California Black Rail**

33 **Indirect construction-related effects:** Both primary and secondary habitat for California black rail  
34 within the vicinity of proposed construction areas could be indirectly affected by construction  
35 activities. Indirect effects associated with construction include noise, dust, and visual disturbance  
36 caused by grading, filling, contouring, and other ground-disturbing operations outside the project  
37 footprint but within 500 feet from the construction edge. Construction noise above background  
38 noise levels (greater than 50 dBA) could extend 500 to 5,250 feet from the edge of construction  
39 activities (BDCP Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of the BDCP*  
40 *Conveyance Facility on Sandhill Crane*, Table 4), although there is no available data to determine the  
41 extent to which these noise levels could affect California black rail. The use of mechanical equipment  
42 during water conveyance facilities construction could cause the accidental release of petroleum or  
43 other contaminants that could affect California black rail in the surrounding habitat. The inadvertent

1 discharge of sediment or excessive dust adjacent to California black rail habitat could also affect the  
2 species.

3 If construction occurs during the nesting season, these indirect effects could result in the loss or  
4 abandonment of nests, and mortality of any eggs and/or nestlings. However, there is a commitment  
5 in AMM19 (as described in BCDP Appendix 3.C, *Avoidance and Minimization Measures*) that  
6 preconstruction surveys of potential breeding habitat would be conducted within 700 feet of project  
7 activities, and a 500-foot no-disturbance buffer would be established around any territorial call-  
8 centers during the breeding season. In addition, construction would be avoided altogether if  
9 breeding territories cannot be accurately delimited.

10 **Salinity:** Water operations under Operational Scenario A would have an effect on salinity gradients  
11 in Suisun Marsh. These effects cannot be disaggregated from tidal habitat restoration, which would  
12 also cause changes in salinity gradients. It is expected that the salinity of water in Suisun Marsh  
13 would generally increase as a result of water operations and operations of salinity-control gates to  
14 mimic a more natural water flow. This would likely encourage the establishment of tidal wetland  
15 plant communities tolerant of more brackish environments, which should be beneficial to California  
16 black rail because its historical natural Suisun Marsh habitat was brackish tidal marsh.

17 **Methylmercury Exposure:** Marsh (tidal and nontidal) and floodplain restoration have the potential  
18 to increase exposure to methylmercury. Mercury is transformed into the more bioavailable form of  
19 methylmercury in aquatic systems, especially areas subjected to regular wetting and drying such as  
20 tidal marshes and flood plains. Thus, BDCP restoration activities that create newly inundated areas  
21 could increase bioavailability of mercury (see BDCP Chapter 3, *Conservation Strategy*, for details of  
22 restoration). Increased methylmercury associated with natural community and floodplain  
23 restoration may indirectly affect California black rail, via uptake in lower trophic levels (as described  
24 in the BDCP Appendix 5.D, *Contaminants*). In general, the highest methylation rates are associated  
25 with high tidal marshes that experience intermittent wetting and drying and associated anoxic  
26 conditions (Alpers et al. 2008). The potential mobilization or creation of methylmercury within the  
27 study area varies with site-specific conditions and would need to be assessed at the project level.  
28 *CM12 Methylmercury Management* contains provisions for project-specific Mercury Management  
29 Plans. Along with avoidance and minimization measures and adaptive management and monitoring,  
30 CM12 is expected to reduce the effects of methylmercury resulting from BDCP natural communities  
31 and floodplain restoration on California black rail.

32 Concentrations of methylmercury known to cause reproductive effects in birds have been found in  
33 blood and feather samples of San Francisco Bay black rails (Tsao et al. 2009). Because they forage  
34 directly in contaminated sediments, California black rails may be especially prone to methylmercury  
35 contamination. Currently, it is unknown how much of the sediment-derived methylmercury enters  
36 the food chain in Suisun Marsh or what tissue concentrations are actually harmful to the California  
37 black rail. Although tidal habitat restoration might increase methylation of mercury export to other  
38 habitats, it is unlikely to increase the exposure of California black rails to methylmercury, as they  
39 currently reside in tidal marshes in the Delta and the San Francisco Bay, where elevated  
40 methylmercury levels exist. Sites-specific restoration plans that address the creation and  
41 mobilization of mercury, as well as monitoring and adaptive management as described in CM12  
42 would address the uncertainty of methylmercury levels in restored tidal marsh.

43 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in  
44 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,

1 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,  
2 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz  
3 2009). The effect of selenium toxicity differs widely between species and also between age and sex  
4 classes within a species. In addition, the effect of selenium on a species can be confounded by  
5 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith  
6 2009).

7 The primary source of selenium bioaccumulation in birds is through their diet (Ackerman and  
8 Eagles-Smith 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the  
9 trophic level at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At  
10 Kesterson Reservoir in the San Joaquin Valley, selenium concentrations in invertebrates have been  
11 found to be two to six times the levels in rooted plants. Furthermore, bivalves sampled in the San  
12 Francisco Bay contained much higher selenium levels than crustaceans such as copepods (Stewart et  
13 al. 2004). Studies conducted at the Grasslands in Merced County recorded higher selenium levels in  
14 black-necked stilts which feed on aquatic invertebrates than in mallards and pintails, which are  
15 primarily herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which  
16 forage on bivalves) have much higher levels of selenium levels than shorebirds that prey on aquatic  
17 invertebrates (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high  
18 levels of selenium have a higher risk of selenium toxicity.

19 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations  
20 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to  
21 exacerbate bioaccumulation of selenium in avian species, including California black rail. Marsh (tidal  
22 and nontidal) and floodplain restoration have the potential to mobilize selenium, and therefore  
23 increase avian exposure from ingestion of prey items with elevated selenium levels. Thus, BDCP  
24 restoration activities that create newly inundated areas could increase bioavailability of selenium  
25 (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Changes in selenium  
26 concentrations were analyzed in Chapter 8, *Water Quality*, and it was determined that, relative to  
27 Existing Conditions and the No Action Alternative, CM1 would not result in substantial, long-term  
28 increases in selenium concentrations in water in the Delta under any alternative. However, it is  
29 difficult to determine whether the effects of potential increases in selenium bioavailability  
30 associated with restoration-related conservation measures (CM4, CM5) would lead to adverse  
31 effects on California black rail.

32 Because of the uncertainty that exists at this programmatic level of review, there could be a  
33 substantial effect on California black rail from increases in selenium associated with restoration  
34 activities. This effect would be addressed through the implementation of *AMM27 Selenium*  
35 *Management* (BDCP Appendix 3.C, *Avoidance and Minimization Measures*) which would provide  
36 specific tidal habitat restoration design elements to reduce the potential for bioaccumulation of  
37 selenium and its bioavailability in tidal habitats. Furthermore, the effectiveness of selenium  
38 management to reduce selenium concentrations and/or bioaccumulation would be evaluated  
39 separately for each restoration effort as part of design and implementation. This avoidance and  
40 minimization measure would be implemented as part of the tidal habitat restoration design  
41 schedule.

42 **NEPA Effects:** Potential effects of noise and visual disturbances on California black rail would be  
43 minimized with *AMM19 California Clapper Rail and California Black Rail*. *AMM1–AMM7*, including  
44 *AMM2 Construction Best Management Practices and Monitoring*, would minimize the likelihood of  
45 spills from occurring and ensure that measures were in place to prevent runoff from the

1 construction area and to avoid negative effects of dust on the species. Implementation of  
2 Operational Scenario A, including operation of salinity-control gates, and tidal habitat restoration  
3 are expected to increase water salinity in Suisun Marsh, which would be expected to establish tidal  
4 marsh similar to historic conditions. Tidal habitat restoration could result in increased exposure of  
5 California black rail to selenium. This effect would be addressed through the implementation of  
6 *AMM27 Selenium Management*, which would provide specific tidal habitat restoration design  
7 elements to reduce the potential for bioaccumulation of selenium and its bioavailability in tidal  
8 habitats. The indirect effects associated with noise and visual disturbances, potential spills of  
9 hazardous material, changes in salinity, and increased exposure to selenium from Alternative 4  
10 implementation would not have an adverse effect on California black rail. Tidal habitat restoration is  
11 unlikely to have a substantial effect on California black rail through increased exposure to  
12 methylmercury, as rails currently reside in tidal marshes where elevated methylmercury levels  
13 exist. However, it is unknown what concentrations of methylmercury are harmful to the species and  
14 the potential for increased exposure varies substantially within the study area. Site-specific  
15 restoration plans in addition to monitoring and adaptive management, described in *CM12*  
16 *Methylmercury Management*, would address the uncertainty of methylmercury levels in restored  
17 tidal marsh. The site-specific planning phase of marsh restoration would be the appropriate place to  
18 assess the potential for risk of methylmercury exposure for California black rail, once site specific  
19 sampling and other information could be developed.

20 **CEQA Conclusion:** Noise and visual disturbances related to construction-related activities and other  
21 conservation measures could disturb primary and secondary California black rail habitat adjacent to  
22 work sites. *AMM19 California Clapper Rail and California Black Rail* would avoid and minimize  
23 impacts on California black rail from noise and visual disturbance. The use of mechanical equipment  
24 during water conveyance facilities construction could cause the accidental release of petroleum or  
25 other contaminants that could affect California black rail in the surrounding habitat. The inadvertent  
26 discharge of sediment or excessive dust adjacent to California black rail habitat could also affect the  
27 species. These impacts on California black rail would be less than significant with the incorporation  
28 of *AMM1–AMM7*, including *AMM2 Construction Best Management Practices and Monitoring*, into the  
29 BDCP. Implementation of Operational Scenario A, including operation of salinity-control gates, and  
30 tidal habitat restoration are expected to increase water salinity in Suisun Marsh. These salinity  
31 gradient changes should have a beneficial impact on California black rail through the establishment  
32 of tidal marsh similar to historic conditions. Tidal habitat restoration is unlikely to have a significant  
33 impact on California black rail through increased exposure to methylmercury, as rails currently  
34 reside in tidal marshes where elevated methylmercury levels exist. However, it is unknown what  
35 concentrations of methylmercury are harmful to the species. Site-specific restoration plans in  
36 addition to monitoring and adaptive management, described in *CM12 Methylmercury Management*,  
37 would address the uncertainty of methylmercury levels in restored tidal marsh. Tidal habitat  
38 restoration could result in increased exposure of California black rail to selenium. This effect would  
39 be addressed through the implementation of *AMM27 Selenium Management*, which would provide  
40 specific tidal habitat restoration design elements to reduce the potential for bioaccumulation of  
41 selenium and its bioavailability in tidal habitats. Therefore, the indirect effects of Alternative 4  
42 implementation would have a less-than-significant impact on California black rail.

1 **Impact BIO-60: Fragmentation of California Black Rail Habitat as a Result of Conservation**  
2 **Component Implementation**

3 Restoration activities may temporarily fragment existing wetlands in Suisun Marsh and could create  
4 temporary barriers to California black rail movements. Grading, filling, contouring and other initial  
5 ground-disturbing activities could remove habitat along movement corridors used by individuals  
6 and potentially temporarily reduce access to adjacent habitat areas. The temporary adverse effects  
7 of fragmentation of tidal brackish emergent wetland habitat for California black rail or restoration  
8 activities resulting in barriers to movement would be minimized through sequencing of *CM4 Tidal*  
9 *Natural Community Restoration* activities. The tidal natural communities restoration would be  
10 phased through the course of the BDCP restoration program to allow for recovery of some areas  
11 before restoration actions are initiated in other areas. In addition, *AMM19 California Clapper Rail*  
12 *and California Black Rail* would avoid and minimize effects on California black rail.

13 **NEPA Effects:** The fragmentation of existing wetlands and creation of temporary barriers to  
14 movement would not represent an adverse effect on California black rail as a result of habitat  
15 modification of a special-status species because *CM4 Tidal Natural Communities Restoration* would  
16 be phased to allow for the recovery of some areas before restoration actions are initiated in other  
17 areas. In addition, *AMM19 California Clapper Rail and California Black Rail* would avoid and  
18 minimize effects on California black rail.

19 **CEQA Conclusion:** The fragmentation of existing wetlands and creation of temporary barriers to  
20 movement would represent a less-than-significant impact on California black rail as a result of  
21 habitat modification of a special-status species because *CM4 Tidal Natural Communities Restoration*  
22 would be phased to allow for the recovery of some areas before restoration actions are initiated in  
23 other areas. In addition, *AMM19 California Clapper Rail and California Black Rail* would avoid and  
24 minimize impacts on California black rail.

25 **Impact BIO-61: Periodic Effects of Inundation of California Black Rail Habitat as a Result of**  
26 **Implementation of Conservation Components**

27 Flooding of the Yolo Bypass from *CM2 Yolo Bypass Fisheries Enhancement* would not result in the  
28 periodic inundation of modeled habitat for California black rail. There are no records for California  
29 black rails in the Yolo Bypass, although the species is highly secretive and the extent to which the  
30 area has been surveyed for California black rails is unknown. Therefore, there is potential for the  
31 species to occur in the Yolo Bypass. In addition, rails may occur in the bypass after restoration  
32 activities are completed. However, periodic inundation would not result in permanent habitat loss  
33 and would not prevent use of the bypass by current or future rail populations.

34 Based on hypothetical floodplain restoration for *CM5 Seasonally Inundated Floodplain Restoration*,  
35 construction of setback levees could result in increased magnitude, frequency and duration of  
36 periodic inundation by up to 6 acres of modeled California black rail habitat in CZ 7. The risk of  
37 changes in inundation frequency, magnitude, and duration through CM2 and CM5 affecting  
38 California black rail are considered to be low, and would not be expected to result in adverse effects  
39 on the species.

40 **NEPA Effects:** Periodic inundation under *CM2 Yolo Bypass Fisheries Enhancement* and *CM5*  
41 *Seasonally Inundated Floodplain Restoration* would not represent an adverse effect on California  
42 black rail as a result of habitat modification of a special-status species because periodic inundation  
43 would not result in permanent habitat loss and would not prevent use of the bypass by current or

1 future rail populations. The risk of changes in inundation frequency and duration through CM2 and  
2 CM5 affecting California black rail is considered to be low.

3 **CEQA Conclusion:** Periodic inundation under *CM2 Yolo Bypass Fisheries Enhancement* and *CM5*  
4 *Seasonally Inundated Floodplain Restoration* would represent a less-than-significant impact on  
5 California black rail because periodic inundation would not result in permanent habitat loss and  
6 would not prevent use of the bypass by current or future rail populations. The risk of changes in  
7 inundation frequency and duration as a result of CM2 and CM5 affecting California black rail is  
8 considered to be low.

### 9 **California Clapper Rail**

10 This section describes the effects of Alternative 4, including water conveyance facilities construction  
11 and implementation of other conservation components, on California clapper rail. California clapper  
12 rail modeled habitat includes primarily middle marsh habitat with select emergent wetland plant  
13 alliances. High marsh is also used if it is of high value, and low marsh provides foraging habitat for  
14 the species. California clapper rail secondary habitats generally provide only a few ecological  
15 functions such as foraging (low marsh) or high-tide refuge (upland transition zones), while primary  
16 habitats provide multiple functions including breeding, effective predator cover, and foraging  
17 opportunities. Further details regarding the habitat model, including assumptions on which the  
18 model is based, are provided in BDCP Appendix 2.A, *Covered Species Accounts*.

19 Construction and restoration associated with Alternative 4 conservation measures would result in  
20 both temporary and permanent losses of California clapper rail modeled habitat as indicated in  
21 Table 12-4-26. Full implementation of Alternative 4 would also include the following conservation  
22 actions over the term of the BDCP to benefit the California clapper rail (BDCP Chapter 3, Section 3.3,  
23 *Biological Goals and Objectives*).

- 24 ● Restore or create at least 6,000 acres of tidal brackish emergent wetland in CZ 11 including at  
25 least 1,500 acres of middle and high marsh (Objectives TBEWNC1.1 and TBEWNC1.2, associated  
26 with CM4).

27 As explained below, with the restoration and protection of these amounts of habitat, in addition to  
28 natural community enhancement and management commitments (including *CM12 Methylmercury*  
29 *Management*) and implementation of AMM1–AMM7, *AMM18 California Clapper Rail and California*  
30 *Black Rail*, and *AMM27 Selenium Management*, impacts on the California clapper rail would not be  
31 adverse for NEPA purposes and would be less than significant for CEQA purposes.

1 **Table 12-4-26. Changes in California Clapper Rail Modeled Habitat Associated with Alternative 4**  
2 **(acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	Primary	0	0	0	0	NA	NA
	Secondary	0	0	0	0	NA	NA
<b>Total Impacts CM1</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>		
CM2–CM18	Primary	26	27	0	0	NA	NA
	Secondary	50	50	0	0	NA	NA
<b>Total Impacts CM2–CM18</b>		<b>76</b>	<b>77</b>	<b>0</b>	<b>0</b>		
<b>TOTAL IMPACTS</b>		<b>76</b>	<b>77</b>	<b>0</b>	<b>0</b>		

<sup>a</sup> See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only.

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-62: Loss or Conversion of Habitat for and Direct Mortality of California Clapper**  
5 **Rail**

6 Alternative 4 conservation measures would result in the total loss or conversion of up to 35 acres of  
7 modeled clapper rail habitat consisting of 27 acres of primary habitat and 50 acres of secondary  
8 habitat (Table 12-4-26). The conservation measure that would result in these losses is tidal natural  
9 communities restoration (CM4). Habitat enhancement and management activities (CM11), which  
10 include ground disturbance or removal of nonnative vegetation, could also result in local adverse  
11 habitat effects. Each of these individual activities is described below. A summary statement of the  
12 combined impacts and NEPA effects, and a CEQA conclusion follow the individual conservation  
13 measure discussions.

- 14 • *CM4 Tidal Natural Communities Restoration*: Site preparation and inundation would convert  
15 approximately 77 acres of modeled California clapper rail habitat (27 acres of primary habitat,  
16 50 acres of secondary habitat), the majority of which would occur in CZ 11. The tidal marsh  
17 restoration action would not result in the permanent loss of any California clapper rail habitat in  
18 the study area. However, approximately 27 acres of primary habitat would be converted to  
19 secondary low marsh habitat and 50 acres of secondary habitat would be converted to middle or  
20 high marsh. Full implementation of CM4 would restore or create at least 6,000 acres of tidal  
21 brackish emergent wetland in CZ 11. Tidal wetlands would be restored as a mosaic of large,  
22 interconnected, and biologically diverse patches that supported a natural gradient extending  
23 from subtidal to the upland fringe. Much of the restored tidal brackish emergent wetland would  
24 meet the primary habitat requirements of the California clapper rail, including development of  
25 mid- and high-marsh vegetation with dense, tall stands of pickleweed cover. Restoration would

1 be sequenced and spaced in a manner that minimizes any temporary, initial loss of habitat and  
2 habitat fragmentation.

- 3 • *CM11 Natural Communities Enhancement and Management*: Because the entire California  
4 clapper rail population is restricted to the San Francisco Bay Area estuary, BDCP enhancement  
5 and restoration actions would be expected to benefit the species by creating the potential for  
6 extending its abundance and distribution in Suisun Marsh. Occupied California clapper rail  
7 habitat would be monitored to determine if there is a need for predator control actions. If  
8 implemented, nonnative predators would be controlled as needed to reduce nest predation and  
9 to help maintain species abundance. A variety of habitat management actions included in *CM11*  
10 *Natural Communities Enhancement and Management* that are designed to enhance wildlife  
11 values in restored and protected tidal wetland habitats could result in localized ground  
12 disturbances that could temporarily remove small amounts of California clapper rail habitat.  
13 Ground-disturbing activities, such as removal of nonnative vegetation and road and other  
14 infrastructure maintenance activities, would be expected to have minor adverse effects on  
15 available California clapper rail habitat. These potential effects are currently not quantifiable,  
16 but would be minimized with implementation *AMM19, Clapper Rail and California Black Rail*  
17 (BDCP Appendix 3.C, *Avoidance and Minimization Measures*).
- 18 • *Operations and Maintenance*: Postconstruction operation and maintenance of the restoration  
19 infrastructure could result in ongoing but periodic disturbances that could affect California  
20 clapper rail use of the surrounding habitat in Suisun. Maintenance activities could include  
21 vegetation management, and levee repair. These effects, however, would be reduced by AMMs  
22 and conservation actions as described below.
- 23 • *Injury and Direct Mortality*: Construction vehicle activity may cause injury or mortality to  
24 California black rail. If rails are present adjacent to covered activities, the operation of  
25 equipment for land clearing, and habitat restoration, enhancement, and management could  
26 result in injury or mortality of California clapper rail. Operation of construction equipment could  
27 result in injury or mortality of California clapper rails. Risk would be greatest to eggs and  
28 nestlings susceptible to land clearing activities, nest abandonment, or increased exposure to the  
29 elements or to predators. Injury to adults and fledged juveniles is less likely as these individuals  
30 are expected to avoid contact with construction equipment. However, nest sites would be  
31 avoided during the nesting season as required by AMM1–AMM7 and *AMM19 California Clapper*  
32 *Rail and California Black Rail*.

33 The following paragraphs summarize the combined effects discussed above and describe other  
34 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also  
35 included.

### 36 ***Near-Term Timeframe***

37 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
38 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
39 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
40 effects of construction would not be adverse under NEPA. There would be no impacts resulting from  
41 the construction of the water conveyance facilities (CM1). However, there would be a loss of 76  
42 acres of modeled habitat for California clapper rail in the study area in the near-term. These effects  
43 would result from implementing *CM4 Tidal Natural Communities Restoration* (26 acres of primary  
44 and 50 acres of secondary habitat).

1 The typical NEPA and CEQA project-level mitigation ratio for those natural communities affected by  
2 CM4 and that are identified in the biological goals and objectives for California clapper rail in  
3 Chapter 3 of the BDCP would be 1:1 for restoration/creation of tidal brackish emergent habitat.  
4 Using this ratio would indicate that 76 acres of tidal brackish emergent wetland should be  
5 restored/created to compensate for the CM4 losses of California clapper rail habitat.

6 The BDCP has committed to near-term goals of restoring 2,000 acres of tidal brackish emergent  
7 wetland in the Plan Area (Table 3-4 in Chapter 3, *Description of Alternatives*). These conservation  
8 actions are associated with CM4 and would occur in the same timeframe as the early restoration  
9 losses, thereby avoiding adverse effects on California clapper rail. The tidal brackish emergent  
10 wetland would be restored in CZ 11 among the Western Suisun/Hill Slough Marsh Complex, the  
11 Suisun Slough/Cutoff Slough Marsh Complex, and the Nurse Slough/Denverton Marsh complex  
12 (Objective TBEWNC1.1) and would be restored in a way that creates topographic heterogeneity and  
13 in areas that increase connectivity among protected lands (Objectives TBEWNC1.4). These biological  
14 goals and objectives would inform the near-term restoration efforts and represent performance  
15 standards for considering the effectiveness of restoration actions. These Plan objectives represent  
16 performance standards for considering the effectiveness of CM4 restoration actions. The acres of  
17 restoration contained in the near-term Plan goals satisfy the typical mitigation that would be  
18 applied to the near-term effects of tidal restoration.

19 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
20 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
21 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
22 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
23 *Material*, *AMM7 Barge Operations Plan*, and *AMM19 California Clapper Rail and California Black Rail*.  
24 All of these AMMs include elements that would avoid or minimize the risk of affecting individuals  
25 and species habitats adjacent to work areas. The AMMs are described in detail in BDCP Appendix  
26 3.C, *Avoidance and Minimization Measures*.

### 27 ***Late Long-Term Timeframe***

28 The habitat model indicates that the study area supports approximately 296 acres of primary and  
29 6,420 acres of secondary habitat for California clapper rail. Alternative 4 as a whole would result in  
30 the permanent loss of and temporary effects on 27 acres of primary habitat and to 50 acres of  
31 secondary habitat for California clapper rail during the term of the Plan (9% of the total primary  
32 habitat in the study area and less than 1% of the total secondary habitat in the study area). The  
33 locations of these losses are described above in the analyses of individual conservation measures.  
34 The Plan includes commitments through *CM4 Tidal Natural Communities Restoration* to restore or  
35 create at least 6,000 acres of tidal brackish emergent wetlands for California clapper rail in Suisun  
36 Marsh in CZ 11 (Objective TBEWNC1.1). These tidal wetlands would be restored as a mosaic of large,  
37 interconnected and biologically diverse patches and at least 1,500 acres of the restored marsh  
38 would consist of middle-and high-marsh vegetation, serving as primary habitat for California  
39 clapper rail in Suisun Marsh (Objectives TBEWNC1.1 and TBEWNC1.2). Additional pressures on the  
40 species such as loss of habitat from invasive species and mortality from nest predators would also  
41 be addressed through the BDCP. Perennial pepperweed, which outcompetes suitable clapper rail  
42 habitat (such as pickleweed) would be reduced to no more than 10% cover in the tidal brackish  
43 emergent wetland natural community within CZ 11 (TBEWNC2.1). In addition, nonnative predators  
44 would be controlled to reduce nest predation if necessary through *CM11 Natural Communities*  
45 *Enhancement and Management*.

1 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*  
2 *Plant Species*) estimates that the restoration and protection actions discussed above, would result in  
3 the restoration of 1,500 acres of primary habitat and 4,500 acres of secondary habitat for California  
4 clapper rail.

5 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*  
6 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*  
7 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
8 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
9 *Material, AMM7 Barge Operations Plan, and AMM19 California Clapper Rail and California Black Rail.*  
10 All of these AMMs include elements that would avoid or minimize the risk of affecting individuals  
11 and species habitats adjacent to work areas. The AMMs are described in detail in BDCP Appendix  
12 3.C, *Avoidance and Minimization Measures.*

13 **NEPA Effects:** The loss of California clapper rail habitat associated with Alternative 4 would  
14 represent an adverse effect as a result of habitat modification of a special-status species and  
15 potential for direct mortality in the absence of other conservation actions. However, with habitat  
16 protection and restoration associated with CM4, guided by biological goals and objectives and by  
17 *AMM1 Worker Awareness Training, AMM2 Construction Best Management Practices and Monitoring,*  
18 *AMM3 Stormwater Pollution Prevention Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill*  
19 *Prevention, Containment, and Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable*  
20 *Tunnel Material, and Dredged Material, AMM7 Barge Operations Plan, and AMM19 California Clapper*  
21 *Rail and California Black Rail,* which would be in place throughout the construction period, the  
22 effects of Alternative 4 as a whole on clapper rail would not be adverse under NEPA.

### 23 **CEQA Conclusion:**

#### 24 **Near-Term Timeframe**

25 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
26 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
27 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
28 effects of construction would be less than significant under CEQA. There would be no impacts  
29 resulting from the construction of the water conveyance facilities (CM1). However, there would be a  
30 loss of 76 acres of modeled habitat for California clapper rail in the study area in the near-term from  
31 the implementation of *CM4 Tidal Natural Communities Restoration* (26 acres of primary and 50 acres  
32 of secondary habitat).

33 The typical NEPA and CEQA project-level mitigation ratio for those natural communities affected by  
34 CM4 and that are identified in the biological goals and objectives for California clapper rail in  
35 Chapter 3 of the BDCP would be 1:1 for restoration/creation of tidal brackish emergent habitat.  
36 Using this ratio would indicate that 76 acres of tidal brackish emergent wetland should be  
37 restored/created to mitigate the CM4 losses of California clapper rail habitat.

38 The BDCP has committed to near-term goals of restoring 2,000 acres of tidal brackish emergent  
39 wetland in the study area. These conservation actions are associated with CM4 and would occur in  
40 the same timeframe as the early restoration losses, thereby avoiding adverse effects on California  
41 clapper rail. The tidal brackish emergent wetland would be restored in CZ 11 among the Western  
42 Suisun/Hill Slough Marsh Complex, the Suisun Slough/Cutoff Slough Marsh Complex, and the Nurse  
43 Slough/Denverton Marsh complex (Objective TBEWNC1.1) and would be restored in a way that

1 creates topographic heterogeneity and in areas that increase connectivity among protected lands  
2 (Objectives TBEWNC1.4).

3 These biological goals and objectives would inform the near-term restoration efforts and represent  
4 performance standards for considering the effectiveness of restoration actions. These Plan  
5 objectives represent performance standards for considering the effectiveness of CM4 restoration  
6 actions.

7 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
8 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
9 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
10 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
11 *Material*, *AMM7 Barge Operations Plan*, and *AMM19 California Clapper Rail and California Black Rail*.  
12 All of these AMMs include elements that would avoid or minimize the risk of affecting individuals  
13 and species habitats adjacent to work areas. The AMMs are described in detail in BDCP Appendix  
14 3.C, *Avoidance and Minimization Measures*.

15 The natural community restoration and protection activities would be concluded in the first 10  
16 years of Plan implementation, which is close enough in time to the occurrence of restoration impacts  
17 to constitute adequate mitigation for CEQA purposes. In addition, *AMM19 California Clapper Rail and*  
18 *California Black Rail* and *AMM1–AMM7* would avoid and minimize potential impacts on the species  
19 from construction-related habitat loss and noise and disturbance. Because the number of acres  
20 required to meet the typical mitigation ratio described above would be only 76 acres of restored  
21 tidal natural communities, the 2,000 acres of tidal brackish emergent wetland restoration contained  
22 in the near-term Plan goals, and the additional detail in the biological objectives for California  
23 clapper rail, are more than sufficient to support the conclusion that the near-term impacts of habitat  
24 loss and direct mortality under Alternative 4 would be less than significant under CEQA.

### 25 ***Late Long-Term Timeframe***

26 The habitat model indicates that the study area supports approximately 296 acres of primary and  
27 6,420 acres of secondary habitat for California clapper rail. Alternative 4 as a whole would result in  
28 the permanent loss of and temporary effects on 27 acres of primary habitat and to 8 acres of  
29 secondary habitat for California clapper rail during the term of the Plan (9% of the total primary  
30 habitat in the study area and less than 1% of the total secondary habitat in the study area). The  
31 locations of these losses are described above in the analyses of individual conservation measures.  
32 The Plan includes a commitment to restore or create at least 6,000 acres of tidal brackish emergent  
33 wetlands for California clapper rail in Suisun Marsh in CZ 11 (Objective TBEWNC1.1). These tidal  
34 wetlands would be restored as a mosaic of large, interconnected and biologically diverse patches  
35 and much of the restored marsh would consist of middle-and high-marsh vegetation with dense, tall  
36 stands of pickleweed, serving as primary habitat for clapper rail in Suisun Marsh (Objective  
37 TBEWNC1.1). Additional pressures on the species such as loss of habitat from invasive species and  
38 mortality from nest predators would also be addressed through the BDCP. Perennial pepperweed,  
39 which outcompetes suitable clapper rail habitat (such as pickleweed) would be reduced to no more  
40 than 10% cover in the tidal brackish emergent wetland natural community within CZ 11  
41 (TBEWNC2.1). In addition, nonnative predators would be controlled to reduce nest predation if  
42 necessary through *CM11 Natural Communities Enhancement and Management*.

43 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*  
44 *Plant Species*) estimates that the restoration and protection actions discussed above, would result in

1 the restoration of 1,500 acres of primary habitat and 4,500 acres of secondary habitat for California  
2 clapper rail.

3 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
4 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
5 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
6 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
7 *Material*, *AMM7 Barge Operations Plan*, and *AMM19 California Clapper Rail and California Black Rail*.  
8 All of these AMMs include elements that would avoid or minimize the risk of affecting individuals  
9 and species habitats adjacent to work areas. The AMMs are described in detail in BDCP Appendix  
10 3.C, *Avoidance and Minimization Measures*.

11 Considering Alternative 4's protection and restoration provisions, which would provide acreages of  
12 new or enhanced habitat in amounts greater than necessary to compensate for habitats lost to  
13 construction and restoration activities, loss of habitat or direct mortality through implementation of  
14 Alternative 4 would not result in a substantial adverse effect through habitat modifications and  
15 would not substantially reduce the number or restrict the range of the species. Therefore, the  
16 alternative would have a less-than-significant impact on California clapper rail.

### 17 **Impact BIO-63: Indirect Effects of Plan Implementation on California Clapper Rail**

18 **Indirect construction-related effects:** California clapper rail habitat within the vicinity of  
19 proposed restoration areas could be indirectly affected by construction activities. Indirect effects  
20 associated with construction include noise, dust, and visual disturbance caused by grading, filling,  
21 contouring, and other ground-disturbing operations outside the project footprint but within 500  
22 feet from the construction edge. Construction noise above background noise levels (greater than 50  
23 dBA) could extend 500 to 5,250 feet from the edge of construction activities (BDCP Appendix 5.J,  
24 Attachment 5J.D, *Indirect Effects of the Construction of the BDCP Conveyance Facility on Sandhill*  
25 *Crane*, Table 4), although there are no available data to determine the extent to which these noise  
26 levels could affect California clapper rail. The use of mechanical equipment during construction-  
27 related restoration activities could cause the accidental release of petroleum or other contaminants  
28 that could affect clapper rail in the surrounding habitat. The inadvertent discharge of sediment or  
29 excessive dust adjacent to California clapper rail habitat could also affect the species. If construction  
30 occurs during the nesting season, these indirect effects could result in the loss or abandonment of  
31 nests, and mortality of any eggs and/or nestlings. However, there is a commitment in *AMM19*  
32 *California Clapper Rail and California Black Rail* (as described in BDCP Appendix 3.C, *Avoidance and*  
33 *Minimization Measures*) that preconstruction surveys of potential breeding habitat would be  
34 conducted within 500 feet of project activities, and a 500-foot no-disturbance buffer would be  
35 established around any territorial call-centers during the breeding season. In addition, construction  
36 would be avoided altogether if breeding territories cannot be accurately delimited.

37 Preconstruction surveys conducted under *AMM19 California Clapper Rail and California Black Rail*  
38 would ensure construction-related noise and visual disturbances would not have an adverse effect  
39 on California clapper rail. AMM1–AMM7, including *AMM2 Construction Best Management Practices*  
40 *and Monitoring*, would minimize the likelihood of such spills from occurring and ensure measures  
41 were in place to prevent runoff from the construction area and to avoid negative effects of dust on  
42 the species. Therefore, with the implementation of AMM1–AMM7 and *AMM19 California Clapper Rail*  
43 *and California Black Rail*, there would be no adverse effect on California black rail.

1 **Salinity:** Water operations under Operational Scenario A would have an effect on salinity gradients  
2 in Suisun Marsh. These effects cannot be disaggregated from tidal habitat restoration, which would  
3 also cause changes in salinity gradients. It is expected that the salinity of water in Suisun Marsh  
4 would generally increase as a result of water operations and operations of salinity-control gates to  
5 mimic a more natural water flow. This would likely encourage the establishment of tidal wetland  
6 plant communities tolerant of more brackish environments, which would be beneficial to California  
7 clapper rail because its historical natural Suisun Marsh habitat was brackish tidal marsh.

8 **Methylmercury Exposure:** Marsh (tidal and nontidal) and floodplain restoration also have the  
9 potential to increase exposure to methylmercury. Mercury is transformed into the more bioavailable  
10 form of methylmercury in aquatic systems, especially areas subjected to regular wetting and drying  
11 such as tidal marshes and flood plains. Thus, BDCP restoration activities that create newly  
12 inundated areas could increase bioavailability of mercury (see BDCP Chapter 3, *Conservation*  
13 *Strategy*, for details of restoration). Concentrations of methylmercury known to be toxic to bird  
14 embryos have been found in the eggs of San Francisco Bay clapper rails (Schwarzbach and  
15 Adelsbach 2003). In general, the highest methylation rates are associated with high tidal marshes  
16 that experience intermittent wetting and drying and associated anoxic conditions (Alpers et al.  
17 2008). Currently, it is unknown how much of the sediment-derived methylmercury enters the food  
18 chain in Suisun Marsh or what tissue concentrations are actually harmful to the California clapper  
19 rail. However, although tidal habitat restoration might increase methylation of mercury export to  
20 other habitats, it is unlikely to significantly increase the exposure of California clapper rails to  
21 methylmercury, as they currently reside in tidal marshes where elevated methylmercury levels  
22 exist. *CM12 Methylmercury Management* includes project-specific management plans including  
23 monitoring and adaptive management to address the uncertainty of methylmercury levels in  
24 restored tidal marsh.

25 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in  
26 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,  
27 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,  
28 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz  
29 2009). The effect of selenium toxicity differs widely between species and also between age and sex  
30 classes within a species. In addition, the effect of selenium on a species can be confounded by  
31 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith  
32 2009).

33 The primary source of selenium bioaccumulation in birds is through their diet (Ackerman and  
34 Eagles-Smith 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the  
35 trophic level at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At  
36 Kesterson Reservoir in the San Joaquin Valley, selenium concentrations in invertebrates have been  
37 found to be two to six times the levels in rooted plants. Furthermore, bivalves sampled in the San  
38 Francisco Bay contained much higher selenium levels than crustaceans such as copepods (Stewart et  
39 al. 2004). Studies conducted at the Grasslands in Merced County recorded higher selenium levels in  
40 black-necked stilts which feed on aquatic invertebrates than in mallards and pintails, which are  
41 primarily herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which  
42 forage on bivalves) have much higher levels of selenium levels than shorebirds that prey on aquatic  
43 invertebrates (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high  
44 levels of selenium have a higher risk of selenium toxicity.

1 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations  
2 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to  
3 exacerbate bioaccumulation of selenium in avian species, including California clapper rail. Marsh  
4 (tidal and nontidal) and floodplain restoration have the potential to mobilize selenium, and  
5 therefore increase avian exposure from ingestion of prey items with elevated selenium levels. Thus,  
6 BDCP restoration activities that create newly inundated areas could increase bioavailability of  
7 selenium (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Changes in  
8 selenium concentrations were analyzed in Chapter 8, *Water Quality*, and it was determined that,  
9 relative to Existing Conditions and the No Action Alternative, CM1 would not result in substantial,  
10 long-term increases in selenium concentrations in water in the Delta under any alternative.  
11 However, it is difficult to determine whether the effects of potential increases in selenium  
12 bioavailability associated with restoration-related conservation measures (CM4, CM5) would lead to  
13 adverse effects on California clapper rail.

14 Because of the uncertainty that exists at this programmatic level of review, there could be a  
15 substantial effect on California clapper rail from increases in selenium associated with restoration  
16 activities. This effect would be addressed through the implementation of *AMM27 Selenium*  
17 *Management* (BDCP Appendix 3.C, *Avoidance and Minimization Measures*) which would provide  
18 specific tidal habitat restoration design elements to reduce the potential for bioaccumulation of  
19 selenium and its bioavailability in tidal habitats. Furthermore, the effectiveness of selenium  
20 management to reduce selenium concentrations and/or bioaccumulation would be evaluated  
21 separately for each restoration effort as part of design and implementation. This avoidance and  
22 minimization measure would be implemented as part of the tidal habitat restoration design  
23 schedule.

24 **NEPA Effects:** Potential effects of noise and visual disturbances on California clapper rail would be  
25 minimized with *AMM19 California Clapper Rail and California Black Rail*. *AMM1–AMM7*, including  
26 *AMM2 Construction Best Management Practices and Monitoring*, would minimize the likelihood of  
27 spills from occurring and ensure that measures were in place to prevent runoff from the  
28 construction area and to avoid negative effects of dust on the species. Implementation of  
29 Operational Scenario A, including operation of salinity-control gates, and tidal habitat restoration  
30 are expected to increase water salinity in Suisun Marsh, which would be expected to establish tidal  
31 marsh similar to historic conditions. Tidal habitat restoration could result in increased exposure of  
32 California clapper rail to selenium. This effect would be addressed through the implementation of  
33 *AMM27 Selenium Management*, which would provide specific tidal habitat restoration design  
34 elements to reduce the potential for bioaccumulation of selenium and its bioavailability in tidal  
35 habitats. The indirect effects associated with noise and visual disturbances, potential spills of  
36 hazardous material, changes in salinity, and increased exposure to selenium from Alternative 4  
37 implementation would not have an adverse effect on California clapper rail. Tidal habitat restoration  
38 is unlikely to have an adverse effect on California clapper rail through increased exposure to  
39 methylmercury, as rails currently reside in tidal marshes where elevated methylmercury levels  
40 exist. However, it is unknown what concentrations of methylmercury are harmful to the species and  
41 the potential for increased exposure varies substantially within the study area. Site-specific  
42 restoration plans in addition to monitoring and adaptive management, described in *CM12*  
43 *Methylmercury Management*, would address the uncertainty of methylmercury levels in restored  
44 tidal marsh. The site-specific planning phase of marsh restoration would be the appropriate place to  
45 assess the potential for risk of methylmercury exposure for California clapper rail, once site specific  
46 sampling and other information could be developed.

1 **CEQA Conclusion:** Noise and visual disturbances related to construction-related activities from the  
2 CMs could disturb California clapper rail habitat adjacent to work sites. *AMM19 California Clapper*  
3 *Rail and California Black Rail* would avoid and minimize impacts on California clapper rail from  
4 noise and visual disturbance. The use of mechanical equipment during water conveyance facilities  
5 construction could cause the accidental release of petroleum or other contaminants that could affect  
6 California clapper rail in the surrounding habitat. The inadvertent discharge of sediment or  
7 excessive dust adjacent to California clapper rail habitat could also affect the species. These impacts  
8 on California clapper rail would be less than significant with the incorporation of AMM1–AMM7 into  
9 the BDCP. Implementation of Operational Scenario A, including operation of salinity-control gates,  
10 and tidal habitat restoration are expected to increase water salinity in Suisun Marsh. These salinity  
11 gradient changes should have a beneficial impact on California clapper rail through the  
12 establishment of tidal marsh similar to historic conditions. Although tidal habitat restoration might  
13 increase methylation of mercury export to other habitats, it is unlikely to significantly increase the  
14 exposure of California clapper rails to methylmercury, as they currently reside in tidal marshes in  
15 the San Francisco Bay, where elevated methylmercury levels exist. It is unknown what  
16 concentrations of methylmercury are harmful to the species. *CM12 Methylmercury Management*  
17 includes project-specific management plans including monitoring and adaptive management to  
18 address the uncertainty of methylmercury levels in restored tidal marsh. Tidal habitat restoration  
19 could result in increased exposure of California clapper rail to selenium. This effect would be  
20 addressed through the implementation of *AMM27 Selenium Management* which would provide  
21 specific tidal habitat restoration design elements to reduce the potential for bioaccumulation of  
22 selenium and its bioavailability in tidal habitats. Therefore, the indirect effects of Alternative 4  
23 implementation would have a less-than-significant impact on California clapper rail.

#### 24 **Impact BIO-64: Effects on California Clapper Rail Associated with Electrical Transmission** 25 **Facilities**

26 Isolated patches of suitable California clapper rail habitat may occur in the study area as far east as  
27 (but not including) Sherman Island. Home range and territory of the California clapper rail is not  
28 known, but in locations outside of California, clapper rail territory ranges 0.3 acre to 8 acres (0.1 to  
29 3.2 hectares) (Rush et al. 2012), indicating that known occurrences are not likely to intersect with  
30 the proposed lines (BDCP Attachment 5).C, *Analysis of Potential Bird Collisions at Proposed BDCP*  
31 *Transmission Lines*). The location of the current population and suitable habitat for the species make  
32 collision with the proposed transmission lines highly unlikely.

33 **NEPA Effects:** The construction and presence of new transmission lines would not have an adverse  
34 effect on California clapper rail because the location of the current population and suitable habitat  
35 for the species would make collision with the proposed transmission lines highly unlikely.

36 **CEQA Conclusion:** The construction and presence of new transmission lines would have a less-than-  
37 significant impact on California clapper rail because the location of the current population and  
38 suitable habitat for the species would make collision with the proposed transmission lines highly  
39 unlikely.

#### 40 **Impact BIO-65: Fragmentation of California Clapper Rail Habitat as a Result of Conservation** 41 **Component Implementation**

42 Restoration activities may temporarily fragment existing wetlands in Suisun Marsh and could create  
43 temporary barriers to movements of California clapper rail. Grading, filling, contouring and other

1 initial ground-disturbing activities could remove habitat along movement corridors used by  
2 individuals and, thus, temporarily reduce access to adjacent habitat areas. The temporary adverse  
3 effects of fragmentation of tidal brackish emergent wetland habitat for California clapper rail or  
4 restoration activities resulting in barriers to movement would be minimized through sequencing of  
5 restoration activities to minimize effects of temporary habitat loss. The tidal natural communities  
6 restoration would be phased through the course of the BDCP restoration program to allow for  
7 recovery of some areas before restoration actions are initiated in other areas. In addition, *AMM19*  
8 *California Clapper Rail and California Black Rail* would avoid and minimize effects on California  
9 clapper rail.

10 **NEPA Effects:** The fragmentation of existing wetlands and creation of temporary barriers to  
11 movement would not represent an adverse effect on California clapper rail as a result of special-  
12 status species habitat modification because *CM4 Tidal Natural Communities Restoration* would be  
13 phased to allow for the recovery of some areas before restoration actions are initiated in other  
14 areas. In addition, *AMM19 California Clapper Rail and California Black Rail* would avoid and  
15 minimize effects on California clapper rail.

16 **CEQA Conclusion:** The fragmentation of existing wetlands and creation of temporary barriers to  
17 movement would represent a less-than-significant impact on California clapper rail as a result of  
18 habitat modification of a special status species because *CM4 Tidal Natural Communities Restoration*  
19 would be phased to allow for the recovery of some areas before initiating restoration actions in  
20 other areas. In addition, *AMM19 California Clapper Rail and California Black Rail* would  
21 avoid and minimize effects on California clapper rail.

## 22 California Least Tern

23 This section describes the effects of Alternative 4, including water conveyance facilities construction  
24 and implementation of other conservation components, on California least tern. California least tern  
25 modeled habitat identifies foraging habitat as all tidal perennial aquatic natural community in the  
26 study area. Breeding habitat is not included in the model because most of the natural shoreline in  
27 the study area that historically provided nesting sites has been modified or removed.

28 Construction and restoration associated with Alternative 4 conservation measures would result in  
29 both temporary and permanent losses of California least tern modeled foraging habitat as indicated  
30 in Table 12-4-27. Full implementation of Alternative 4 would also include the following  
31 conservation actions over the term of the BDCP to benefit California least tern (BDCP Chapter 3,  
32 Section 3.3, *Biological Goals and Objectives*).

- 33 ● Restore and protect at least 65,000 acres of tidal natural communities and transitional uplands  
34 to accommodate sea level rise (Objective L1.3, associated with CM4).
- 35 ● Within the at least 65,000 acres of tidal natural communities and transitional uplands, restore or  
36 create tidal perennial aquatic natural community as necessary when creating tidal emergent  
37 wetland (Objective TPANC1.1, associated with CM4).
- 38 ● Control invasive aquatic vegetation that adversely affects native fish habitat (Objective  
39 TPANC2.1, associated with CM13).

40 Least terns currently nest on artificial fill adjacent to tidal perennial aquatic habitat in the vicinity of  
41 Suisun Marsh and west Delta, and additional nesting could occur at the edge of tidal perennial

1 waters whenever disturbed or artificial sites mimic habitat conditions sought for nesting (i.e., sandy  
2 or gravelly substrates with sparse vegetation).

3 As explained below, with the restoration and protection of tidal perennial aquatic foraging habitat,  
4 in addition to natural community enhancement and management commitments (including CM12  
5 *Methylmercury Management*) and implementation of AMM1–AMM7, *AMM27 Selenium Management*,  
6 and mitigation to avoid impacts on terns should they nest in the study area, impacts on the  
7 California least tern would not be adverse for NEPA purposes and would be less than significant for  
8 CEQA purposes.

9 **Table 12-4-27. Changes in California Least Tern Modeled Habitat Associated with Alternative 4**  
10 **(acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	Foraging	178	178	2,101	2,101	NA	NA
<b>Total Impacts CM1</b>		<b>178</b>	<b>178</b>	<b>2,101</b>	<b>2,101</b>	<b>NA</b>	<b>NA</b>
CM2–CM18	Foraging	38	46	11	16	NA	NA
<b>Total Impacts CM2–CM18</b>		<b>38</b>	<b>46</b>	<b>11</b>	<b>16</b>	<b>NA</b>	<b>NA</b>
<b>TOTAL IMPACTS</b>		<b>216</b>	<b>224</b>	<b>2,112</b>	<b>2,117</b>	<b>NA</b>	<b>NA</b>

<sup>a</sup> See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

11  
12 **Impact BIO-66: Loss or Conversion of Habitat for and Direct Mortality of California Least Tern**

13 Alternative 4 conservation measures would result in the combined permanent and temporary loss  
14 of up to 2,341 acres of modeled foraging habitat for California least tern (Table 12-4-27). The  
15 conservation measures that would result in these losses are construction of water conveyance  
16 facilities and operation (CM1), Yolo Bypass Fisheries Enhancement (CM2), Tidal Natural  
17 Communities Restoration (CM4), and Seasonally Inundated Floodplain Restoration (CM5). Habitat  
18 enhancement and management activities (CM11), which include ground disturbance or removal of  
19 nonnative vegetation, could also result in local adverse habitat effects. In addition, maintenance  
20 activities associated with the long-term operation of the water conveyance facilities and other BDCP  
21 physical facilities could degrade or eliminate California least tern foraging habitat. Each of these  
22 individual activities is described below. A summary statement of the combined impacts, NEPA  
23 effects, and CEQA conclusion follow the individual conservation measure discussions.

- 24 • *CM1 Water Facilities and Operation*: Construction of Alternative 4 conveyance facilities would  
25 result in the combined permanent and temporary loss of up to 2,279 acres of modeled California

1 least tern aquatic foraging habitat (Table 12-4-27). Of these acres, 178 acres would be a  
2 permanent loss the majority of which would occur where Intakes 2, 3 and 5 encroach on the  
3 Sacramento River's east bank between Clarksburg and Courtland. Permanent losses would also  
4 occur where new control structures would be built into the California Aqueduct and the Delta  
5 Mendota Canal adjacent to Clifton Court Forebay. The temporary effects on tidal perennial  
6 aquatic habitats would occur at numerous locations, with the largest affect occurring at Clifton  
7 Court Forebay, where the entire forebay would be dredged to provide additional storage  
8 capacity. Other temporary effects would occur in the Sacramento River at Intakes 2, 3, and 5,  
9 and at temporary barge unloading facilities established at three locations along the tunnel route.  
10 The CM1 footprint does not overlap with any California least tern occurrences. Refer to the  
11 Terrestrial Biology Map Book for a detailed view of Alternative 4 construction locations. Impacts  
12 from CM1 would occur within the first 10 years of Alternative 4 implementation.

- 13 ● *CM2 Yolo Bypass Fisheries Enhancement*: Construction of Yolo Bypass fisheries enhancement  
14 (CM2) would result in the permanent loss of 8 acres and the temporary loss of 11 acres of  
15 modeled aquatic foraging habitat for California least tern in CZ 2. Activities from Fremont and  
16 Sacramento Weir improvements, Putah Creek realignment, and Lisbon Weir modification could  
17 involve excavation and grading in tidal perennial aquatic areas to improve passage of fish  
18 through the bypasses. The loss is expected to occur during the first 10 years of Alternative 4  
19 implementation.
- 20 ● *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration actions would result in the  
21 permanent loss of 36 acres of modeled aquatic foraging habitat for California least tern. An  
22 estimated 65,000 acres of tidal wetlands would be restored during tidal habitat restoration,  
23 consistent with BDCP Objective L1.3. Of these acres, an estimated 27,000 acres of tidal perennial  
24 aquatic would be restored, based on modeling conducted by ESAPWA (refer to Table 5 in BDCP  
25 Appendix 3.B, *BDCP Tidal Habitat Evolution Assessment*). This restoration is consistent with  
26 BDCP Objective TPANC1.1. Tidal perennial aquatic restoration would be expected to  
27 substantially increase the primary productivity of fish, increasing the prey base for California  
28 least tern. Approximately 3,400 acres of the restoration would happen during the first 10 years  
29 of BDCP implementation, which would coincide with the timeframe of water conveyance  
30 facilities construction. The remaining restoration would be phased over the following 30 years.  
31 Some of the restoration would occur in the lower Yolo Bypass, but restoration would also be  
32 spread among the Suisun Marsh, South Delta, Cosumnes/Mokelumne and West Delta ROAs.
- 33 ● *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore  
34 seasonally inundated floodplain would result in the permanent loss of 2 acres and the  
35 temporary loss of 5 acres of modeled aquatic foraging habitat for California least tern. This  
36 activity is scheduled to start following construction of water conveyance facilities, which is  
37 expected to take 10 years. Specific locations for the floodplain restoration have not been  
38 identified, but it is expected that much of the activity would occur in the south Delta along the  
39 major rivers.
- 40 ● *CM11 Natural Communities Enhancement and Management*: Noise and visual disturbances  
41 during implementation of habitat management actions could result in temporary disturbances  
42 that affect California least tern use of the surrounding habitat. These effects cannot be  
43 quantified, but are expected to be minimal because few management activities would be  
44 implemented in aquatic habitat and because terns are not expected to nest on protected lands.  
45 Surveys would be conducted prior to ground disturbance in any areas that have suitable nesting  
46 substrate for California least tern (flat, unvegetated areas near aquatic foraging habitat) and

1 injury mortality and noise and visual disturbance of nesting terns would be avoided and  
2 minimized by the AMMs and Mitigation Measure BIO-66, *California Least Tern Nesting Colonies*  
3 *Shall Be Avoided and Indirect Effects on Colonies Will Be Minimized*, described below.

- 4 • Operations and Maintenance: Postconstruction operation and maintenance of the above-ground  
5 water conveyance facilities and restoration infrastructure could result in ongoing but periodic  
6 postconstruction disturbances, localized impacts on California least tern foraging habitat, and  
7 temporary noise and disturbances over the term of the BDCP. Maintenance activities would  
8 include vegetation management, levee and structure repair, and re-grading of roads and  
9 permanent work areas which could be adjacent to California least tern foraging habitat. These  
10 effects, however, would be reduced by AMMs described below.
- 11 • Injury and Direct Mortality: California least terns currently nest in the vicinity of potential  
12 restoration sites in Suisun Marsh and west Delta area (CZ 10 and CZ 11). New nesting colonies  
13 could establish if suitable nesting habitat is created during restoration activities (e.g., placement  
14 of unvegetated fill to raise surface elevations prior to breaching levees during restoration  
15 efforts). If nesting occurs where covered activities are undertaken, the operation of equipment  
16 for land clearing, construction, conveyance facilities operation and maintenance, and habitat  
17 restoration, enhancement, and management could result in injury or mortality of California least  
18 tern. Risk of injury or disturbance would be greatest to eggs and nestlings susceptible to land-  
19 clearing activities, abandonment of nests and nesting colonies, or increased exposure to the  
20 elements or to predators. Injury to adults or fledged juveniles is less likely as these individuals  
21 would be expected to avoid contact with construction equipment. However, injury or mortality  
22 would be avoided through planning and preconstruction surveys to identify nesting colonies,  
23 the design of projects to avoid locations with least tern colonies, and the provision for 500-foot  
24 buffers as required by Mitigation Measure BIO-66, *California Least Tern Nesting Colonies Shall Be*  
25 *Avoided and Indirect Effects on Colonies Will Be Minimized*.

26 The following paragraph summarizes the combined effects discussed above and describes other  
27 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also  
28 included.

### 29 ***Near-Term Timeframe***

30 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
31 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
32 provide sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that  
33 the effects of construction would not be adverse under NEPA. With Alternative 4 implementation,  
34 there would be a loss of 2,328 acres of modeled foraging habitat for California least tern in the study  
35 area in the near-term. These effects would result from the construction of the water conveyance  
36 facilities (CM1, 2,279 acres), and implementing other conservation measures (Yolo Bypass fisheries  
37 improvements [CM2], and tidal habitat restoration [CM4] - 49 acres). All modeled foraging habitat  
38 impacts would occur in tidal perennial aquatic natural communities.

39 The typical NEPA and CEQA project-level mitigation ratio for those natural communities affected by  
40 CM1 would be 1:1 for restoration/creation of tidal perennial aquatic habitat. Using this ratio would  
41 indicate that 2,279 acres of the tidal perennial aquatic natural community should be  
42 restored/created to compensate for the CM1 losses of California least tern foraging habitat. The  
43 near-term effects of other conservation actions would remove 49 acres of tidal perennial aquatic

1 habitat, and therefore require 49 acres of tidal perennial aquatic natural community restoration  
2 using the same typical NEPA and CEQA ratio (1:1 for restoration).

3 The BDCP has committed to near-term goals of restoring 19,150 acres of tidal natural communities  
4 in the Plan Area through *CM4 Tidal Natural Communities Restoration* (Table 3-4 in Chapter 3,  
5 *Description of Alternatives*). This conservation action would result in the creation of approximately  
6 3,400 acres of high quality tidal perennial aquatic natural community, based on modeling conducted  
7 by ESAPWA (refer to Table 5 in BDCP Appendix 3.B, *BDCP Tidal Habitat Evolution Assessment*) (Tidal  
8 perennial aquatic restoration would occur in the same timeframe as the construction and early  
9 restoration losses, thereby avoiding adverse effects on California least tern from loss of foraging  
10 habitat.

11 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
12 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
13 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
14 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
15 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
16 minimize the risk of affecting individuals and species habitats at or adjacent to work areas and  
17 storage sites. The AMMs are described in detail in BDCP Appendix 3.C, *Avoidance and Minimization*  
18 *Measures*.

19 The California least tern is not a species that is covered under the BDCP. Although nesting by  
20 California least tern is not expected to occur, restoration sites could attract individuals wherever  
21 disturbed or artificial sites mimic habitat conditions sought for nesting (i.e., sandy or gravelly  
22 substrates with sparse vegetation). If nesting were to occur, construction activities could have an  
23 adverse effect on California least tern. Mitigation Measure BIO-66, *California Least Tern Nesting*  
24 *Colonies Shall be Avoided and Indirect Effects on Colonies Will be Minimized*, would be available to  
25 address this adverse effect on nesting California least terns.

### 26 **Late Long-Term Timeframe**

27 The habitat model indicates that the study area supports approximately 86,263 acres of foraging  
28 habitat for California least tern. Alternative 4 as a whole would result in the permanent loss of and  
29 temporary effects on 2,341 acres of foraging habitat during the term of the Plan (3% of the total  
30 habitat in the study area). The locations of these losses are described above in the analyses of  
31 individual conservation measures. The Plan includes conservation commitments through *CM4 Tidal*  
32 *Natural Communities Restoration* would restore an estimated 27,000 acres of high quality tidal  
33 perennial aquatic natural community would be restored (estimated from Table 5 in BDCP Appendix  
34 3.B, *BDCP Tidal Habitat Evolution Assessment*). The restoration would occur over a wide region of  
35 the study area, including within the Suisun Marsh, Cosumnes/Mokelumne, Cache Creek, and South  
36 Delta ROAs (see Figure 12-1).

37 **NEPA Effects:** The loss of California least tern foraging habitat and potential direct mortality  
38 associated with Alternative 4 would represent an adverse effect in the absence of other conservation  
39 actions. Although nesting by California least tern is not expected to occur in the study area,  
40 restoration sites could attract individuals wherever disturbed or artificial sites mimic habitat  
41 conditions sought for nesting (i.e., sandy or gravelly substrates with sparse vegetation). If nesting  
42 were to occur, construction activities could have an adverse effect on California least tern. Mitigation  
43 Measure BIO-66, *California Least Tern Nesting Colonies Shall be Avoided and Indirect Effects on*  
44 *Colonies will be Minimized*, would be available to address this effect on nesting California least terns.

1 With habitat restoration associated with CM4, guided by *AMM1 Worker Awareness Training, AMM2*  
2 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*  
3 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
4 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
5 *Material, and AMM7 Barge Operations Plan, which would be in place throughout the construction*  
6 period, the effects of Alternative 4 as a whole on California least tern would not be adverse.

7 **CEQA Conclusion:**

8 ***Near-Term Timeframe***

9 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
10 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
11 provide sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that  
12 the effects of construction would be less than significant under CEQA. With Alternative 4  
13 implementation, there would be a loss of 2,328 acres of modeled foraging habitat for California least  
14 tern in the study area in the near-term. These effects would result from the construction of the  
15 water conveyance facilities (CM1, 2,279 acres), and implementing other conservation measures  
16 (Yolo Bypass fisheries improvements [CM2], and tidal habitat restoration [CM4] - 49 acres). All  
17 modeled foraging habitat impacts would occur in tidal perennial aquatic natural communities.

18 The typical NEPA and CEQA project-level mitigation ratio for those natural communities affected by  
19 CM1 would be 1:1 for restoration/creation of tidal perennial aquatic habitat. Using this ratio would  
20 indicate that 2,279 acres of the tidal perennial aquatic natural community should be  
21 restored/created to compensate for the CM1 losses of California least tern foraging habitat. The  
22 near-term effects of other conservation actions would remove 49 acres of tidal perennial aquatic  
23 habitat, and therefore require 49 acres of tidal perennial aquatic natural community restoration  
24 using the same typical NEPA and CEQA ratio (1:1 for restoration).

25 The BDCP has committed to near-term goals of restoring 19,150 acres of tidal natural communities  
26 in the Plan Area through *CM4 Tidal Natural Communities Restoration* (Table 3-4 in Chapter 3).  
27 Modeling conducted by ESA PWA indicates that this conservation action would result in the creation  
28 of approximately 3,400 acres of high-value tidal perennial aquatic natural community (refer to Table  
29 5 in BDCP Appendix 3.B, *BDCP Tidal Habitat Evolution Assessment*). Tidal perennial aquatic  
30 restoration would occur in the same timeframe as the construction and early restoration losses,  
31 thereby avoiding adverse effects on California least tern.

32 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*  
33 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*  
34 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
35 *Countermeasure Plan, AMM6 Spoils, Reusable Tunnel Material, and Dredged Material Disposal Plan,*  
36 *and AMM7 Barge Operations Plan. All of these AMMs include elements that would avoid or minimize*  
37 *the risk of affecting individuals and species habitats at or adjacent to work areas and storage sites.*  
38 *The AMMs are described in detail in BDCP Appendix 3.C, Avoidance and Minimization Measures.*

39 Although nesting by California least tern is not expected to occur, restoration sites could attract  
40 individuals wherever disturbed or artificial sites mimic habitat conditions sought for nesting (i.e.,  
41 sandy or gravelly substrates with sparse vegetation). If nesting were to occur, construction activities  
42 could have a significant impact on California least tern. Implementation of Mitigation Measure BIO-

1 66, *California Least Tern Nesting Colonies Shall be Avoided and Indirect Effects on Colonies Will be*  
2 *Minimized*, would reduce the impact on nesting California least terns to a less-than-significant level.

3 The natural community restoration and protection activities would be concluded in the first 10  
4 years of Plan implementation, which is close enough in time to the occurrence of impacts to  
5 constitute adequate mitigation for CEQA purposes. In addition, AMM1–AMM7 and Mitigation  
6 Measure BIO-66, *California Least Tern Nesting Colonies Shall be Avoided and Indirect Effects on*  
7 *Colonies will be Minimized*, would avoid and minimize potential impacts on the species from  
8 construction-related habitat loss and noise and disturbance. Because the number of acres required  
9 to meet the typical mitigation ratio described above would be only 2,309 acres of restored tidal  
10 perennial aquatic habitat, the 3,400 acres of tidal perennial aquatic restoration estimated in the  
11 near-term, are more than sufficient to support the conclusion that the near-term impacts of habitat  
12 loss and direct mortality under Alternative 4 would be less than significant under CEQA.

### 13 **Late Long-Term Timeframe**

14 The habitat model indicates that the study area supports approximately 86,263 acres of foraging  
15 habitat for California least tern. Alternative 4 as a whole would result in the permanent loss of and  
16 temporary effects on 2,341 acres of foraging habitat during the term of the Plan (3% of the total  
17 habitat in the study area). The locations of these losses are described above in the analyses of  
18 individual conservation measures. The Plan includes conservation commitments through *CM4 Tidal*  
19 *Natural Communities Restoration* to restore an estimated 27,000 acres of high-value tidal perennial  
20 aquatic natural community (estimated from Table 5 in BDCP Appendix 3.B, *BDCP Tidal Habitat*  
21 *Evolution Assessment*). The restoration would occur over a wide region of the study area, including  
22 within the Suisun Marsh, Cosumnes/Mokelumne, Cache Creek, and South Delta ROAs (see Figure  
23 12-1).

24 The loss of California least tern foraging habitat and potential direct mortality associated with  
25 Alternative 4 would represent a significant impact in the absence of other conservation actions.  
26 However, with habitat restoration associated with CM4, guided by *AMM1 Worker Awareness*  
27 *Training*, *AMM2 Construction Best Management Practices and Monitoring*, *AMM3 Stormwater*  
28 *Pollution Prevention Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention,*  
29 *Containment, and Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel*  
30 *Material, and Dredged Material*, *AMM7 Barge Operations Plan*, and implementation of Mitigation  
31 Measure BIO-66, *California Least Tern Nesting Colonies Shall Be Avoided and Indirect Effects on*  
32 *Colonies Will Be Minimized*, the loss of habitat or mortality under this alternative would have a less-  
33 than-significant impact on California least tern.

### 34 **Mitigation Measure BIO-66: California Least Tern Nesting Colonies Shall Be Avoided and** 35 **Indirect Effects on Colonies Will Be Minimized**

36 If suitable nesting habitat for California least tern (flat unvegetated areas near aquatic foraging  
37 habitat) is identified during planning level surveys, DWR will ensure that a qualified biologist  
38 with experience observing the species and its nests conducts at least three preconstruction  
39 surveys for this species during the nesting season. DWR will design projects to avoid the loss of  
40 California least tern nesting colonies. No construction will take place within 500 feet California  
41 least tern nests during the nesting season (April 15 to August 15 or as determined through  
42 surveys). Only inspection, maintenance, research, or monitoring activities may be performed

1 during the least tern breeding season in areas within or adjacent to least tern breeding habitat  
2 with USFWS and CDFW approval under the supervision of a qualified biologist.

### 3 **Impact BIO-67: Indirect Effects of Plan Implementation on California Least Tern**

4 **Indirect construction- and operation-related effects:** Indirect effects associated with  
5 construction that could affect California least tern include noise, dust, and visual disturbance caused  
6 by grading, filling, contouring, and other ground-disturbing operations outside the project footprint  
7 but within 500 feet from the construction edge. Construction noise above background noise levels  
8 (greater than 50 dBA) could extend 500 to 5,250 feet from the edge of construction activities (BDCP  
9 Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of the BDCP Conveyance Facility on*  
10 *Sandhill Crane*, Table 4), although there are no available data to determine the extent to which these  
11 noise levels could affect California least tern. The use of mechanical equipment during water  
12 conveyance facilities construction could cause the accidental release of petroleum or other  
13 contaminants that could affect California least tern or their prey species in the surrounding habitat.  
14 The inadvertent discharge of sediment or excessive dust adjacent to foraging habitat could also  
15 affect the species. Noise and visual disturbance is not expected to have an adverse effect on  
16 California least tern foraging behavior. As described in Mitigation Measure BIO-66, *California Least*  
17 *Tern Nesting Colonies Shall Be Avoided and Indirect Effects on Colonies Will Be Minimized*, if least tern  
18 nests were found during planning or preconstruction surveys, no construction would take place  
19 within 500 feet of active nests. In addition, AMM1–AMM7, including construction best management  
20 practices, would minimize the likelihood of spills or excessive dust being created during  
21 construction. Should a spill occur, implementation of these AMMs would greatly reduce the  
22 likelihood of individuals being affected.

23 **Methylmercury Exposure:** Covered activities have the potential to exacerbate the bioaccumulation  
24 of mercury in avian species including the California least tern. The operational impacts of new flows  
25 under CM1 were analyzed using a DSM-2 based model to assess potential effects on mercury  
26 concentration and bioavailability. Subsequently, a regression model was used to estimate fish-tissue  
27 concentrations under these future operational conditions (evaluated starting operations or ESO).  
28 Results indicated that changes in total mercury levels in water and fish tissues due to ESO were  
29 insignificant (see BDCP Appendix 5.D, Tables 5D.4-3, 5D.4-4, and 5D.4-5).

30 Marsh (tidal and nontidal) and floodplain restoration also have the potential to increase exposure to  
31 methylmercury. Mercury is transformed into the more bioavailable form of methylmercury in  
32 aquatic systems, especially areas subjected to regular wetting and drying such as tidal marshes and  
33 flood plains. Thus, BDCP restoration activities that create newly inundated areas could increase  
34 bioavailability of mercury (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration).  
35 Increased methylmercury associated with natural community and floodplain restoration may  
36 indirectly affect California least tern, via uptake in lower trophic levels (as described in the BDCP,  
37 Appendix 5.D, *Contaminants*). In general, the highest methylation rates are associated with high tidal  
38 marshes that experience intermittent wetting and drying and associated anoxic conditions (Alpers  
39 et al. 2008). The potential mobilization or creation of methylmercury within the study area varies  
40 with site-specific conditions and would need to be assessed at the project level.

41 Schwarzbach and Adelsbach (2003) investigated mercury exposure in 15 species of birds inhabiting  
42 the Bay-Delta ecosystem. Among the species studied, the highest concentrations of mercury were  
43 found in the eggs of piscivorous birds (terns and cormorants) that bioaccumulate mercury from  
44 their fish prey. The very highest concentrations were found in Caspian and Forster's terns, especially

1 those inhabiting South San Francisco Bay. Based on three California least tern eggs collected from  
2 Alameda Naval Air Station in the San Francisco Central Bay, concentrations in California least tern  
3 eggs were a third (0.3 ppm) those of the eggs of the other two terns. Because of the small sample  
4 size, there is a high degree of uncertainty regarding the levels of mercury that may be present in  
5 California least tern eggs. If the mercury levels measured at Alameda Naval Air Station are  
6 representative of the population in the San Francisco Bay, they would not be expected to result in  
7 adverse effects on tern hatchlings. Hatching and fledging success were not reduced in common tern  
8 eggs in Germany with mercury concentrations of 6.7 ppm (Hothem and Powell 2000).

9 *CM12 Methylmercury Management* includes provisions for project-specific Mercury Management  
10 Plans. Site-specific restoration plans that address the creation and mobilization of mercury, as well  
11 as monitoring and adaptive management as described in CM12 would be available to address the  
12 uncertainty of methylmercury levels in restored tidal marsh and potential impacts on California  
13 least tern.

14 **Selenium:** Selenium is an essential nutrient for avian species and has a beneficial effect in low  
15 doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009, Ohlendorf  
16 and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults, and can also  
17 result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz 2009). The  
18 effect of selenium toxicity differs widely between species and also between age and sex classes  
19 within a species. In addition, the effect of selenium on a species can be confounded by interactions  
20 with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith 2009).

21 The primary source of selenium bioaccumulation in birds is through their diet (Ackerman and  
22 Eagles-Smith 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the  
23 trophic level at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At  
24 Kesterson Reservoir in the San Joaquin Valley, selenium concentrations in invertebrates have been  
25 found to be two to six times the levels in rooted plants. Furthermore, bivalves sampled in the San  
26 Francisco Bay contained much higher selenium levels than crustaceans such as copepods (Stewart et  
27 al. 2004). Studies conducted at the Grasslands in Merced County recorded higher selenium levels in  
28 black-necked stilts which feed on aquatic invertebrates than in mallards and pintails, which are  
29 primarily herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which  
30 forage on bivalves) have much higher levels of selenium levels than shorebirds that prey on aquatic  
31 invertebrates (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high  
32 levels of selenium have a higher risk of selenium toxicity.

33 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations  
34 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to  
35 exacerbate bioaccumulation of selenium in avian species, including California least tern. Marsh (tidal  
36 and nontidal) and floodplain restoration have the potential to mobilize selenium, and therefore  
37 increase avian exposure from ingestion of prey items with elevated selenium levels. Thus, BDCP  
38 restoration activities that create newly inundated areas could increase bioavailability of selenium  
39 (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Changes in selenium  
40 concentrations were analyzed in Chapter 8, *Water Quality*, and it was determined that, relative to  
41 Existing Conditions and the No Action Alternative, CM1 would not result in substantial, long-term  
42 increases in selenium concentrations in water in the Delta under any alternative. However, it is  
43 difficult to determine whether the effects of potential increases in selenium bioavailability  
44 associated with restoration-related conservation measures (CM4, CM5) would lead to adverse  
45 effects on California least tern.

1 Because of the uncertainty that exists at this programmatic level of review, there could be a  
2 substantial effect on California least tern from increases in selenium associated with restoration  
3 activities. This effect would be addressed through the implementation of *AMM27 Selenium*  
4 *Management* (BDCP Appendix 3.C, *Avoidance and Minimization Measures*) which would provide  
5 specific tidal habitat restoration design elements to reduce the potential for bioaccumulation of  
6 selenium and its bioavailability in tidal habitats. Furthermore, the effectiveness of selenium  
7 management to reduce selenium concentrations and/or bioaccumulation would be evaluated  
8 separately for each restoration effort as part of design and implementation. This avoidance and  
9 minimization measure would be implemented as part of the tidal habitat restoration design  
10 schedule.

11 **NEPA Effects:** Noise and visual disturbances within 500 feet of construction-related activities from  
12 the CMs could disturb California least tern foraging habitat adjacent to work sites. Mitigation  
13 Measure BIO-66, *California Least Tern Nesting Colonies Shall Be Avoided and Indirect Effects on*  
14 *Colonies Will Be Minimized*, would be available to address this adverse effect. AMM1–AMM7,  
15 including *AMM2 Construction Best Management Practices and Monitoring*, would minimize the  
16 likelihood of spills from occurring and ensure that measures were in place to prevent runoff from  
17 the construction area and to avoid negative effects of dust on the species. Tidal habitat restoration  
18 could result in increased exposure of California least tern to selenium. This effect would be  
19 addressed through the implementation of *AMM27 Selenium Management*, which would provide  
20 specific tidal habitat restoration design elements to reduce the potential for bioaccumulation of  
21 selenium and its bioavailability in tidal habitats. The indirect effects associated with noise and visual  
22 disturbances, potential spills of hazardous material, and increased exposure to selenium from  
23 Alternative 4 implementation would not have an adverse effect on California least tern. Tidal habitat  
24 restoration could result in increased exposure of California least tern to methylmercury. However, it  
25 is unknown what concentrations of methylmercury are harmful to the species, and the potential for  
26 increased exposure varies substantially within the study area. Site-specific restoration plans that  
27 address the creation and mobilization of mercury, as well as monitoring and adaptive management  
28 as described in *CM12 Methylmercury Management*, would be available to address the uncertainty of  
29 methylmercury levels in restored tidal marsh and potential impacts on California least tern. The  
30 site-specific planning phase of marsh restoration would be the appropriate place to assess the  
31 potential for risk of methylmercury exposure for California least tern, once site specific sampling  
32 and other information could be developed.

33 **CEQA Conclusion:** Noise and visual disturbances within 500 feet of construction-related activities  
34 from the CMs could disturb California least tern foraging habitat adjacent to work sites. Mitigation  
35 Measure BIO-66, *California Least Tern Nesting Colonies Shall Be Avoided and Indirect Effects on*  
36 *Colonies Will Be Minimized*, would avoid and minimize impacts on potential nesting California least  
37 terns from noise and visual disturbance. The use of mechanical equipment during water conveyance  
38 facilities construction could cause the accidental release of petroleum or other contaminants that  
39 could affect California least tern if present in the surrounding habitat. The inadvertent discharge of  
40 sediment or excessive dust adjacent to California least tern habitat could also affect the species.  
41 These impacts on California least tern would be less than significant with the incorporation of  
42 AMM1–AMM7 into the BDCP. Tidal habitat restoration could result in increased exposure of  
43 California least tern to methylmercury. However, it is unknown what concentrations of  
44 methylmercury are harmful to the species. Sites-specific restoration plans that address the creation  
45 and mobilization of mercury, as well as monitoring and adaptive management as described in *CM12*  
46 *Methylmercury Management*, would be available to address the uncertainty of methylmercury levels

1 in restored tidal marsh and potential impacts on California least tern. Tidal habitat restoration could  
2 result in increased exposure of California least tern to selenium. This effect would be addressed  
3 through the implementation of *AMM27 Selenium Management*, which would provide specific tidal  
4 habitat restoration design elements to reduce the potential for bioaccumulation of selenium and its  
5 bioavailability in tidal habitats. With these measures in place, the indirect effects of Alternative 4  
6 implementation would not have an adverse effect on California least tern.

7 **Mitigation Measure BIO-66, California Least Tern Nesting Colonies Shall Be Avoided and**  
8 **Indirect Effects on Colonies Will Be Minimized**

9 See Mitigation Measure BIO-66 under Impact BIO-66.

10 **Impact BIO-68: Effects on California Least Tern Associated with Electrical Transmission**  
11 **Facilities**

12 New transmission lines would increase the risk for bird-power line strikes, which could result in  
13 injury or mortality of California least tern. This risk is considered to be minimal based on tern flight  
14 behaviors and its unlikely use of habitats near the transmission line corridors.

15 **NEPA Effects:** The construction and presence of new transmission lines would not represent an  
16 adverse effect on California least tern as a result of direct mortality of a special-status species  
17 because they are not known to be present in areas of disturbance and because the probability of  
18 bird-powerline strikes is unlikely due to tern flight behaviors.

19 **CEQA Conclusion:** The construction and presence of new transmission lines would represent a less-  
20 than-significant impact on California least tern as a result of direct mortality of a special-status  
21 species because they are not known to be present in areas of disturbance and because the  
22 probability of bird-powerline strikes is unlikely due to tern flight behaviors.

23 **Greater Sandhill Crane**

24 This section describes the effects of Alternative 4, including water conveyance facilities construction  
25 and implementation of other conservation components, on greater sandhill crane. Greater sandhill  
26 cranes in the study area are almost entirely dependent on privately owned agricultural lands for  
27 foraging. Long-term sustainability of the species is thus dependent on providing a matrix of  
28 compatible crop types that afford suitable foraging habitat and maintaining compatible agricultural  
29 practices, while sustaining and increasing the extent of other essential habitat elements such as  
30 night roosting habitat. The habitat model for greater sandhill crane includes “roosting and foraging”  
31 and “foraging” habitat. These habitat types include certain agricultural types, specific grassland  
32 types, irrigated pastures and hay crops, managed seasonal wetland, and other natural seasonal  
33 wetland. Roosting and foraging habitat includes known, traditional roost sites that also provide  
34 foraging habitat (BDCP Appendix 2.A *Covered Species Accounts*). Both temporary and permanent  
35 roost sites were identified for greater Sandhill crane. Permanent roosting and foraging sites are  
36 those used regularly, year after year, while temporary roosting and foraging sites are those used in  
37 some years. Factors included in assessing the loss of foraging habitat for the greater sandhill crane  
38 includes the relative habitat value of specific crop or land cover types, and proximity to known roost  
39 sites. Foraging habitat for greater sandhill crane included crop types and natural communities up to  
40 4 miles from known roost sites, within the boundary of the winter crane use area (BDCP Appendix  
41 2.A, *Covered Species Accounts*).

1 Construction and restoration associated with Alternative 4 conservation measures would result in  
2 both temporary and permanent losses of foraging and roosting habitat for greater sandhill crane as  
3 indicated in Table 12-4-28. Full implementation of Alternative 4 would also include the following  
4 conservation actions over the term of the BDCP to benefit the greater sandhill crane (BDCP Chapter  
5 3, Section 3.3, *Biological Goals and Objectives*).

- 6 • Protect at least 7,300 acres of high- to very high-value habitat for greater sandhill crane, with at  
7 least 80% maintained in very high-value types in any given year. This protected habitat will be  
8 within 2 miles of known roosting sites in CZs 3, 4, 5, and/or 6 and will consider sea level rise and  
9 local seasonal flood events, greater sandhill crane population levels, and the location of foraging  
10 habitat loss. Patch size of protected cultivated lands will be at least 160 acres (Objective  
11 GSHC1.1, associated with CM3).
- 12 • To create additional high-value greater sandhill crane winter foraging habitat, 10% of the  
13 habitat protected under Objective GSHC1.1 will involve acquiring low-value habitat or  
14 nonhabitat areas and converting it to high- or very high-value habitat. Created habitat will be  
15 within 2 miles of known roosting sites in CZs 3, 4, 5, and/or 6 and will consider sea level rise and  
16 local seasonal flood events, greater sandhill crane population levels, and the location of foraging  
17 habitat loss (Objective GSHC1.2, associated with CM3).
- 18 • Create at least 320 acres of managed wetlands in minimum patch sizes of 40 acres within the  
19 Greater Sandhill Crane Winter Use Area in CZs 3, 4, 5, or 6, with consideration of sea level rise  
20 and local seasonal flood events. The wetlands will be located within 2 miles of existing  
21 permanent roost sites and protected in association with other protected natural community  
22 types (excluding nonhabitat cultivated lands) at a ratio of 2:1 upland to wetland to provide  
23 buffers around the wetlands (Objective GSHC1.3, associated with CM3).
- 24 • Create at least two 90-acre wetland complexes within the Stone Lakes National Wildlife Refuge  
25 project boundary. The complexes will be no more than 2 miles apart and will help provide  
26 connectivity between the Stone Lakes and Cosumnes greater sandhill crane populations. Each  
27 complex will consist of at least three wetlands totaling at least 90 acres of greater sandhill crane  
28 roosting habitat, and will be protected in association with other protected natural community  
29 types (excluding nonhabitat cultivated lands) at a ratio of at least 2:1 uplands to wetlands (i.e.,  
30 two sites with at least 90 acres of wetlands each). One of the 90-acre wetland complexes may be  
31 replaced by 180 acres of cultivated lands (e.g., cornfields) that are flooded following harvest to  
32 support roosting cranes and provide highest-value foraging habitat, provided such substitution  
33 is consistent with the long-term conservation goals of Stone Lakes National Wildlife Refuge for  
34 greater sandhill crane. (Objective GSHC1.4, associated with CM10).
- 35 • Create an additional 95 acres of roosting habitat within 2 miles of existing permanent roost  
36 sites. The habitat will consist of active cornfields that are flooded following harvest to support  
37 roosting cranes and that provide highest-value foraging habitat. Individual fields will be at least  
38 40 acres and can shift locations throughout the Greater Sandhill Crane Winter Use Area, but will  
39 be sited with consideration of the location of roosting habitat loss and will be in place prior to  
40 roosting habitat loss (Objective GSCH1.5, associated with CM3).
- 41 • Protect at least 48,625 acres of cultivated lands that provide suitable habitat for covered and  
42 other native wildlife species (Objective CLNC1.1, associated with CM3).
- 43 • Target cultivated land conservation to provide connectivity between other conservation lands  
44 (Objective CLNC1.2, associated with CM3).

- Maintain and protect the small patches of important wildlife habitats associated with cultivated lands that occur in cultivated lands within the reserve system, including, water conveyance channels, grasslands, ponds, and wetlands (Objective CLNC1.3, associated with CM3).

As explained below, with the restoration and protection of these amounts of habitat, in addition to natural community enhancement and management commitments (including *CM12 Methylmercury Management*) and implementation of *AMM1-AMM7*, *AMM20 Greater Sandhill Crane*, *AMM27 Selenium Management*, and *AMM30 Transmission Line Design and Alignment Guidelines*, impacts on the greater sandhill crane would be less than significant for CEQA purposes.

**Table 12-4-28. Changes in Greater Sandhill Crane Modeled Habitat Associated with Alternative 4 (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	Roosting and Foraging - Permanent	0	0	8	8	NA	NA
	Roosting and Foraging - Temporary	29	29	16	16	NA	NA
	Foraging	2,699	2,699	961	961	NA	NA
<b>Total Impacts CM1</b>		<b>2,728</b>	<b>2,728</b>	<b>985</b>	<b>985</b>	<b>NA</b>	<b>NA</b>
CM2-CM18	Roosting and Foraging - Permanent	0	0	0	0	0	0
	Roosting and Foraging - Temporary	0	41	0	0	0	0
	Foraging	2,776	4,367	0	0	0	0
<b>Total Impacts CM2-CM18</b>		<b>2,776</b>	<b>4,408</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>Total Roosting/Foraging - Permanent</b>		<b>0</b>	<b>0</b>	<b>8</b>	<b>8</b>	<b>0</b>	<b>0</b>
<b>Total Roosting/Foraging - Temporary</b>		<b>29</b>	<b>70</b>	<b>16</b>	<b>16</b>	<b>0</b>	<b>0</b>
<b>Total Foraging</b>		<b>5,474</b>	<b>7,065</b>	<b>961</b>	<b>961</b>	<b>0</b>	<b>0</b>
<b>TOTAL IMPACTS</b>		<b>5,503</b>	<b>7,135</b>	<b>985</b>	<b>985</b>	<b>0</b>	<b>0</b>

<sup>a</sup> See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

1 **Impact BIO-69: Loss or Conversion of Habitat for and Direct Mortality of Greater Sandhill**  
2 **Crane**

3 Alternative 4 conservation measures would result in the combined permanent and temporary loss  
4 of up to 94 acres of modeled roosting and foraging habitat (70 acres of permanent loss, 24 acres of  
5 temporary loss) and 8,026 acres of foraging habitat for greater sandhill crane (7,065 of permanent  
6 loss, 961 acres of temporary loss; see Table 12-4-28). Conservation measures that would result in  
7 these losses are conveyance facilities and transmission line construction, and establishment and use  
8 of borrow and spoil areas (CM1), Tidal Natural Communities Restoration (CM4), Grassland Natural  
9 Community Restoration (CM8), Nontidal Marsh Natural Community Restoration (CM10), and  
10 Natural Communities Enhancement and Management (CM11). The majority of habitat loss would  
11 result from water conveyance facility construction and conversion of habitat to tidal natural  
12 communities through CM4. Habitat enhancement and management activities through CM11, which  
13 include ground disturbance or removal of nonnative vegetation, could also result in local adverse  
14 habitat effects. In addition, maintenance activities associated with the long-term operation of the  
15 water conveyance facilities and other BDCP physical facilities could degrade or eliminate greater  
16 sandhill crane modeled habitat. Each of these individual activities is described below. A summary  
17 statement of the combined impacts, NEPA effects and a CEQA conclusion follow the individual  
18 conservation measure discussions.

- 19 • *CM1 Water Facilities and Operation:* Construction of Alternative 4 conveyance facilities as they  
20 are currently designed would result in the combined permanent loss of up to 2,728 acres of  
21 modeled greater sandhill crane habitat. This would consist of the permanent removal of 29  
22 acres of temporary roosting and foraging habitat, and 2,699 acres of foraging habitat. Foraging  
23 habitat that would be permanently impacted by CM1 would consist of 2,138 acres of very high-  
24 value, 169 acres of high-value, and 365 acres of medium-value foraging habitat (Table 12-4-29).  
25 In addition, 8 acres of permanent roosting and foraging habitat, 16 acres of temporary roosting  
26 and foraging habitat, and 961 acres of foraging habitat would be temporarily removed (Table  
27 12-4-29). The temporarily removed habitat would consist primarily of cultivated lands and it  
28 would be restored within one year following construction. However, it would not necessarily be  
29 restored to its original topography and it could be restored as grasslands in the place of  
30 cultivated lands. CM1 activities that would result in temporary impacts would include  
31 temporary access roads, borrow and spoil sites, and work areas for construction.

32 The acres of temporary and permanent roosting and foraging habitat that would be removed is  
33 located on Staten Island, Zacharias Island, Bouldin Island, and Venice Island and the losses  
34 would be a result of installation of permanent and temporary transmission lines and associated  
35 access roads. However, the implementation of *AMM20 Greater Sandhill Crane* would require that  
36 CM1 activities be designed to avoid direct loss of crane roost sites. This includes a provision that  
37 the final transmission line alignment would be designed to avoid crane roost sites. Avoidance of  
38 crane roost sites would be accomplished either by siting activities outside of identified roost  
39 sites or by relocating the roost site if it consisted of cultivated lands (roost sites consisting of  
40 wetlands would not be subject to re-location). Relocated roost sites would be established prior  
41 to construction activities affecting the original roost site (as described in *AMM20 Greater*  
42 *Sandhill Crane*, BDCP Appendix 3.C). Therefore there would be no loss of crane roosting and  
43 foraging habitat as a result of water conveyance facility construction once the facilities were  
44 fully designed. The potential for injury and direct mortality from electrical transmission  
45 facilities is addressed below under Impact BIO-70.

1 Approximately 2,347 acres of the permanent loss of foraging habitat would be from the storage  
 2 of reusable tunnel material. This material would likely be moved to other sites for use in levee  
 3 build-up and restoration, and the affected area would likely eventually be restored. While this  
 4 effect is categorized as permanent because there is no assurance that the material would  
 5 eventually be moved, the effect would likely be temporary. The actual footprint of the storage  
 6 areas required for reusable tunnel material is flexible, and the actual acreage of habitat affected  
 7 by this activity could be reduced based on the height of the storage piles in addition to other  
 8 considerations. The implementation of *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel*  
 9 *Material, and Dredged Material*, would require that the areas used for reusable tunnel material  
 10 storage be minimized in crane foraging habitat and completely avoid crane roost sites.

11 Staten Island is among the most significant crane use areas in the Delta (Littlefield and Ivey  
 12 2000) and approximately 1,257 acres of the foraging habitat permanently lost would be from  
 13 storage of reusable tunnel material on Staten Island. As described above, AMM6 would require  
 14 that the actual footprint of this impact be minimized in crane foraging habitat. Specifically,  
 15 AMM6 would require that reusable tunnel material storage on Staten Island be sized and located  
 16 in coordination with greater sandhill crane experts, USFWS, and CDFW to reduce potential  
 17 effects on greater sandhill crane. *AMM20 Greater Sandhill Crane* includes specific measures to  
 18 reduce potential effects of construction on greater sandhill cranes on Staten Island. A conveyor  
 19 belt located down the center of Staten Island would convey RTM from the tunnel to the RTM  
 20 storage area at the south end of the island. This would potentially minimize the disturbance of  
 21 increased truck traffic for RTM disposal although the effects of the conveyor belt on sandhill  
 22 cranes cannot be directly quantified. The effects of noise and visual disturbance from CM1  
 23 construction activities are discussed under Impact BIO-71. Refer to the Terrestrial Biology Map  
 24 Book for a detailed view of Alternative 4 construction locations. Impacts from CM1 would occur  
 25 within the first 10 years of Alternative 4 implementation.

26 **Table 12-4-29. Value of Greater Sandhill Crane Foraging Habitat affected by Alternative 4**

Foraging Habitat		Acres Affected by CM1 permanent (temporary)	Acres Affected by CM2–CM18 permanent (temporary)
Value Class	Land Cover Type		
Very high	Corn, rice	2,138 (209)	525 (0)
High	Alfalfa and alfalfa mixtures, mixed pasture, native pasture, wheat, other pasture, irrigated pasture, managed wetlands, native vegetation	169 (263)	1,732 (0)
	Grain and hay crops, miscellaneous grain and hay, mixed grain and hay, nonirrigated mixed grain and hay, other grain crops, miscellaneous grasses, grassland, alkali seasonal wetlands, vernal pool complex		
Medium	Other irrigated crops, idle cropland, blueberries, asparagus, clover, cropped within the last 3 years, grain sorghum, green beans, miscellaneous truck, miscellaneous field, new lands being prepped for crop production, nonirrigated mixed pasture, nonirrigated native pasture, onions, garlic, peppers, potatoes, safflower, sudan, sugar beets, tomatoes (processing), melons squash and cucumbers all types, artichokes, beans (dry)	365 (244)	1,018 (0)
Low		17 (216)	1,069 (0)
None	Vineyards, orchards	12 (29)	23 (0)

- 1       • *CM4 Tidal Natural Communities Restoration*: Based on the hypothetical tidal restoration  
2 footprint, this activity would result in the permanent loss or conversion of approximately 2,754  
3 acres of greater sandhill crane habitat, consisting of 41 acres of temporary roosting and foraging  
4 habitat and 2,713 acres of foraging habitat. Loss of foraging habitat from CM4 would consist of  
5 78 acres of very high-value, 1,199 acres of high value, 855 acres of medium-value, and 558 acres  
6 of low-value foraging habitat (Table 12-4-29). This loss would occur in the Cosumnes-Mokelumne  
7 River and West Delta ROAs. Tidal wetland restoration in CZ 4 could occur between the high  
8 crane use areas of the central Delta and the Cosumnes River Preserve. However, the conversion  
9 of grasslands and cultivated lands to tidal wetlands would not prohibit crane movement or  
10 reduce use of these areas. In CZ 5, loss of modeled habitat would occur along the western edge of  
11 the greater sandhill crane winter use area and therefore would not result in fragmentation of  
12 traditional crane habitats. Therefore fragmentation of habitat from tidal restoration activities  
13 would be expected to be minimal. Approximately 1,951 acres of foraging habitat would be  
14 impacted within the first 10 years of Alternative 4 implementation.
- 15       • *CM8 Grassland Natural Community Restoration*: Approximately 300 acres of cultivated lands that  
16 provide foraging habitat for greater sandhill crane would be converted to grassland by the late  
17 long-term timeframe. No roosting/foraging habitat would be impacted by grassland restoration  
18 activities. The restored grasslands would continue to provide foraging habitat value for the  
19 greater sandhill crane. Approximately 257 acres would be impacted within the first 10 years of  
20 Alternative 4 implementation.
- 21       • *CM10 Nontidal Marsh Restoration*: Nontidal marsh restoration would result in the permanent  
22 conversion of approximately 1,350 acres of modeled foraging habitat for the greater sandhill  
23 crane. A portion of the restored nontidal marsh would be expected to continue to provide  
24 roosting and foraging habitat value for the greater sandhill crane. However, some of this  
25 restored marsh would be unsuitable as it would lack emergent vegetation and consist of open  
26 water that would be too deep to provide suitable roosting or foraging habitat. Approximately  
27 567 acres of habitat would be converted to nontidal marsh within the first 10 years of  
28 Alternative 4 implementation.
- 29       • *CM11 Natural Communities Enhancement and Management*: A variety of habitat management  
30 actions included in CM11 that are designed to enhance wildlife values in restored or protected  
31 habitats could result in localized ground disturbances that could temporarily remove small  
32 amounts of modeled habitat. Ground-disturbing activities, such as removal of nonnative  
33 vegetation and road and other infrastructure maintenance activities, would be expected to have  
34 minor adverse effects on available habitat and would be expected to result in overall  
35 improvements to and maintenance of habitat values over the term of the BDCP. The potential for  
36 these activities to result in direct mortality of greater sandhill crane would be minimized with  
37 the implementation of *AMM20 Greater Sandhill Crane*. CM11 would also include the construction  
38 of recreational-related facilities including trails, interpretive signs, and picnic tables (BDCP  
39 Chapter 4, *Covered Activities and Associated Federal Actions*). The construction of trailhead  
40 facilities, signs, staging areas, picnic areas, bathrooms, etc. would be placed on existing,  
41 disturbed areas when and where possible. If new ground disturbance was necessary, greater  
42 sandhill crane habitat would be avoided, with the exception of a permanent loss of 4 acres of  
43 grassland foraging habitat (1 acre of which would be impacted within the first 10 years of  
44 Alternative 4 implementation).
- 45       • *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground  
46 water conveyance facilities and restoration infrastructure could result in ongoing but periodic

1 disturbances that could affect greater sandhill crane use of the surrounding habitat.  
2 Maintenance activities would include vegetation management, levee and structure repair, and  
3 re-grading of roads and permanent work areas. These effects, could be adverse as sandhill  
4 cranes are sensitive to disturbance. However, potential impacts would be reduced by AMMs and  
5 conservation actions as described below.

- 6 • Injury and Direct Mortality: Construction-related activities would not be expected to result in  
7 direct mortality of greater sandhill crane if they were present in the study area, because they  
8 would be expected to avoid contact with construction and other equipment. Potential effects  
9 would be avoided and minimized with the implementation of *AMM20 Greater Sandhill Crane*.  
10 The potential for injury and direct mortality from electrical transmission facilities is discussed  
11 below under Impact BIO-70.

12 The following paragraphs summarize the combined effects discussed above and describe other  
13 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also  
14 included.

### 15 ***Near-Term Timeframe***

16 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
17 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
18 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
19 effects of construction would not be adverse under NEPA. Based on current design footprints,  
20 Alternative 4 would remove 53 acres roosting and foraging habitat (29 acres of permanent loss, 24  
21 acres of temporary loss) in the study area in the near-term. These effects would result from the  
22 construction of the water conveyance facilities (CM1). In addition, 6,436 acres of foraging habitat  
23 would be removed or converted in the near-term (CM1, 3,660 acres; *CM4 Tidal Natural Communities*  
24 *Restoration*, *CM8 Grassland Natural Community Restoration*, and *CM11 Natural Communities*  
25 *Enhancement and Management—2,776 acres*). Of these near-term acres of foraging habitat impact,  
26 5,315 acres would be moderate- to very high-value habitat (CM1, 3,388 acres, CM4-11, 1,927 acres).

27 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by  
28 CM1 and that are identified in the biological goals and objectives for greater sandhill crane in  
29 Chapter 3 of the BDCP would be 1:1 protection and 1:1 restoration for loss of roost sites and 1:1  
30 protection of high- to very high-value foraging habitat for loss of moderate- to very high-value  
31 foraging habitat. Using these ratios would indicate that 53 acres of greater sandhill crane roosting  
32 habitat should be restored/created and 53 acres should be protected to compensate for the CM1  
33 losses of greater sandhill crane roosting and foraging habitat. In addition, 3,660 acres of high- to  
34 very high-value foraging habitat should be protected to mitigate the CM1 losses of greater sandhill  
35 crane moderate- to very high-value foraging habitat. The near-term effects of other conservation  
36 actions would remove 1,927 acres of moderate- to very high-value foraging habitat, and therefore  
37 require 1,927 acres of protection of high- to very high-value foraging habitat using the same typical  
38 NEPA and CEQA ratios (1:1 restoration and 1:1 protection for the loss of roosting and foraging  
39 habitat; 1:1 protection for the loss of foraging habitat).

40 The implementation of *AMM20 Greater Sandhill Crane* would require that no greater sandhill crane  
41 roost sites were directly impacted by CM1 covered activities (including transmission lines and their  
42 associated footprints). Therefore there would be no loss of crane roosting and foraging habitat as a  
43 result of water conveyance facility construction once the facilities were fully designed, which would  
44 avoid the CM1 impact on 53 acres of roosting and foraging habitat once the project design is final.

1 Indirect effects of construction-related noise and visual disturbance are discussed below under  
2 Impact BIO-71.

3 The BDCP has committed to near-term goals of creating 500 acres of managed wetlands and  
4 protecting 15,600 acres of cultivated lands in the Plan Area (Table 3-4 in Chapter 3, *Description of*  
5 *Alternatives*). These conservation actions are associated with CM3 and CM10 and would occur in the  
6 same timeframe as the construction and early restoration losses.

7 Up to 95 acres of roosting habitat would be created within 2 miles of existing permanent roost sites  
8 (Objective GSHC1.5). These roosts would consist of active cornfields that are flooded following  
9 harvest to support roosting cranes and also provide the highest-value foraging habitat for the  
10 species. Individual fields would be at least 40 acres could shift locations throughout the Greater  
11 Sandhill Crane Winter Use Area, and would be in place prior to roosting habitat loss. Of the 500  
12 acres of managed wetlands to be created for roosting habitat, 320 acres would be created in  
13 minimum patch sizes of 40 acres within the Greater Sandhill Crane Winter Use Area in CZs 3, 4, 5, or  
14 6 (Objective GSHC1.3). Restoration sites would be identified with consideration of sea level rise and  
15 local seasonal flood events. These wetlands would be created within 2 miles of existing permanent  
16 roost sites and protected in association with other protected natural community types at a ratio of  
17 2:1 upland to wetland habitat to provide buffers that will protect cranes from the types of  
18 disturbances that would otherwise result from adjacent roads and developed areas (e.g., roads,  
19 noise, visual disturbance, lighting). The remaining 180 acres of crane roosting habitat would be  
20 constructed within the Stone Lakes NWR project boundary (BDCP Chapter 3, Figure 3.3-6) and  
21 would be designed to provide connectivity between the Stone Lakes and Cosumnes greater sandhill  
22 crane populations (Objective GSHC1.4). The large patch sizes of these wetland complexes would  
23 provide additional conservation to address the threats of vineyard conversion, urbanization to the  
24 east, and sea level rise to the west of greater sandhill crane wintering habitat.

25 At least 15,600 acres of cultivated lands that provide habitat for covered and other native wildlife  
26 species would be protected in the near-term time period (Objective CLNC1.1). Mitigation Measure  
27 BIO-69a would be available to guide the near-term protection of cultivated lands to ensure that the  
28 near-term impacts of moderate- to very high-value habitat for greater sandhill crane were  
29 compensated for with appropriate crop types and natural communities.

30 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
31 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
32 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
33 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
34 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
35 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
36 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

### 37 **Late Long-Term Timeframe**

38 The study area supports approximately 23,919 acres of roosting and foraging habitat and 164,676  
39 acres of foraging habitat for greater sandhill crane. Alternative 4 as a whole would result in the  
40 permanent loss of and temporary effects on 94 acres of roosting and foraging habitat (less than 1%  
41 of the total habitat in the study area) and 8,026 acres of foraging habitat (5% of the total habitat in  
42 the study area) for the greater sandhill crane during the term of the Plan. The foraging habitat lost  
43 by the late long-term timeframe would consist of 6,663 acres of medium- to very high-value foraging  
44 habitat. The locations of these losses are described above in the analyses of individual conservation

1 measures. The implementation of *AMM20 Greater Sandhill Crane* would require that no roost sites  
2 were directly affected by water conveyance facilities including transmission lines and associated  
3 footprints. In addition, temporarily removed habitat would be restored within 1 year following  
4 construction. However, it would not necessarily be restored to its original topography and it could  
5 result in the conversion of cultivated lands to grasslands.

6 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*  
7 *Restoration* and *CM10 Nontidal Marsh Restoration* to restore or create at least 595 acres of greater  
8 Sandhill crane roost habitat (Objectives GSHC1.3, GSHC1.4, and GSHC1.5) and to protect at least  
9 7,300 acres of high- to very high-value foraging habitat for greater Sandhill crane (Objective  
10 GSHC1.1).

11 Of the 500 acres of managed wetlands to be created for roosting habitat, 320 acres would be created  
12 in minimum patch sizes of 40 acres within the Greater Sandhill Crane Winter Use Area in CZs 3, 4, 5,  
13 or 6 (Objective GSHC1.3). Restoration sites would be identified with consideration of sea level rise  
14 and local seasonal flood events. These wetlands would be created within 2 miles of existing  
15 permanent roost sites and protected in association with other protected natural community types at  
16 a ratio of 2:1 upland to wetland habitat to provide buffers that will protect cranes from the types of  
17 disturbances that would otherwise result from adjacent roads and developed areas (e.g., roads,  
18 noise, visual disturbance, lighting). The remaining 180 acres of crane roosting habitat would be  
19 constructed within the Stone Lakes NWR project boundary (BDCP Chapter 3, Figure 3.3-6) and  
20 would be designed to provide connectivity between the Stone Lakes and Cosumnes greater sandhill  
21 crane populations (Objective GSHC1.4). These wetlands would consist of two 90-acre wetland  
22 complexes each consisting of at least three wetlands and would be no more than 2 miles apart. The  
23 large patch sizes of these wetland complexes would provide additional conservation to address the  
24 threats of vineyard conversion, urbanization to the east, and sea level rise to the west of greater  
25 sandhill crane wintering habitat. Approximately 95 acres of roosting habitat would be created  
26 within 2 miles of existing permanent roost sites (Objective GSHC1.5). These roosts would consist of  
27 active cornfields that are flooded following harvest to support roosting cranes and also provide the  
28 highest-value foraging habitat for the species. Individual fields would be at least 40 acres could shift  
29 locations throughout the Greater Sandhill Crane Winter Use Area, but would be sited with  
30 consideration of the location of roosting habitat loss and would be in place prior to roosting habitat  
31 loss.

32 The BDCP has committed to protecting 7,300 acres of high- to very high-value greater sandhill crane  
33 foraging habitat by the late long-term timeframe with at least 80% maintained in very-high value  
34 types in any given year (Objective GSHC1.1). These acres of protected foraging habitat would be  
35 located within 2 miles of known roosting sites in CZs 3, 4, 5, and/or 6 and would consider sea level  
36 rise and local seasonal flood events, greater Sandhill crane population levels, and the location of  
37 foraging habitat loss. The patch size of these protected lands would be at least 160 acres (Objectives  
38 GSHC1.1 and GSHC1.2). Because agricultural habitat values change over time based largely on  
39 economically driven agricultural practices, protecting crane habitat would provide enhanced  
40 stability to agricultural habitat value within the crane use area that does not currently exist.

41 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
42 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
43 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
44 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
45 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or

1 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
2 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

3 ***CEQA Conclusion:***

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20 foraging habitat. Using these ratios would indicate that 53 acres of greater roosting habitat should  
21 be restored/created and 53 acres should be protected to compensate for the CM1 losses of greater  
22 sandhill crane roosting and foraging habitat. In addition, 3,660 acres of high- to very high-value  
23 foraging habitat should be protected to mitigate the CM1 losses of greater sandhill crane moderate-  
24 to very high-value foraging habitat. The near-term effects of other conservation actions would  
25 remove 1,927 acres of moderate- to very high-value foraging habitat, and therefore require 1,927  
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23 foraging habitat by the late long-term timeframe with at least 80% maintained in very-high value  
24 types in any given year (Objective GSHC1.1). These acres of protected foraging habitat would be  
25 located within 2 miles of known roosting sites in CZs 3, 4, 5, and/or 6 and would consider sea level  
26 rise and local seasonal flood events, greater Sandhill crane population levels, and the location of  
27 foraging habitat loss. The patch size of these protected lands would be at least 160 acres (Objectives  
28 GSHC1.1 and GSHC1.2). Because agricultural habitat values change over time based largely on  
29 economically driven agricultural practices, protecting crane habitat would provide enhanced  
30 stability to agricultural habitat value within the crane use area that does not currently exist.

31 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
32 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
33 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
34 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
35 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
36 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
37 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

38 Considering Alternative 4's protection and restoration provisions, in addition to Mitigation Measure  
39 BIO-69a, which would compensate for the loss of medium- to very high-value foraging habitat at a  
40 ratio of 1:1 prior to or concurrent with impacts, loss of habitat and direct mortality through  
41 implementation of Alternative 4 would not result in a substantial adverse effect through habitat  
42 modifications and would not substantially reduce the number or restrict the range of the species.  
43 Therefore, the alternative would have a less-than-significant impact on greater sandhill crane.

1           **Mitigation Measure BIO-69a: Compensate for the Loss of Medium- to Very High-Value**  
2           **Greater Sandhill Crane Foraging Habitat**

3           DWR must compensate for loss of greater sandhill crane medium to very high-value foraging  
4           habitat at a ratio of 1:1 by protecting or managing high- to very high-value habitat in the Plan  
5           Area. Compensation must occur prior to or concurrent with the impacts, to minimize the effects  
6           of habitat loss. The crop types and natural communities that are included in foraging habitat  
7           value categories are listed in Table 12-4-29. Foraging habitat conservation must occur within  
8           the greater sandhill crane winter use area and the location of protected habitat or conservation  
9           easements must be preapproved by the USFWS and CDFW.

10           **Impact BIO-70: Effects on Greater Sandhill Crane Associated with Electrical Transmission**  
11           **Facilities**

12           Greater sandhill cranes are susceptible to collision with power lines and other structures during  
13           periods of inclement weather and low visibility (Avian Power Line Interaction Committee 1994,  
14           Brown and Drewien 1995, Manville 2005). New transmission lines installed in the study area would  
15           increase the risk for bird-power line strikes, which could result in injury or mortality of greater  
16           sandhill cranes. Both permanent and temporary electrical transmission lines would be constructed  
17           to supply construction and operational power to BDCP facilities. Typically, higher-voltage (230-  
18           kilovolt [kV]) lines vary in height from 90 to 110 feet, while “sub” transmission (69-kV) lines vary  
19           from 50 to 70 feet (Avian Power Line Interaction Committee 2006). The Alternative 4 alignment  
20           would require the installation of both permanent and temporary transmission lines extending north  
21           and south through much of the crane use area. In addition, a transmission line would be constructed  
22           between the cities of Hood and Locke eastward toward SR 99 which would require the installation  
23           of approximately 17 miles of permanent transmission line (10 miles of 230-kV line and 7 miles of  
24           69-kV line) and approximately 46 miles (21 miles of 230-kV line and 25 miles of 69-kV line) of  
25           temporary transmission line. The temporary transmission lines that would be constructed on Staten  
26           Island would occur within the highest birdstrike risk area in the study area as Staten Island is one of  
27           the most important wintering sites for greater sandhill cranes in the Delta. Temporary lines would  
28           be removed after construction of the water conveyance facilities, within 10 years.

29           Existing transmission lines in the sandhill crane winter use area include a network of distribution  
30           lines that are between 11- and 22-kV. In addition, there are two 115-kV lines (one that overlaps with  
31           the winter use area between Antioch and I-5 east of Hood, and one that crosses the northern tip of  
32           the crane winter use area north of Clarksburg); and 69-kV lines that parallel Twin Cities Road,  
33           Herzog Road, Lambert Road, and the Southern Pacific Dredge Cut in the vicinity of Stone Lakes  
34           National Wildlife Refuge. At the south end of the winter use area, there are three 230-kV  
35           transmission lines that follow I-5, and then cut southwest through Holt, and two 500-kV lines cross  
36           the southwestern corner of the winter use area. This existing network of power lines in the study  
37           currently poses a risk for sandhill cranes, as both distribution and transmission lines cross over or  
38           surround sandhill crane roost sites in the study area. New transmission lines would increase this  
39           risk and have an adverse effect on the species in the absence of other conservation actions.

40           As described in BDCP Appendix 5.J, Attachment 5J.C, *Analysis of Potential Bird Collisions at Proposed*  
41           *BDCP Powerlines*, the potential mortality of greater sandhill crane in the area of the proposed  
42           transmission lines was estimated using collision mortality rates by Brown and Drewien (1995) and  
43           an estimate of potential crossings along the proposed lines. Results indicate that in the absence of  
44           any line marking to increase visibility and reduce collision risk (i.e., without minimization

1 measures), the average annual mortality of greater sandhill crane at permanent lines would be up to  
2 18 fatalities per year and would be 120 fatalities per year at temporary lines.

3 Marking transmission lines with devices that make the lines more visible to birds has been shown to  
4 dramatically reduce the incidence of bird mortality, including for sandhill cranes. Brown and  
5 Drewien (1995) estimated that marking devices in the Central Valley would reduce crane mortality  
6 by 66%. Using this assumption, by incorporating line-marking devices into the designs the annual  
7 mortality rate would be estimated to decrease to 7 fatalities per year for the permanent lines and 41  
8 fatalities per year for the temporary lines.

9 The current proposed transmission line alignment under Alternative 4 is not fully designed, and line  
10 locations are not final. The implementation of *AMM20 Greater Sandhill Crane* would require that the  
11 final transmission line alignment would not result in a net increase in bird strike risk to greater  
12 sandhill cranes in the Plan Area. This would be achieved by implementing any combination of the  
13 following: (1) siting new transmission lines in lower bird strike risk zones; (2) removing, relocating  
14 or undergrounding existing lines; (3) installing flight diverters on existing lines in the crane winter  
15 use area; and/or (4) for areas outside of the Stone Lakes National Wildlife Refuge project boundary,  
16 shifting locations of flooded areas that provide crane roosts to lower risk areas. This would be  
17 expected to reduce existing mortality and thus fully offset the overall population effects of new  
18 transmission lines. Designing the alignment to minimize risk and removing, relocating, or  
19 undergrounding existing lines would be given priority out of the above methods. With these  
20 measures, and considering that the temporary lines would be removed within the first 10 years of  
21 Alternative 4 implementation, the risk of greater sandhill crane mortality from transmission lines  
22 would be reduced substantially.

23 **CEQA Conclusion:** Sandhill cranes are known to be susceptible to collision with overhead wires. The  
24 existing network of power lines in the study area currently poses a risk for sandhill cranes. New  
25 transmission lines would increase the risk for bird-power line strikes, which could result in injury or  
26 mortality of greater sandhill crane. By incorporating line-marking devices on new transmission lines  
27 the estimated mortality rate would be 7 fatalities per year from permanent transmission lines and  
28 41 fatalities per year from temporary transmission lines. The current proposed transmission line  
29 alignment under Alternative 4 is not fully designed, and line locations are not final. The  
30 implementation of *AMM20 Greater Sandhill Crane* would require that the final transmission line  
31 alignment avoided crane roost sites and achieved no net increase of greater sandhill crane strike  
32 risk in the Plan Area. With *AMM20 Greater Sandhill Crane*, and considering that the temporary lines  
33 would be removed within the first 10 years of Alternative 4 implementation, the risk of mortality  
34 from collision with transmission lines would result in a less-than-significant impact on the greater  
35 sandhill crane population.

### 36 **Impact BIO-71: Indirect Effects of Plan Implementation on Greater Sandhill Crane**

37 **Indirect construction-and operation-related effects:** Sandhill cranes are sensitive to disturbance.  
38 Noise and visual disturbances from the construction of water conveyance facilities and other  
39 conservation measures could reduce greater sandhill crane use of modeled habitat adjacent to work  
40 areas. Indirect effects associated with construction include noise, dust, and visual disturbance  
41 caused by grading, filling, contouring, and other ground-disturbing operations outside the project  
42 footprint but within 1,300 feet of the construction edge. Furthermore, maintenance of the  
43 aboveground water conveyance facilities could result in ongoing but periodic postconstruction noise  
44 and visual disturbances that could affect greater sandhill crane use of surrounding habitat. These

1 effects could result from periodic vehicle use along the conveyance corridor, inspection and  
2 maintenance of aboveground facilities, and similar activities. These potential effects would be  
3 minimized with implementation of *AMM20 Greater Sandhill Crane* described in BDCP Appendix 3.C,  
4 *Avoidance and Minimization Measures*.

5 The BDCP includes an analysis of the indirect effects of noise and visual disturbance that would  
6 result from the construction of the Alternative 4 water conveyance facilities on greater sandhill  
7 crane (BDCP Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of the BDCP*  
8 *Conveyance Facility on Sandhill Crane*). The analysis addressed the potential noise effects on cranes,  
9 and concluded that as much as 13,421-43,125 acres of crane habitat could potentially be affected by  
10 general construction noise above baseline level (50–60 dBA). This would include 666 – 3,274 acres  
11 of permanent crane roosting habitat, 1,498 – 5,036 acres of temporary crane roosting habitat, and  
12 11,258 – 34,816 acres of crane foraging habitat. In addition, 120 - 668 acres of permanent crane  
13 roosting habitat, 477 – 1,562 acres of temporary crane roosting habitat, and 1,392 – 11,882 acres of  
14 crane foraging habitat could be affected by noise from pile driving that would be above baseline  
15 level (50–60 dBA, Table 12-4-30). The analysis was conducted based on the assumption that there  
16 would be direct line-of-sight from sandhill crane habitat areas to the construction site, and,  
17 therefore, provides a worst-case estimate of effects. In many areas the existing levees would  
18 partially or completely block the line-of-sight and would function as effective noise barriers,  
19 substantially reducing noise transmission. However, there is insufficient data to assess the effects  
20 that increased noise levels would have on sandhill crane behavior.

21 **Table 12-4-30. Greater Sandhill Crane Habitat Affected By General Construction and Pile Driving**  
22 **Noise Under Alternative 4 (acres)**

Habitat Type	General Construction		Pile Driving	
	Above 60 dBA	Above 50 dBA	Above 60 dBA	Above 50 dBA
Permanent Roosting	666	3,274	120	668
Temporary Roosting	1,498	5,036	477	1,562
Foraging	11,258	34,816	1,392	11,882
Total Habitat	13,421	43,125	1,989	14,111

23  
24 Evening and nighttime construction activities would require the use of extremely bright lights.  
25 Nighttime construction could also result in headlights flashing into roost sites when construction  
26 vehicles are turning onto or off of construction access routes. Proposed surge towers would require  
27 the use of safety lights that would alert low-flying aircraft to the presence of these structures  
28 because of their height. Little data is available on the effects of impact of artificial lighting on  
29 roosting birds. Direct light from automobile headlights has been observed to cause roosting cranes  
30 to flush and it is thought that they may avoid roosting in areas where lighting is bright (BDCP  
31 Chapter 5, *Effects Analysis*). If the birds were to roost in a brightly lit site, they may be vulnerable to  
32 sleep-wake cycle shifts and reproductive cycle shifts. Potential risks of visual impacts from lighting  
33 include a reduction in the cranes' quality of nocturnal rest, and effects on their sense of photo-period  
34 which might cause them to shift their physiology towards earlier migration and breeding (BDCP  
35 Chapter 5, *Effects Analysis*). Effects such as these could prove detrimental to the cranes' overall  
36 fitness and reproductive success (which could in turn have population-level impacts). A change in  
37 photo-period interpretation could also cause cranes to fly out earlier from roost sites to forage and

1 might increase their risk of power line collisions if they were to leave roosts before dawn (BDCP  
2 Chapter 5, *Effects Analysis*).

3 The effects of noise and visual disturbance on greater sandhill crane would be minimized through  
4 the implementation of *AMM20 Greater Sandhill Crane* (BDCP Appendix 3.C, *Avoidance and*  
5 *Minimization Measures*). Activities within 0.75 mile of crane roosting habitat would reduce  
6 construction noise during night time hours (from one hour before sunset to one hour after sunrise)  
7 such that construction noise levels do not exceed 50 dBA  $L_{eq}$  (1 hour) at the nearest temporary or  
8 permanent roosts during periods when the roost sites are available (flooded). In addition, the area  
9 of crane foraging habitat that would be affected during the day (from one hour after sunrise to one  
10 hour before sunset) by construction noise exceeding 50 dBA  $L_{eq}$  (1 hour) would also be minimized.  
11 Unavoidable noise related effects would be compensated for by the enhancement of 0.1 acre of  
12 foraging habitat for every acre indirectly affected within the 50 dBA  $L_{eq}$  (1 hour) construction noise  
13 contour. With these measures in place, indirect effects of noise and visual disturbance from  
14 construction activities are not expected to reduce the greater sandhill crane population in the study  
15 area.

16 The use of mechanical equipment during water conveyance facilities construction could cause the  
17 accidental release of petroleum or other contaminants that could affect greater sandhill crane in the  
18 surrounding habitat. The inadvertent discharge of sediment or excessive dust adjacent to greater  
19 sandhill crane habitat could also affect the species. AMM1–AMM7, including *AMM2 Construction Best*  
20 *Management Practices and Monitoring*, would minimize the likelihood of such spills and ensure that  
21 measures were in place to prevent runoff from the construction area and negative effects of dust on  
22 foraging habitat.

23 **Methylmercury Exposure:** Covered activities have the potential to exacerbate bioaccumulation of  
24 mercury in covered species, including greater sandhill crane. Marsh (tidal and nontidal) and  
25 floodplain restoration also have the potential to increase exposure to methylmercury. Mercury is  
26 transformed into the more bioavailable form of methylmercury in aquatic systems, especially areas  
27 subjected to regular wetting and drying such as tidal marshes and flood plains. Thus, BDCP  
28 restoration activities that create newly inundated areas could increase bioavailability of mercury  
29 (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Increased methylmercury  
30 associated with natural community and floodplain restoration may indirectly affect greater sandhill  
31 crane via uptake in lower trophic levels (BDCP Appendix 5.D, *Contaminants*). In general, the highest  
32 methylation rates are associated with high tidal marshes that experience intermittent wetting and  
33 drying and associated anoxic conditions (Alpers et al. 2008). The potential mobilization or creation  
34 of methylmercury within the study area varies with site-specific conditions and would need to be  
35 assessed at the project level. *CM12 Methylmercury Management* includes provisions for project-  
36 specific Mercury Management Plans. Along with avoidance and minimization measures and adaptive  
37 management and monitoring, *CM12 Methylmercury Management* would be available to address the  
38 uncertainty of methylmercury levels in restored tidal marsh and potential impacts on greater  
39 sandhill crane. The potential indirect effects of increased mercury exposure is likely low for greater  
40 sandhill crane for the following reasons: 1) greater sandhill cranes occur in the study area only  
41 during the nonbreeding winter months, 2) their primary foraging habitats in the study area are  
42 cultivated crops, and 3) the use of restored tidal wetlands by cranes is likely to be limited compared  
43 to seasonal managed wetlands.

44 **Selenium:** Selenium is an essential nutrient for avian species and has a beneficial effect in low  
45 doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009, Ohlendorf

1 and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults, and can also  
2 result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz 2009). The  
3 effect of selenium toxicity differs widely between species and also between age and sex classes  
4 within a species. In addition, the effect of selenium on a species can be confounded by interactions  
5 with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith 2009).

6 The primary source of selenium bioaccumulation in birds is through their diet (Ackerman and  
7 Eagles-Smith 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the  
8 trophic level at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At  
9 Kesterson Reservoir in the San Joaquin Valley, selenium concentrations in invertebrates have been  
10 found to be two to six times the levels in rooted plants. Furthermore, bivalves sampled in the San  
11 Francisco Bay contained much higher selenium levels than crustaceans such as copepods (Stewart et  
12 al. 2004). Studies conducted at the Grasslands in Merced County recorded higher selenium levels in  
13 black-necked stilts which feed on aquatic invertebrates than in mallards and pintails, which are  
14 primarily herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which  
15 forage on bivalves) have much higher levels of selenium levels than shorebirds that prey on aquatic  
16 invertebrates (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high  
17 levels of selenium have a higher risk of selenium toxicity.

18 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations  
19 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to  
20 exacerbate bioaccumulation of selenium in avian species, including greater sandhill crane. Marsh  
21 (tidal and nontidal) and floodplain restoration have the potential to mobilize selenium, and  
22 therefore increase avian exposure from ingestion of prey items with elevated selenium levels. Thus,  
23 BDCP restoration activities that create newly inundated areas could increase bioavailability of  
24 selenium (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Changes in  
25 selenium concentrations were analyzed in Chapter 8, *Water Quality*, and it was determined that,  
26 relative to Existing Conditions and the No Action Alternative, CM1 would not result in substantial,  
27 long-term increases in selenium concentrations in water in the Delta under any alternative.  
28 However, it is difficult to determine whether the effects of potential increases in selenium  
29 bioavailability associated with restoration-related conservation measures (CM4, CM5) would lead to  
30 adverse effects on greater sandhill crane.

31 Because of the uncertainty that exists at this programmatic level of review, there could be a  
32 substantial effect on greater sandhill crane from increases in selenium associated with restoration  
33 activities. This effect would be addressed through the implementation of *AMM27 Selenium*  
34 *Management* (BDCP Appendix 3.C, *Avoidance and Minimization Measures*) which would provide  
35 specific tidal habitat restoration design elements to reduce the potential for bioaccumulation of  
36 selenium and its bioavailability in tidal habitats. Furthermore, the effectiveness of selenium  
37 management to reduce selenium concentrations and/or bioaccumulation would be evaluated  
38 separately for each restoration effort as part of design and implementation. This avoidance and  
39 minimization measure would be implemented as part of the tidal habitat restoration design  
40 schedule.

41 **CEQA Conclusion:** Crane habitat could potentially be affected by general construction noise  
42 (13,421–43,125 acres) and pile driving (1,989–14,111 acres) above baseline level (50–60 dBA).  
43 Construction in certain areas would take place 7 days a week and 24 hours a day and evening and  
44 nighttime construction activities would require the use of extremely bright lights, which could  
45 adversely affect roosting cranes by impacting their sense of photo-period and by exposing them to

1 predators. The effects of noise and visual disturbances would be reduced through the  
 2 implementation of *AMM20 Greater Sandhill Crane* which would include requirements (described  
 3 above) to minimize the effects of noise and visual disturbance on greater sandhill cranes. With these  
 4 measures in place, in addition to AMM1–AMM7, noise and visual disturbances, potential spills of  
 5 hazardous materials, increased dust and sedimentation, and operations and maintenance of the  
 6 water conveyance facilities would have a less-than-significant impact on greater sandhill crane. The  
 7 implementation of tidal natural communities restoration or floodplain restoration could result in  
 8 increased exposure of greater sandhill crane to methylmercury. The potential indirect effects of  
 9 increased mercury exposure is likely low for greater sandhill crane for the following reasons: 1)  
 10 greater sandhill cranes occur in the study area only during the nonbreeding winter months, 2) their  
 11 primary foraging habitats in the study area are cultivated crops, and 3) the use of restored tidal  
 12 wetlands by cranes is likely to be limited compared to seasonal managed wetlands. Site-specific  
 13 restoration plans that address the creation and mobilization of mercury, as well as monitoring and  
 14 adaptive management as described in *CM12 Methylmercury Management*, would be available to  
 15 address the uncertainty of methylmercury levels in restored tidal marsh and potential impacts on  
 16 greater sandhill crane. Tidal habitat restoration could result in increased exposure of greater  
 17 sandhill crane to selenium. This effect would be addressed through the implementation of *AMM27*  
 18 *Selenium Management*, which would provide specific tidal habitat restoration design elements to  
 19 reduce the potential for bioaccumulation of selenium and its bioavailability in tidal habitats. With  
 20 these measures in place, the indirect effects of Alternative 4 implementation would have a less-than-  
 21 significant impact on greater sandhill crane.

22 **Lesser Sandhill Crane**

23 This section describes the effects of Alternative 4, including water conveyance facilities construction  
 24 and implementation of other conservation components, on lesser sandhill crane. Lesser sandhill  
 25 cranes in the study area are almost entirely dependent on privately owned agricultural lands for  
 26 foraging. Long-term sustainability of the lesser sandhill crane is thus dependent on providing a  
 27 matrix of compatible crop types that afford suitable foraging habitat and maintaining compatible  
 28 agricultural practices, while sustaining and increasing the extent of other essential habitat elements  
 29 such as night roosting habitat. The habitat model for lesser sandhill crane includes “roosting and  
 30 foraging” and “foraging” habitat. Suitable roosting and foraging habitat in the study area includes  
 31 certain agricultural types, specific grassland types, irrigated pastures and hay crops, managed  
 32 seasonal wetland, and other natural seasonal wetland. Roosting and foraging habitat includes  
 33 traditional roost sites that are known to be used by sandhill cranes (both greater and lesser) and  
 34 that also provide foraging habitat. Detail regarding the roosting and foraging modeled habitat for  
 35 both subspecies of sandhill crane is included in the BDCP (BDCP Appendix 2.A, *Covered Species*  
 36 *Accounts*). Both temporary and permanent roost sites were identified for sandhill cranes. Permanent  
 37 roosting and foraging sites are those used regularly, year after year, while temporary roosting and  
 38 foraging sites are those used in some years. Factors included in assessing the loss of foraging habitat  
 39 for the lesser sandhill crane considers the relative habitat value of specific crop or land cover types.  
 40 Although both the greater and the lesser Sandhill crane use similar crop or land cover types, these  
 41 provide different values of foraging habitat for the two subspecies based on proportional use of  
 42 these habitats. Lesser sandhill cranes are less traditional than greater sandhill cranes and are more  
 43 likely to move between different roost site complexes and different wintering regions (Ivey pers.  
 44 comm.) The wintering range is ten times larger than the greater sandhill crane and their average  
 45 foraging flight radius from roost sites is twice that of greater sandhill cranes. Because of this higher

1 mobility, lesser sandhill cranes are more flexible in their use of foraging areas than the greater  
2 sandhill crane.

3 Construction and restoration associated with Alternative 4 conservation measures would result in  
4 both temporary and permanent losses of foraging and roosting habitat for lesser sandhill crane as  
5 indicated in Table 12-4-31. Full implementation of Alternative 4 would include the following  
6 conservation actions over the term of the BDCP for the greater sandhill crane (BDCP Chapter 3,  
7 Section 3.3, *Biological Goals and Objectives*) that would also benefit the lesser sandhill crane.

- 8 • Protect at least 7,300 acres of high- to very high-value habitat for greater sandhill crane, with at  
9 least 80% maintained in very high-value types in any given year. This protected habitat will be  
10 within 2 miles of known roosting sites in CZs 3, 4, 5, and/or 6 and will consider sea level rise and  
11 local seasonal flood events, greater sandhill crane population levels, and the location of foraging  
12 habitat loss. Patch size of protected cultivated lands will be at least 160 acres (Objective  
13 GSHC1.1, associated with CM3).
- 14 • To create additional high-value greater sandhill crane winter foraging habitat, 10% of the  
15 habitat protected under Objective GSHC1.1 will involve acquiring low-value habitat or  
16 nonhabitat areas and converting it to high- or very high-value habitat. Created habitat will be  
17 within 2 miles of known roosting sites in CZs 3, 4, 5, and/or 6 and will consider sea level rise and  
18 local seasonal flood events, greater sandhill crane population levels, and the location of foraging  
19 habitat loss (Objective GSHC1.2, associated with CM3).
- 20 • Create at least 320 acres of managed wetlands in minimum patch sizes of 40 acres within the  
21 Greater Sandhill Crane Winter Use Area in CZs 3, 4, 5, or 6, with consideration of sea level rise  
22 and local seasonal flood events. The wetlands will be located within 2 miles of existing  
23 permanent roost sites and protected in association with other protected natural community  
24 types (excluding nonhabitat cultivated lands) at a ratio of 2:1 upland to wetland to provide  
25 buffers around the wetlands (Objective GSHC1.3, associated with CM3).
- 26 • Create at least two 90-acre wetland complexes within the Stone Lakes National Wildlife Refuge  
27 project boundary. The complexes will be no more than 2 miles apart and will help provide  
28 connectivity between the Stone Lakes and Cosumnes greater sandhill crane populations. Each  
29 complex will consist of at least three wetlands totaling at least 90 acres of greater sandhill crane  
30 roosting habitat, and will be protected in association with other protected natural community  
31 types (excluding nonhabitat cultivated lands) at a ratio of at least 2:1 uplands to wetlands (i.e.,  
32 two sites with at least 90 acres of wetlands each). One of the 90-acre wetland complexes may be  
33 replaced by 180 acres of cultivated lands (e.g., cornfields) that are flooded following harvest to  
34 support roosting cranes and provide highest-value foraging habitat, provided such substitution  
35 is consistent with the long-term conservation goals of Stone Lakes National Wildlife Refuge for  
36 greater sandhill crane. (Objective GSHC1.4, associated with CM10).
- 37 • Create an additional 95 acres of roosting habitat within 2 miles of existing permanent roost  
38 sites. The habitat will consist of active cornfields that are flooded following harvest to support  
39 roosting cranes and that provide highest-value foraging habitat. Individual fields will be at least  
40 40 acres and can shift locations throughout the Greater Sandhill Crane Winter Use Area, but will  
41 be sited with consideration of the location of roosting habitat loss and will be in place prior to  
42 roosting habitat loss (Objective GSHC1.5, associated with CM3).
- 43 • Protect at least 48,625 acres of cultivated lands that provide suitable habitat for covered and  
44 other native wildlife species (Objective CLNC1.1, associated with CM3).

- 1       • Within the at least 48,625 acres of protected cultivated lands, protect at least 42,275 acres of  
2       cultivated lands as Swainson’s hawk foraging habitat with at least 50% in very high-value  
3       habitat in CZs 2, 3, 4, 5, 7, 8, 9, and 11 (Objective SH1.2, associated with CM3).
- 4       • Target cultivated land conservation to provide connectivity between other conservation lands  
5       (Objective CLNC1.2, associated with CM3).
- 6       • Maintain and protect the small patches of important wildlife habitats associated with cultivated  
7       lands that occur in cultivated lands within the reserve system, including, water conveyance  
8       channels, grasslands, ponds, and wetlands (Objective CLNC1.3, associated with CM3).

9       As explained below, with the restoration and protection of these amounts of habitat, in addition to  
10      natural community enhancement and management commitments (including *CM12 Methylmercury*  
11      *Management*) and implementation of *AMM1–AMM7*, *AMM20 Greater Sandhill Crane*, *AMM27*  
12      *Selenium Management*, and *AMM30 Transmission Line Design and Alignment Guidelines*, impacts on  
13      the lesser sandhill crane would be less than significant for CEQA purposes, and would not be  
14      adverse for NEPA purposes.

1  
2

**Table 12-4-31. Changes in Lesser Sandhill Crane Modeled Habitat Associated with Alternative 4 (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	Roosting and Foraging - Permanent	0	0	8	8	NA	NA
	Roosting and Foraging - Temporary	29	29	16	16	NA	NA
	Foraging	2,709	2,709	1,115	1,115	NA	NA
<b>Total Impacts CM1</b>		<b>2,738</b>	<b>2,738</b>	<b>1,131</b>	<b>1,131</b>		
CM2-CM18	Roosting and Foraging - Permanent	0	0	0	0	0	0
	Roosting and Foraging - Temporary	0	41	0	0	0	0
	Foraging	3,610	12,172	2	4	0	0
<b>Total Impacts CM2-CM18</b>		<b>3,610</b>	<b>12,172</b>	<b>2</b>	<b>4</b>	<b>0</b>	<b>0</b>
<b>Total Roosting and Foraging - Permanent</b>		<b>0</b>	<b>0</b>	<b>8</b>	<b>8</b>		
<b>Total Roosting and Foraging - Temporary</b>		<b>29</b>	<b>70</b>	<b>16</b>	<b>16</b>		
<b>Total Foraging</b>		<b>6,319</b>	<b>14,840</b>	<b>1,117</b>	<b>1,119</b>		
<b>TOTAL IMPACTS</b>		<b>6,348</b>	<b>14,910</b>	<b>1,133</b>	<b>1,135</b>	<b>0</b>	<b>0</b>

<sup>a</sup> See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-72: Loss or Conversion of Habitat for and Direct Mortality of Lesser Sandhill**  
5 **Crane**

6 Alternative 4 conservation measures would result in the combined permanent and temporary loss  
7 of up to 94 acres of modeled roosting and foraging habitat (70 acres of permanent loss, 24 acres of  
8 temporary loss) and 15,959 acres of foraging habitat (14,840 acres of permanent loss, 1,119 acres of  
9 temporary loss, Table 12-4-31). Conservation measures that would result in these losses are  
10 conveyance facilities and transmission line construction, and establishment and use of borrow and

1 spoil areas (CM1), Yolo Bypass Fisheries Improvements (CM2), Tidal Natural Communities  
2 Restoration (CM4), Seasonally Inundated Floodplain Restoration (CM5), Grassland Natural  
3 Community Restoration (CM8), Nontidal Marsh Natural Community Restoration (CM10), and  
4 Natural Communities Enhancement and Management (CM11). The majority of habitat loss would  
5 result from water conveyance facility construction and conversion of habitat to tidal natural  
6 communities through CM4. Habitat enhancement and management activities through CM11, which  
7 include ground disturbance or removal of nonnative vegetation, could also result in local adverse  
8 habitat effects. In addition, maintenance activities associated with the long-term operation of the  
9 water conveyance facilities and other BDCP physical facilities could degrade or eliminate lesser  
10 sandhill crane modeled habitat. Each of these individual activities is described below. A summary  
11 statement of the combined impacts, NEPA effects and a CEQA conclusion follow the individual  
12 conservation measure discussions.

- 13 • *CM1 Water Facilities and Operation*: Construction of Alternative 4 conveyance facilities as they  
14 are currently designed would result in the combined permanent loss of up to 3,823 acres of  
15 modeled lesser sandhill crane habitat. This would consist of the permanent removal of 29 acres  
16 of temporary roosting and foraging habitat, and 2,709 acres of foraging habitat. Foraging habitat  
17 that would be permanently impacted by CM1 would consist of 2,261 acres of very high-value, 39  
18 acres of high-value, and 372 acres of medium-value foraging habitat (Table 12-4-32). In  
19 addition, 8 acres of permanent roosting and foraging habitat, 16 acres of temporary roosting  
20 and foraging habitat, and 1,115 acres of foraging habitat would be temporarily removed (Table  
21 12-4-31). The temporarily removed habitat would consist primarily of cultivated lands and it  
22 would be restored within 1 year following construction. However, it would not necessarily be  
23 restored to its original topography and it could be restored as grasslands. CM1 activities that  
24 would result in temporary impacts would include temporary access roads, borrow and spoil  
25 sites, and work areas for construction.

26 The acres of temporary and permanent roosting and foraging habitat that would be removed is  
27 located on Staten Island, Zacharias Island, Bouldin Island, and Venice Island and the losses  
28 would be a result of installation of permanent and temporary transmission lines and associated  
29 access roads. However, the implementation of *AMM20 Greater Sandhill Crane* would require that  
30 CM1 activities be designed to avoid direct loss of crane roost sites. This includes a provision that  
31 the final transmission line alignment would be designed to avoid crane roost sites. Avoidance of  
32 crane roost sites would be accomplished either by siting activities outside of identified roost  
33 sites or by relocating the roost site if it consisted of cultivated lands (roost sites consisting of  
34 wetlands would not be subject to re-location). Relocated roost sites would be established prior  
35 to construction activities affecting the original roost site (as described in *AMM20 Greater  
36 Sandhill Crane*, BDCP Appendix 3C). Therefore there would be no loss of crane roosting and  
37 foraging habitat as a result of water conveyance facility construction once the facilities were  
38 fully designed.

39 Approximately 2,347 acres of the permanent loss of foraging habitat would be from the storage  
40 of reusable tunnel material. This material would likely be moved to other sites for use in levee  
41 build-up and restoration, and the affected area would likely eventually be restored. While this  
42 effect is categorized as permanent because there is no assurance that the material would  
43 eventually be moved, the effect would likely be temporary. The actual footprint of the storage  
44 areas required for reusable tunnel material is flexible, and the actual acreage of habitat affected  
45 by this activity could be reduced based on the height of the storage piles in addition to other  
46 considerations. The implementation of *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel*

1            *Material and Dredged Material*, would require that the areas used for reusable tunnel material  
2            storage be minimized in crane foraging habitat and completely avoid crane roost sites.

3            Approximately 1,257 acres of the foraging habitat permanently lost from storage of reusable tunnel  
4            material would be on Staten Island, which is among the most significant crane use areas in the Delta  
5            (Littlefield and Ivey 2000). As described above, AMM6 would require that the actual footprint of this  
6            impact be minimized in crane foraging habitat. Specifically, AMM6 would require that reusable  
7            tunnel material storage on Staten Island be sized and located in coordination with greater sandhill  
8            crane experts, USFWS, and CDFW, which would reduce potential effects on both greater and lesser  
9            sandhill cranes. *AMM20 Greater Sandhill Crane* includes specific measures to reduce potential effects  
10           of construction on sandhill cranes on Staten Island. Refer to the Terrestrial Biology Map Book for a  
11           detailed view of Alternative 4 construction locations. Impacts from CM1 would occur within the first  
12           10 years of Alternative 4 implementation.

13           **Table 12-4-32. Value of Lesser Sandhill Crane Foraging Habitat Affected By Alternative 4**

Foraging Habitat Value Class	Land Cover Type	CM1 Permanent (Temporary)	CM2-CM18 Permanent (Temporary)
Very high	Corn, alfalfa and alfalfa mixtures	2,261 (367)	4,083 (0)
High	Mixed pasture, native pasture, other pasture, irrigated pasture, native vegetation, rice	39 (132)	2,058 (0)
Medium	Grain and hay crops, miscellaneous grain and hay, mixed grain and hay, non- irrigated mixed grain and hay, other grain crops, miscellaneous grasses, grassland, wheat, other grain crops, managed wetlands	372 (276)	2,220 (2)
Low	Other irrigated crops, idle cropland, blueberries, asparagus, clover, cropped within the last 3 years, grain sorghum, green beans, miscellaneous truck, miscellaneous field, new lands being prepped for crop production, nonirrigated mixed pasture, nonirrigated native pasture, onions, garlic, peppers, potatoes, safflower, sudan, sugar beets, tomatoes (processing), melons squash and cucumbers all types, artichokes, beans (dry)	25 (311)	3,745 (2)
None	Vineyards, orchards	12 (29)	23 (0)

14

- 1       ● *CM2 Yolo Bypass Fisheries Enhancement*: Construction under CM2 would result in a permanent  
2       loss of 267 acres and a temporary loss of 2 acres of lesser sandhill crane foraging habitat in CZ 2.  
3       Lesser sandhill crane use in this area is less common than in the central Delta.
  
- 4       ● *CM4 Tidal Natural Communities Restoration*: Based on the hypothetical tidal restoration  
5       footprint, this activity would result in the permanent loss or conversion of approximately  
6       10,248 acres of lesser sandhill crane habitat, consisting of 41 acres of temporary roosting and  
7       foraging habitat and 10,207 acres of foraging habitat. Loss of foraging habitat from CM4 would  
8       consist of 3,642 acres of very high-value, 1,529 acres of high value, 2,040 acres of medium-value,  
9       and 2,983 acres of low-value foraging habitat (Table 12-4-32). Habitat loss would primarily  
10      occur in the Cosumnes-Mokelumne River and West Delta ROAs. Tidal wetland restoration in CZ 4  
11      could occur between the high crane use areas of the central Delta and the Cosumnes River  
12      Preserve. However, the conversion of grasslands and cultivated lands to tidal wetlands would  
13      not prohibit crane movement or reduce use of these areas. Lesser sandhill cranes are less  
14      traditional than greater sandhill cranes and would be more adaptable to changes in land use.  
15      Approximately 2,516 acres of foraging habitat would be removed within the first 10 years of  
16      Alternative 4 implementation.
  
- 17      ● *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees would result in  
18      the loss of 2 acres of low-value lesser sandhill crane foraging habitat (1 acre of permanent loss, 1  
19      acres of temporary loss). This impact would occur after the first 10 years of Alternative 4  
20      implementation.
  
- 21      ● *CM8 Grassland Natural Community Restoration*: Approximately 300 acres of cultivated lands  
22      (foraging habitat) would be converted to grassland. No roosting/foraging habitat would be  
23      impacted by grassland restoration activities. The restored grasslands would continue to provide  
24      foraging habitat value for the lesser sandhill crane. Approximately 257 acres would be impacted  
25      within the first 10 years of Plan implementation.
  
- 26      ● *CM10 Nontidal Marsh Restoration*: Nontidal marsh restoration would result in the permanent  
27      conversion of approximately 1,350 acres of modeled foraging habitat for the lesser sandhill  
28      crane. A portion of the restored nontidal marsh would be expected to continue to provide  
29      roosting and foraging habitat value for the lesser sandhill crane. However, some of this restored  
30      marsh would be unsuitable as it would lack emergent vegetation and consist of open water that  
31      would be too deep to provide suitable roosting or foraging habitat. Approximately 567 acres of  
32      habitat would be converted to nontidal marsh within the first 10 years of Alternative 4  
33      implementation.
  
- 34      ● *CM11 Natural Communities Enhancement and Management*: A variety of habitat management  
35      actions included in *CM11* that are designed to enhance wildlife values in restored or protected  
36      habitats could result in localized ground disturbances that could temporarily remove small  
37      amounts of modeled habitat. Ground-disturbing activities, such as removal of nonnative  
38      vegetation and road and other infrastructure maintenance activities, would be expected to have  
39      minor adverse effects on available habitat and would be expected to result in overall  
40      improvements to and maintenance of habitat values over the term of the BDCP. The potential for  
41      these activities to result in direct mortality of lesser sandhill crane would be minimized with the  
42      implementation of *AMM20 Greater Sandhill Crane*. *CM11* would also include the construction of  
43      recreational-related facilities including trails, interpretive signs, and picnic tables (BDCP  
44      Chapter 4, *Covered Activities and Associated Federal Actions*). The construction of trailhead  
45      facilities, signs, staging areas, picnic areas, bathrooms, etc. would be placed on existing,

1 disturbed areas when and where possible. If new ground disturbance was necessary, sandhill  
2 crane habitat would be avoided, with the exception of a permanent loss of 4 acres of grassland  
3 foraging habitat (1 acre of which would be impacted within the first 10 years of Alternative 4  
4 implementation).

- 5 ● Operations and Maintenance: Postconstruction operation and maintenance of the above-ground  
6 water conveyance facilities and restoration infrastructure could result in ongoing but periodic  
7 disturbances that could affect lesser sandhill crane use of the surrounding habitat. Maintenance  
8 activities would include vegetation management, levee and structure repair, and re-grading of  
9 roads and permanent work areas. These effects, could be adverse as sandhill cranes are  
10 sensitive to disturbance. However, potential impacts would be reduced by AMMs and  
11 conservation actions as described below.
- 12 ● Injury and Direct Mortality: Construction-related activities would not be expected to result in  
13 direct mortality of lesser sandhill crane if they were present in the study area, because they  
14 would be expected to avoid contact with construction and other equipment. Potential effects  
15 would be avoided and minimized with the implementation of *AMM20 Greater Sandhill Crane*.  
16 Injury and mortality from electrical transmission facilities are described below under Impact  
17 BIO-73.

18 The following paragraphs summarize the combined effects discussed above and describe other  
19 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also  
20 included.

### 21 ***Near-Term Timeframe***

22 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
23 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
24 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
25 effects of construction would not be adverse under NEPA. Based on current design footprints,  
26 Alternative 4 would remove 53 acres roosting and foraging habitat (29 acres of permanent loss, 24  
27 acres of temporary loss) in the study area in the near-term. These effects would result from the  
28 construction of the water conveyance facilities (CM1, 53 acres). In addition, 7,436 acres of foraging  
29 habitat would be removed or converted in the near-term (CM1, 3,824 acres; *CM4 Tidal Natural*  
30 *Communities Restoration*, *CM8 Grassland Natural Community Restoration*, and *CM11 Natural*  
31 *Communities Enhancement and Management*—3,612 acres). Of these near-term acres of foraging  
32 habitat impacted, 5,953 acres would be medium- to very high-value habitat (CM1, 3,447 acres, CM2-  
33 11, 2,507 acres).

34 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected would  
35 be 1:1 protection and 1:1 restoration for loss of roost sites and 1:1 protection for loss of foraging  
36 habitat. Using these ratios would indicate that 53 acres of lesser sandhill crane roosting habitat  
37 should be restored/created and 53 acres should be protected to compensate for the CM1 losses of  
38 lesser sandhill crane roosting and foraging habitat. In addition, 3,447 acres of high- to very high-  
39 value foraging habitat should be protected to mitigate the CM1 losses of lesser sandhill crane  
40 medium- to very high-value foraging habitat. The near-term effects of other conservation actions  
41 would remove 2,507 acres of medium- to very high-value foraging habitat, and therefore require  
42 2,507 acres of protection of high- to very high-value foraging habitat using the same typical NEPA  
43 and CEQA ratios (1:1 restoration and 1:1 protection for the loss of roosting and foraging habitat; 1:1  
44 protection for the loss of foraging habitat).

1 The implementation of *AMM20 Greater Sandhill Crane* would require that no sandhill crane roost  
2 sites were directly impacted by CM1 covered activities (including transmission lines and their  
3 associated footprints). Therefore there would be no loss of crane roosting and foraging habitat as a  
4 result of water conveyance facility construction once the facilities were fully designed, which would  
5 avoid the CM1 impact on 53 acres of roosting and foraging habitat once the project design is final.  
6 Indirect effects of construction-related noise and visual disturbance are discussed below under  
7 Impact BIO-74.

8 The BDCP has committed to near-term goals of creating 500 acres of managed wetlands and  
9 protecting 15,600 acres of cultivated lands in the Plan Area (Table 3-4 in Chapter 3, *Description of*  
10 *Alternatives*). These conservation actions are associated with CM3 and CM10 and would occur in the  
11 same timeframe as the construction and early restoration losses.

12 The BDCP also includes the following objectives for the greater sandhill crane which would also  
13 benefit the lesser sandhill crane, as they utilize similar habitats and face similar threats within their  
14 winter use areas.

15 Up to 95 acres of roosting habitat would be created within 2 miles of existing permanent roost sites  
16 (Objective GSHC1.5). These roosts would consist of active cornfields that are flooded following  
17 harvest to support roosting cranes and also provide the highest-value foraging habitat for the  
18 species. Individual fields would be at least 40 acres could shift locations throughout the Greater  
19 Sandhill Crane Winter Use Area, but would be sited with consideration of the location of roosting  
20 habitat loss and would be in place prior to roosting habitat loss. Of the 500 acres of managed  
21 wetlands to be created for roosting habitat, 320 acres would be created in minimum patch sizes of  
22 40 acres within the Greater Sandhill Crane Winter Use Area in CZs 3, 4, 5, or 6 (Objective GSHC1.3).  
23 Restoration sites would be identified with consideration of sea level rise and local seasonal flood  
24 events. These wetlands would be created within 2 miles of existing permanent roost sites and  
25 protected in association with other protected natural community types at a ratio of 2:1 upland to  
26 wetland habitat to provide buffers that will protect cranes from the types of disturbances that would  
27 otherwise result from adjacent roads and developed areas (e.g., roads, noise, visual disturbance,  
28 lighting). The remaining 180 acres of crane roosting habitat would be constructed within the Stone  
29 Lakes NWR project boundary (BDCP Chapter 3, Figure 3.3-6) and would be designed to provide  
30 connectivity between the Stone Lakes and Cosumnes greater sandhill crane populations (Objective  
31 GSHC1.4) which would also benefit lesser sandhill crane. These wetlands would consist of two 90-  
32 acre wetland complexes each consisting of at least three wetlands and would be no more than 2  
33 miles apart. One of the 90-acre wetland complexes created under this objective could be replaced by  
34 180 acres of cultivated lands (e.g., cornfields) that are flooded following harvest to support roosting  
35 cranes and provide highest-value foraging habitat, provided such substitution is consistent with the  
36 long-term conservation goals of Stone Lakes National Wildlife Refuge for greater sandhill crane. The  
37 large patch sizes of these wetland complexes would provide additional conservation to address the  
38 threats of vineyard conversion, urbanization to the east, and sea level rise to the west of sandhill  
39 crane wintering habitat.

40 At least 15,600 acres of cultivated lands that provide habitat for covered and other native wildlife  
41 species would be protected in the near-term time period (Objective CLNC1.1). Mitigation Measure  
42 BIO-72 would be available to guide the near-term protection of cultivated lands to ensure that the  
43 near-term impacts of medium- to very high-value foraging habitat for lesser sandhill crane were  
44 compensated for with appropriate crop types and natural communities.

1 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
2 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
3 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
4 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
5 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
6 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
7 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

### 8 ***Late Long-Term Timeframe***

9 The study area supports approximately 23,919 acres of roosting and foraging habitat and 240,475  
10 acres of foraging habitat for lesser sandhill crane. Alternative 4 as a whole would result in the  
11 permanent loss of and temporary effects on 94 acres of roosting and foraging habitat (70 acres of  
12 permanent loss, 24 acres of temporary loss) and 15,959 acres of foraging habitat (14,840 acres of  
13 permanent loss, 1,119 acres of temporary loss) for the lesser sandhill crane during the term of the  
14 Plan. The foraging habitat lost by the late long-term timeframe would consist of 11,809 acres of  
15 medium- to very high-value foraging habitat. The locations of these losses are described above in the  
16 analyses of individual conservation measures. The implementation of *AMM20 Greater Sandhill Crane*  
17 would require that no crane roost sites were directly affected by water conveyance facilities  
18 including transmission lines and associated footprints. In addition, temporarily removed habitat  
19 would be restored within 1 year following construction. However, it would not necessarily be  
20 restored to its original topography and it could result in the conversion of cultivated lands to  
21 grasslands.

22 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*  
23 *Restoration* and *CM10 Nontidal Marsh Restoration* to restore or create at least 595 acres of greater  
24 Sandhill crane roost habitat (Objectives GSHC1.3, GSHC1.4, and GSHC1.5) and to protect at least  
25 7,300 acres of high- to very high-value foraging habitat for greater Sandhill crane (Objective  
26 GSHC1.1). These croptypes would also provide high-value habitat for the lesser sandhill crane.

27 The BDCP also includes the following objectives for the greater sandhill crane which would also  
28 benefit the lesser sandhill crane, as they utilize similar habitats and face similar threats within their  
29 winter use areas.

30 Of the 500 acres of managed wetlands to be created for roosting habitat, 320 acres would be created  
31 in minimum patch sizes of 40 acres within the Greater Sandhill Crane Winter Use Area in CZs 3, 4, 5,  
32 or 6 (Objective GSHC1.3). Restoration sites would be identified with consideration of sea level rise  
33 and local seasonal flood events. These wetlands would be created within 2 miles of existing  
34 permanent roost sites and protected in association with other protected natural community types at  
35 a ratio of 2:1 upland to wetland habitat to provide buffers that will protect cranes from the types of  
36 disturbances that would otherwise result from adjacent roads and developed areas (e.g., roads,  
37 noise, visual disturbance, lighting). The remaining 180 acres of crane roosting habitat would be  
38 constructed within the Stone Lakes NWR project boundary (BDCP Chapter 3, Figure 3.3-6) and  
39 would be designed to provide connectivity between the Stone Lakes and Cosumnes greater sandhill  
40 crane populations (Objective GSHC1.4). These wetlands would consist of two 90-acre wetland  
41 complexes each consisting of at least three wetlands and would be no more than 2 miles apart. One  
42 of the 90-acre wetland complexes created under this objective could be replaced by 180 acres of  
43 cultivated lands (e.g., cornfields) that are flooded following harvest to support roosting cranes and  
44 provide highest-value foraging habitat, provided such substitution is consistent with the long-term

1 conservation goals of Stone Lakes National Wildlife Refuge for greater sandhill crane. The large  
2 patch sizes of these wetland complexes would provide additional conservation to address the  
3 threats of vineyard conversion, urbanization to the east, and sea level rise to the west of greater  
4 sandhill crane wintering habitat. Approximately 95 acres of roosting habitat would be created  
5 within 2 miles of existing permanent roost sites (Objective GSHC1.5). These roosts would consist of  
6 active cornfields that are flooded following harvest to support roosting cranes and also provide the  
7 highest-value foraging habitat for the species. Individual fields would be at least 40 acres could shift  
8 locations throughout the Greater Sandhill Crane Winter Use Area, but would be sited with  
9 consideration of the location of roosting habitat loss and would be in place prior to construction  
10 activities.

11 The BDCP has committed to protecting 7,300 acres of high- to very high-value greater sandhill crane  
12 foraging habitat by the late long-term timeframe with at least 80% maintained in very-high value  
13 types in any given year (Objective GSHC1.1). These acres of protected foraging habitat would be  
14 located within 2 miles of known roosting sites in CZs 3, 4, 5, and/or 6. The patch size of these  
15 protected lands would be at least 160 acres (Objectives GSHC1.1 and GSHC1.2). Because agricultural  
16 habitat values change over time based largely on economically driven agricultural practices,  
17 protecting crane habitat would provide enhanced stability to agricultural habitat value within the  
18 crane use area that does not currently exist. Although lesser sandhill cranes are less traditional in  
19 their use of roost sites in the Delta, these objectives for the greater sandhill crane would also benefit  
20 the lesser sandhill crane.

21 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
22 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
23 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
24 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
25 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
26 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
27 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

28 **NEPA Effects:** The loss of lesser sandhill crane habitat and potential direct mortality of this special-  
29 status species under Alternative 4 would represent an adverse effect in the absence of other  
30 conservation actions. However, with habitat protection and restoration associated with *CM3 Natural*  
31 *Communities Protection and Restoration* and *CM10 Nontidal Marsh Restoration*, guided by biological  
32 goals and objectives for the species and by AMM1–AMM7 and *AMM20 Greater Sandhill Crane*, which  
33 would be in place throughout the construction period, and with implementation of Mitigation  
34 Measure BIO-72, which would be available to compensate for loss of medium- to very high-value  
35 foraging habitat, the effects of habitat loss and potential mortality on lesser sandhill crane would not  
36 be adverse under Alternative 4.

37 **CEQA Conclusion:**

38 **Near-Term Timeframe**

39 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
40 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
41 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
42 effects of construction would be less than significant under CEQA. Based on current design  
43 footprints, Alternative 4 would remove 53 acres roosting and foraging habitat (29 acres of  
44 permanent loss, 24 acres of temporary loss) in the study area in the near-term. These effects would

1 result from the construction of the water conveyance facilities (CM1, 53 acres). In addition, 7,436  
2 acres of foraging habitat would be removed or converted in the near-term (CM1, 3,824 acres; *CM4*  
3 *Tidal Natural Communities Restoration*, *CM8 Grassland Natural Community Restoration*, and *CM11*  
4 *Natural Communities Enhancement and Management*—3,612 acres). Of these near-term acres of  
5 foraging habitat impacted, 5,953 acres would be medium- to very high-value habitat (CM1, 3,447  
6 acres, CM2-11, 2,507 acres).

7 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected would  
8 be 1:1 protection and 1:1 restoration for loss of roost sites and 1:1 protection for loss of foraging  
9 habitat. Using these ratios would indicate that 53 acres of lesser sandhill crane roosting habitat  
10 should be restored/created and 53 acres should be protected to compensate for the CM1 losses of  
11 lesser sandhill crane roosting and foraging habitat. In addition, 3,447 acres of high- to very high-  
12 value foraging habitat should be protected to mitigate the CM1 losses of lesser sandhill crane  
13 medium- to very high-value foraging habitat. The near-term effects of other conservation actions  
14 would remove 2,507 acres of medium- to very high-value foraging habitat, and therefore require  
15 2,507 acres of protection of high- to very high-value foraging habitat using the same typical NEPA  
16 and CEQA ratios (1:1 restoration and 1:1 protection for the loss of roosting and foraging habitat; 1:1  
17 protection for the loss of foraging habitat).

18 The implementation of *AMM20 Greater Sandhill Crane* would require that no sandhill crane roost  
19 sites were directly impacted by CM1 covered activities (including transmission lines and their  
20 associated footprints). Therefore there would be no loss of crane roosting and foraging habitat as a  
21 result of water conveyance facility construction once the facilities were fully designed, which would  
22 avoid the CM1 impact on 53 acres of roosting and foraging habitat once the project design is final.  
23 Indirect effects of construction-related noise and visual disturbance are discussed below under  
24 Impact BIO-74.

25 The BDCP has committed to near-term goals of creating 500 acres of managed wetlands and  
26 protecting 15,600 acres of cultivated lands in the Plan Area (Table 3-4 in Chapter 3, *Description of*  
27 *Alternatives*). These conservation actions are associated with CM3 and CM10 and would occur in the  
28 same timeframe as the construction and early restoration losses.

29 The BDCP also includes the following objectives for the greater sandhill crane which would also  
30 benefit the lesser sandhill crane, as they utilize similar habitats and face similar threats within their  
31 winter use areas.

32 Up to 95 acres of roosting habitat would be created within 2 miles of existing permanent roost sites  
33 (Objective GSHC1.5). These roosts would consist of active cornfields that are flooded following  
34 harvest to support roosting cranes and also provide the highest-value foraging habitat for the  
35 species. Individual fields would be at least 40 acres could shift locations throughout the Greater  
36 Sandhill Crane Winter Use Area, but would be sited with consideration of the location of roosting  
37 habitat loss and would be in place prior to roosting habitat loss. Of the 500 acres of managed  
38 wetlands to be created for roosting habitat, 320 acres would be created in minimum patch sizes of  
39 40 acres within the Greater Sandhill Crane Winter Use Area in CZs 3, 4, 5, or 6 (Objective GSHC1.3).  
40 Restoration sites would be identified with consideration of sea level rise and local seasonal flood  
41 events. These wetlands would be created within 2 miles of existing permanent roost sites and  
42 protected in association with other protected natural community types at a ratio of 2:1 upland to  
43 wetland habitat to provide buffers that will protect cranes from the types of disturbances that would  
44 otherwise result from adjacent roads and developed areas (e.g., roads, noise, visual disturbance,

1 lighting). The remaining 180 acres of crane roosting habitat would be constructed within the Stone  
2 Lakes NWR project boundary (BDCP Chapter 3, Figure 3.3-6) and would be designed to provide  
3 connectivity between the Stone Lakes and Cosumnes greater sandhill crane populations (Objective  
4 GSHC1.4) which would also benefit lesser sandhill crane. These wetlands would consist of two 90-  
5 acre wetland complexes each consisting of at least three wetlands and would be no more than 2  
6 miles apart. One of the 90-acre wetland complexes created under this objective could be replaced by  
7 180 acres of cultivated lands (e.g., cornfields) that are flooded following harvest to support roosting  
8 cranes and provide highest-value foraging habitat, provided such substitution is consistent with the  
9 long-term conservation goals of Stone Lakes National Wildlife Refuge for greater sandhill crane. The  
10 large patch sizes of these wetland complexes would provide additional conservation to address the  
11 threats of vineyard conversion, urbanization to the east, and sea level rise to the west of sandhill  
12 crane wintering habitat.

13 At least 15,600 acres of cultivated lands that provide habitat for covered and other native wildlife  
14 species would be protected in the near-term time period (Objective CLNC1.1). Mitigation Measure  
15 BIO-72 would be available to guide the near-term protection of cultivated lands to ensure that the  
16 near-term impacts of medium- to very high-value foraging habitat for lesser sandhill crane were  
17 compensated for with appropriate crop types and natural communities.

18 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
19 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
20 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
21 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
22 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
23 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
24 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

### 25 ***Late Long-Term Timeframe***

26 The study area supports approximately 23,919 acres of roosting and foraging habitat and 240,475  
27 acres of foraging habitat for lesser sandhill crane. Alternative 4 as a whole would result in the  
28 permanent loss of and temporary effects on 94 acres of roosting and foraging habitat (70 acres of  
29 permanent loss, 24 acres of temporary loss) and 15,959 acres of foraging habitat (14,840 acres of  
30 permanent loss, 1,119 acres of temporary loss) for the lesser sandhill crane during the term of the  
31 Plan. The foraging habitat lost by the late long-term timeframe would consist of 11,809 acres of  
32 medium- to very high-value foraging habitat. The locations of these losses are described above in the  
33 analyses of individual conservation measures. The implementation of *AMM20 Greater Sandhill Crane*  
34 would require that no crane roost sites were directly affected by water conveyance facilities  
35 including transmission lines and associated footprints. In addition, temporarily removed habitat  
36 would be restored within 1 year following construction. However, it would not necessarily be  
37 restored to its original topography and it could result in the conversion of cultivated lands to  
38 grasslands.

39 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*  
40 *Restoration* and *CM10 Nontidal Marsh Restoration* to restore or create at least 595 acres of greater  
41 Sandhill crane roost habitat (Objectives GSHC1.3, GSHC1.4, and GSHC1.5) and to protect at least  
42 7,300 acres of high- to very high-value foraging habitat for greater Sandhill crane (Objective  
43 GSHC1.1). These croptypes would also provide high-value habitat for the lesser sandhill crane.

1 The BDCP also includes the following objectives for the greater sandhill crane which would also  
2 benefit the lesser sandhill crane, as they utilize similar habitats and face similar threats within their  
3 winter use areas.

4 Of the 500 acres of managed wetlands to be created for roosting habitat, 320 acres would be created  
5 in minimum patch sizes of 40 acres within the Greater Sandhill Crane Winter Use Area in CZs 3, 4, 5,  
6 or 6 (Objective GSHC1.3). Restoration sites would be identified with consideration of sea level rise  
7 and local seasonal flood events. These wetlands would be created within 2 miles of existing  
8 permanent roost sites and protected in association with other protected natural community types at  
9 a ratio of 2:1 upland to wetland habitat to provide buffers that will protect cranes from the types of  
10 disturbances that would otherwise result from adjacent roads and developed areas (e.g., roads,  
11 noise, visual disturbance, lighting). The remaining 180 acres of crane roosting habitat would be  
12 constructed within the Stone Lakes NWR project boundary (BDCP Chapter 3, Figure 3.3-6) and  
13 would be designed to provide connectivity between the Stone Lakes and Cosumnes greater sandhill  
14 crane populations (Objective GSHC1.4). These wetlands would consist of two 90-acre wetland  
15 complexes each consisting of at least three wetlands and would be no more than 2 miles apart. One  
16 of the 90-acre wetland complexes created under this objective could be replaced by 180 acres of  
17 cultivated lands (e.g., cornfields) that are flooded following harvest to support roosting cranes and  
18 provide highest-value foraging habitat, provided such substitution is consistent with the long-term  
19 conservation goals of Stone Lakes National Wildlife Refuge for greater sandhill crane. The large  
20 patch sizes of these wetland complexes would provide additional conservation to address the  
21 threats of vineyard conversion, urbanization to the east, and sea level rise to the west of greater  
22 sandhill crane wintering habitat. Approximately 95 acres of roosting habitat would be created  
23 within 2 miles of existing permanent roost sites (Objective GSHC1.5). These roosts would consist of  
24 active cornfields that are flooded following harvest to support roosting cranes and also provide the  
25 highest-value foraging habitat for the species. Individual fields would be at least 40 acres could shift  
26 locations throughout the Greater Sandhill Crane Winter Use Area, but would be sited with  
27 consideration of the location of roosting habitat loss and would be in place prior to construction  
28 activities.

29 The BDCP has committed to protecting 7,300 acres of high- to very high-value greater sandhill crane  
30 foraging habitat by the late long-term timeframe with at least 80% maintained in very-high value  
31 types in any given year (Objective GSHC1.1). These acres of protected foraging habitat would be  
32 located within 2 miles of known roosting sites in CZs 3, 4, 5, and/or 6. The patch size of these  
33 protected lands would be at least 160 acres (Objectives GSHC1.1 and GSHC1.2). Because agricultural  
34 habitat values change over time based largely on economically driven agricultural practices,  
35 protecting crane habitat would provide enhanced stability to agricultural habitat value within the  
36 crane use area that does not currently exist. Although lesser sandhill cranes are less traditional in  
37 their use of roost sites in the Delta, these objectives for the greater sandhill crane would also benefit  
38 the lesser sandhill crane.

39 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
40 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
41 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
42 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
43 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
44 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
45 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

1 Considering Alternative 4's protection and restoration provisions, in addition to Mitigation Measure  
2 BIO-72, which would compensate for the loss of medium- to very high-value foraging habitat at a  
3 ratio of 1:1, loss of habitat or direct mortality through implementation of Alternative 4 would not  
4 result in a substantial adverse effect through habitat modifications and would not substantially  
5 reduce the number or restrict the range of the species. Therefore, the alternative would have a less-  
6 than-significant impact on lesser sandhill crane.

7 **Mitigation Measure BIO-72: Compensate for the Loss of Medium- to Very High-Value**  
8 **Lesser Sandhill Crane Foraging Habitat**

9 DWR must compensate for the loss of lesser sandhill crane medium- to very high-value foraging  
10 habitat at a ratio of 1:1 by protecting or managing high- to very high-value habitat in the Plan  
11 Area. Compensation must occur prior to or concurrent with the impacts, to minimize the effects  
12 of habitat loss. The crop types and natural communities that are included in foraging value  
13 categories are listed in Table 12-4-32. Foraging habitat conservation must occur within 10  
14 kilometers of traditional sandhill crane roost sites and the location of protected habitat or  
15 conservation easements must be preapproved by CDFW.

16 **Impact BIO-73: Effects on Lesser Sandhill Crane Associated with Electrical Transmission**  
17 **Facilities**

18 Sandhill cranes are susceptible to collision with power lines and other structures during periods of  
19 inclement weather and low visibility (Avian Power Line Interaction Committee 1994, Brown and  
20 Drewien 1995, Manville 2005). New transmission lines installed in the study area would increase  
21 the risk for bird-power line strikes, which could result in injury or mortality of lesser sandhill  
22 cranes. Both permanent and temporary electrical transmission lines would be constructed to supply  
23 construction and operational power to BDCP facilities. Typically, higher-voltage (230-kilovolt [kV])  
24 lines vary in height from 90 to 110 feet, while "sub" transmission (69-kV) lines vary from 50 to 70  
25 feet (Avian Power Line Interaction Committee 2006). The Alternative 4 alignment would require the  
26 installation of both permanent and temporary transmission lines extending north and south through  
27 much of the crane use area. In addition, a transmission line would be constructed between the cities  
28 of Hood and Locke eastward toward SR 99 which would require the installation of approximately 17  
29 miles of permanent transmission line (10 miles of 230-kV line and 7 miles of 69-kV line) and  
30 approximately 46 miles (21 miles of 230-kV line and 25 miles of 69-kV line) of temporary  
31 transmission lines. Temporary lines would be removed after construction of the water conveyance  
32 facilities, within 10 years.

33 Existing transmission lines in the sandhill crane winter use area include a network of distribution  
34 lines that are between 11- and 22-kV. In addition, there are two 115-kV lines (one that overlaps with  
35 the winter use area between Antioch and I-5 east of Hood, and one that crosses the northern tip of  
36 the crane winter use area north of Clarksburg); and 69-kV lines that parallel Twin Cities Road,  
37 Herzog Road, Lambert Road, and the Southern Pacific Dredge Cut in the vicinity of Stone Lakes  
38 National Wildlife Refuge. At the south end of the winter use area, there are three 230-kV  
39 transmission lines that follow I-5, and then cut southwest through Holt, and two 500-kV lines cross  
40 the southwestern corner of the winter use area. This existing network of power lines in the study  
41 currently poses a risk for sandhill cranes, as both distribution and transmission lines cross over or  
42 surround sandhill crane roost sites in the study area. New transmission lines would increase this  
43 risk and have an adverse effect on the species in the absence of other conservation actions.

1 As described in BDCP Appendix 5.J, Attachment 5J.C, *Analysis of Potential Bird Collisions at Proposed*  
2 *BDCP Powerlines*, the potential mortality of greater sandhill crane in the area of the proposed  
3 transmission lines was estimated using collision mortality rates by Brown and Drewien (1995) and  
4 an estimate of potential crossings along the proposed lines. Results indicate that in the absence of  
5 any line marking to increase visibility and reduce collision risk (i.e., without minimization  
6 measures), the average annual mortality of greater sandhill crane at permanent lines would be up to  
7 18 fatalities per year and would be 120 fatalities per year at temporary lines. Lesser sandhill cranes  
8 use the same roost sites as greater sandhill cranes. However, their numbers fluctuate greatly over  
9 the season as they are more mobile and use a broader landscape than greater sandhill cranes.  
10 Although the roost population sizes would fluctuate more for lesser sandhill cranes, one could  
11 expect that proportionally, the total number of potential fatalities for the lesser sandhill crane would  
12 be similar to those of the greater sandhill crane.

13 Marking transmission lines with devices that make the lines more visible to birds has been shown to  
14 dramatically reduce the incidence of bird mortality, including for sandhill cranes. Brown and  
15 Drewien (1995) estimated that marking devices in the Central Valley would reduce crane mortality  
16 by 66%. Using this assumption, by incorporating line-marking devices into the designs the annual  
17 mortality rate is estimated to decrease to 7 fatalities per year for the permanent lines and, 41  
18 fatalities per year for the temporary lines.

19 The current proposed transmission line alignment under Alternative 4 is not fully designed, and line  
20 locations are not final. The implementation of *AMM20 Greater Sandhill Crane* would require that the  
21 final transmission line alignment would not result in a net increase in bird strike risk to greater  
22 sandhill cranes in the Plan Area. This would be achieved by implementing any combination of the  
23 following: (1) siting new transmission lines in lower bird strike risk zones; (2) removing, relocating  
24 or undergrounding existing lines; (3) installing flight diverters on existing lines in the crane winter  
25 use area; and/or (4) for areas outside of the Stone Lakes National Wildlife Refuge project boundary,  
26 shifting locations of flooded areas that provide crane roosts to lower risk areas. This would be  
27 expected to reduce existing mortality of both greater and lesser sandhill cranes in the study area.  
28 Designing the alignment to minimize risk and removing, relocating, or undergrounding existing lines  
29 would be given priority out of the above methods. With these measures, and considering that the  
30 temporary lines would be removed within the first 10 years of Alternative 4 implementation, the  
31 risk of lesser sandhill crane mortality from transmission lines would be reduced substantially.

32 **NEPA Effects:** Sandhill cranes are known to be susceptible to collision with overhead wires. The  
33 existing network of power lines in the study area currently poses a risk for sandhill cranes. New  
34 transmission lines would increase the risk for bird-power line strikes, which could result in injury or  
35 mortality of lesser sandhill cranes. By incorporating line-marking devices on new transmission lines  
36 the estimated mortality rate for the greater sandhill crane would be 7 fatalities per year from  
37 permanent transmission lines and 41 fatalities per year from temporary transmission lines, and  
38 similar mortality rates would be expected for lesser sandhill cranes. The current proposed  
39 transmission line alignment under Alternative 4 is not fully designed, and line locations are not final.  
40 The implementation of *AMM20 Greater Sandhill Crane* would require that the final transmission line  
41 alignment avoided crane roost sites and achieved no net increase of greater sandhill crane strike  
42 risk in the Plan Area. Measures to achieve this would also substantially reduce lesser sandhill crane  
43 strike risk. With *AMM20 Greater Sandhill Crane*, and considering that the temporary lines would be  
44 removed within the first 10 years of Alternative 4 implementation, the risk of mortality from  
45 collision with transmission lines would not result in an adverse effect on the lesser sandhill crane  
46 population.

1 **CEQA Conclusion:** Sandhill cranes are known to be susceptible to collision with overhead wires. The  
2 existing network of power lines in the study area currently poses a risk for sandhill cranes. New  
3 transmission lines would increase the risk for bird-power line strikes, which could result in injury or  
4 mortality of greater sandhill crane. By incorporating line-marking devices on new transmission lines  
5 the estimated mortality rate would be 7 fatalities per year from permanent transmission lines and  
6 41 fatalities per year from temporary transmission lines. A similar mortality rate would be expected  
7 for lesser sandhill crane. The current proposed transmission line alignment under Alternative 4 is  
8 not fully designed, and line locations are not final. The implementation of *AMM20 Greater Sandhill*  
9 *Crane* would require that the final transmission line alignment avoided crane roost sites and  
10 achieved no net increase of greater sandhill crane strike risk in the Plan Area. Measures to achieve  
11 this would also substantially reduce lesser sandhill crane strike risk. With *AMM20 Greater Sandhill*  
12 *Crane*, and considering that the temporary lines would be removed within the first 10 years of  
13 Alternative 4 implementation, the risk of mortality from collision with transmission lines would  
14 result in a less-than-significant impact on the lesser sandhill crane population.

### 15 **Impact BIO-74: Indirect Effects of Plan Implementation on Lesser Sandhill Crane**

16 **Indirect construction-and operation-related effects:** Sandhill cranes are sensitive to disturbance.  
17 Noise and visual disturbances from the construction of water conveyance facilities and other  
18 conservation measures could reduce lesser sandhill crane use of modeled habitat adjacent to work  
19 areas. Indirect effects associated with construction include noise, dust, and visual disturbance  
20 caused by grading, filling, contouring, and other ground-disturbing operations outside the project  
21 footprint but within 1,300 feet of the construction edge. Furthermore, maintenance of the  
22 aboveground water conveyance facilities could result in ongoing but periodic postconstruction noise  
23 and visual disturbances that could affect lesser sandhill crane use of surrounding habitat. These  
24 effects could result from periodic vehicle use along the conveyance corridor, inspection and  
25 maintenance of aboveground facilities, and similar activities. These potential effects would be  
26 minimized with implementation of *AMM20 Greater Sandhill Crane* described in BDCP Appendix 3.C,  
27 *Avoidance and Minimization Measures*.

28 The BDCP includes an analysis of the indirect effects of noise and visual disturbance that would  
29 result from the construction of the Alternative 4 water conveyance facilities on greater sandhill  
30 crane (BDCP Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of the BDCP*  
31 *Conveyance Facility on Sandhill Crane*). The analysis addressed the potential noise effects on cranes,  
32 and concluded that as much as 13,421–43,125 acres of crane habitat could potentially be affected by  
33 general construction noise above baseline level (50–60 dBA). This would include 666–3,274 acres of  
34 permanent crane roosting habitat, 1,498–5,036 acres of temporary crane roosting habitat, and  
35 11,258–34,816 acres of crane foraging habitat. In addition, 120–668 acres of permanent crane  
36 roosting habitat, 477–1,562 acres of temporary crane roosting habitat, and 1,392–11,882 acres of  
37 crane foraging habitat could be affected by noise from pile driving that would be above baseline  
38 level (50–60 dBA, Table 12-4-30 under Impact-BIO-71). The analysis was conducted based on the  
39 assumption that there would be direct line-of-sight from sandhill crane habitat areas to the  
40 construction site, and, therefore, provides a worst-case estimate of effects. In many areas the  
41 existing levees would partially or completely block the line-of-sight and would function as effective  
42 noise barriers, substantially reducing noise transmission. However, there is insufficient data to  
43 assess the effects that increased noise levels would have on sandhill crane behavior. Similar  
44 acreages of lesser sandhill crane habitat would be expected to be indirectly affected. However, lesser

1 sandhill cranes are less traditional in their winter roost sites and may be more likely to travel away  
2 from disturbed areas to roost and forage in more suitable habitat.

3 Evening and nighttime construction activities would require the use of extremely bright lights.  
4 Nighttime construction could also result in headlights flashing into roost sites when construction  
5 vehicles are turning onto or off of construction access routes. Proposed surge towers would require  
6 the use of safety lights that would alert low-flying aircraft to the presence of these structures  
7 because of their height. Little data is available on the effects of impact of artificial lighting on  
8 roosting birds. Direct light from automobile headlights has been observed to cause roosting cranes  
9 to flush and it is thought that they may avoid roosting in areas where lighting is bright (BDCP  
10 Chapter 5, *Effects Analysis*). If the birds were to roost in a brightly lit site, they may be vulnerable to  
11 sleep-wake cycle shifts and reproductive cycle shifts. Potential risks of visual impacts from lighting  
12 include a reduction in the cranes' quality of nocturnal rest, and effects on their "sense of photo-  
13 period which might cause them to shift their physiology towards earlier migration and breeding."  
14 (BDCP Chapter 5, *Effects Analysis*). Effects such as these could prove detrimental to the cranes'  
15 overall fitness and reproductive success (which could in turn have population-level impacts). A  
16 change in photo-period interpretation could also cause cranes to fly out earlier from roost sites to  
17 forage and might increase their risk of power line collisions if they were to leave roosts before dawn  
18 (BDCP Chapter 5, *Effects Analysis*).

19 The effects of noise and visual disturbance on lesser sandhill crane would be minimized through the  
20 implementation of AMM20 (BDCP Appendix 3.C, *Avoidance and Minimization Measures*). Activities  
21 within 0.75 mile of crane roosting habitat would reduce construction noise during night time hours  
22 (from one hour before sunset to one hour after sunrise) such that construction noise levels do not  
23 exceed 50 dBA  $L_{eq}$  (1 hour) at the nearest temporary or permanent roosts during periods when the  
24 roost sites are available (flooded). In addition, the area of crane foraging habitat that would be  
25 affected during the day (from one hour after sunrise to one hour before sunset) by construction  
26 noise exceeding 50 dBA  $L_{eq}$  (1 hour) would also be minimized. Unavoidable noise related effects  
27 would be compensated for by the enhancement of 0.1 acre of foraging habitat for every acre  
28 indirectly affected within the 50 dBA  $L_{eq}$  (1 hour) construction noise contour. With these measures  
29 in place, indirect effects of noise and visual disturbance from construction activities are not expected  
30 to reduce the lesser sandhill crane population in the study area.

31 The use of mechanical equipment during water conveyance facilities construction could cause the  
32 accidental release of petroleum or other contaminants that could affect lesser sandhill cranes in the  
33 surrounding habitat. The inadvertent discharge of sediment or excessive dust adjacent to lesser  
34 sandhill crane habitat could also affect the subspecies. AMM1–AMM7, including *AMM2 Construction*  
35 *Best Management Practices and Monitoring*, would minimize the likelihood of such spills and ensure  
36 that measures were in place to prevent runoff from the construction area and negative effects of  
37 dust on foraging habitat.

38 **Methylmercury Exposure:** Covered activities have the potential to exacerbate bioaccumulation of  
39 mercury in lesser sandhill crane. Marsh (tidal and nontidal) and floodplain restoration also have the  
40 potential to increase exposure to methylmercury. Mercury is transformed into the more bioavailable  
41 form of methylmercury in aquatic systems, especially areas subjected to regular wetting and drying  
42 such as tidal marshes and flood plains (Alpers et al. 2008). Thus, BDCP restoration activities that  
43 create newly inundated areas could increase bioavailability of mercury (see BDCP Chapter 3,  
44 *Conservation Strategy*, for details of restoration). Increased methylmercury associated with natural  
45 community and floodplain restoration may indirectly affect lesser sandhill crane via uptake in lower

1 tropic levels (BDCP Appendix 5.D, *Contaminants*). The potential mobilization or creation of  
2 methylmercury within the study area varies with site-specific conditions and would need to be  
3 assessed at the project level. *CM12 Methylmercury Management* includes provisions for project-  
4 specific Mercury Management Plans. Along with avoidance and minimization measures and adaptive  
5 management and monitoring, *CM12 Methylmercury Management* would be available to address the  
6 uncertainty of methylmercury levels in restored tidal marsh and potential impacts on lesser sandhill  
7 crane.

8 The potential indirect effects of increased mercury exposure is likely low for lesser sandhill crane  
9 for the following reasons: 1) lesser sandhill cranes occur in the study area only during the  
10 nonbreeding months, 2) their primary foraging habitats in the study area are cultivated crops, and  
11 3) the use of restored tidal wetlands by cranes is likely to be limited compared to seasonal managed  
12 wetlands.

13 **Selenium:** Selenium is an essential nutrient for avian species and has a beneficial effect in low  
14 doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009, Ohlendorf  
15 and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults, and can also  
16 result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz 2009). The  
17 effect of selenium toxicity differs widely between species and also between age and sex classes  
18 within a species. In addition, the effect of selenium on a species can be confounded by interactions  
19 with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith 2009).

20 The primary source of selenium bioaccumulation in birds is through their diet (Ackerman and  
21 Eagles-Smith 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the  
22 trophic level at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At  
23 Kesterson Reservoir in the San Joaquin Valley, selenium concentrations in invertebrates have been  
24 found to be two to six times the levels in rooted plants. Furthermore, bivalves sampled in the San  
25 Francisco Bay contained much higher selenium levels than crustaceans such as copepods (Stewart et  
26 al. 2004). Studies conducted at the Grasslands in Merced County recorded higher selenium levels in  
27 black-necked stilts which feed on aquatic invertebrates than in mallards and pintails, which are  
28 primarily herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which  
29 forage on bivalves) have much higher levels of selenium levels than shorebirds that prey on aquatic  
30 invertebrates (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high  
31 levels of selenium have a higher risk of selenium toxicity.

32 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations  
33 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to  
34 exacerbate bioaccumulation of selenium in avian species, including the lesser sandhill crane. Marsh  
35 (tidal and nontidal) and floodplain restoration have the potential to mobilize selenium, and  
36 therefore increase avian exposure from ingestion of prey items with elevated selenium levels. Thus,  
37 BDCP restoration activities that create newly inundated areas could increase bioavailability of  
38 selenium (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Changes in  
39 selenium concentrations were analyzed in Chapter 8, *Water Quality*, and it was determined that,  
40 relative to Existing Conditions and the No Action Alternative, CM1 would not result in substantial,  
41 long-term increases in selenium concentrations in water in the Delta under any alternative.  
42 However, it is difficult to determine whether the effects of potential increases in selenium  
43 bioavailability associated with restoration-related conservation measures (CM4–CM5) would lead to  
44 adverse effects on lesser sandhill crane.

1 Because of the uncertainty that exists at this programmatic level of review, there could be a  
2 substantial effect on lesser sandhill crane from increases in selenium associated with restoration  
3 activities. This effect would be addressed through the implementation of *AMM27 Selenium*  
4 *Management* (BDCP Appendix 3.C, *Avoidance and Minimization Measures*) which would provide  
5 specific tidal habitat restoration design elements to reduce the potential for bioaccumulation of  
6 selenium and its bioavailability in tidal habitats. Furthermore, the effectiveness of selenium  
7 management to reduce selenium concentrations and/or bioaccumulation would be evaluated  
8 separately for each restoration effort as part of design and implementation. This avoidance and  
9 minimization measure would be implemented as part of the tidal habitat restoration design  
10 schedule.

11 **NEPA Effects:** Crane habitat could potentially be affected by general construction noise (13,421-  
12 43,125 acres) and pile driving (1,989-14,111 acres) above baseline level (50–60 dBA). However,  
13 lesser sandhill cranes are less traditional in their winter roost sites and may be more likely to travel  
14 away from disturbed areas to roost in more suitable habitat. Construction in certain areas would  
15 take place 7 days a week and 24 hours a day and evening and nighttime construction activities  
16 would require the use of extremely bright lights, which could adversely affect roosting cranes by  
17 impacting their sense of photo-period and by exposing them to predators. The effects of noise and  
18 visual disturbances would be reduced through the implementation of *AMM20 Greater Sandhill*  
19 *Crane*, which would include requirements (described above) to minimize the effects of noise and  
20 visual disturbance on sandhill cranes. With these measures in place, in addition to AMM1–AMM7,  
21 noise and visual disturbances, the potential for hazardous spills, increased dust and sedimentation,  
22 and operations and maintenance of the water conveyance facilities would not result in an adverse  
23 effect on the lesser sandhill crane. Tidal habitat restoration could result in increased exposure of  
24 lesser sandhill crane to selenium. This effect would be addressed through the implementation of  
25 *AMM27 Selenium Management*, which would provide specific tidal habitat restoration design  
26 elements to reduce the potential for bioaccumulation of selenium and its bioavailability in tidal  
27 habitats. With these measures in place, the effects of noise and visual disturbance, potential spills of  
28 hazardous materials, and increased exposure to selenium would not have an adverse effect on lesser  
29 sandhill crane. The implementation of tidal natural communities restoration or floodplain  
30 restoration could result in increased exposure of lesser sandhill crane to methylmercury. The  
31 potential indirect effects of increased mercury exposure is likely low for lesser sandhill crane  
32 However, it is unknown what concentrations of methylmercury are harmful to the species, and the  
33 potential for increased exposure varies substantially within the study area. Site-specific restoration  
34 plans that address the creation and mobilization of mercury, as well as monitoring and adaptive  
35 management as described in *CM12 Methylmercury Management*, would be available to address the  
36 uncertainty of methylmercury levels in restored tidal marsh and potential impacts on lesser sandhill  
37 crane. The site-specific planning phase of marsh restoration would be the appropriate place to  
38 assess the potential for risk of methylmercury exposure for lesser sandhill crane, once site specific  
39 sampling and other information could be developed.

40 **CEQA Conclusion:** Crane habitat could potentially be affected by general construction noise  
41 (13,421–43,125 acres) and pile driving (1,989–14,111 acres) above baseline level (50–60 dBA).  
42 However, lesser sandhill cranes are less traditional in their winter roost sites and may be more  
43 likely to travel away from disturbed areas to roost in more suitable habitat. Construction in certain  
44 areas would take place 7 days a week and 24 hours a day and evening and nighttime construction  
45 activities would require the use of extremely bright lights, which could adversely affect roosting  
46 cranes by impacting their sense of photo-period and by exposing them to predators. The effects of

1 noise and visual disturbances would be reduced through the implementation of *AMM20 Greater*  
2 *Sandhill Crane* which would include requirements (described above) to minimize the effects of noise  
3 and visual disturbance on sandhill cranes. The implementation of tidal natural communities  
4 restoration or floodplain restoration could result in increased exposure of lesser sandhill crane to  
5 methylmercury. The potential indirect effects of increased mercury exposure is likely low for lesser  
6 sandhill crane. However, it is unknown what concentrations of methylmercury are harmful to the  
7 species, and the potential for increased exposure varies substantially within the study area. Site-  
8 specific restoration plans that address the creation and mobilization of mercury, as well as  
9 monitoring and adaptive management as described in *CM12 Methylmercury Management*, would be  
10 available to address the uncertainty of methylmercury levels in restored tidal marsh and potential  
11 impacts on lesser sandhill crane. Tidal habitat restoration could result in increased exposure of  
12 lesser sandhill crane to selenium. This impact would be addressed through the implementation of  
13 *AMM27 Selenium Management*, which would provide specific tidal habitat restoration design  
14 elements to reduce the potential for bioaccumulation of selenium and its bioavailability in tidal  
15 habitats. With *AMM1-AMM7* and *AMM27 Selenium Management* in place, in addition to *CM12*  
16 *Methylmercury Management*, indirect effects of Alternative 4 implementation would have a less-  
17 than-significant impact on lesser sandhill crane.

#### 18 **Least Bell's Vireo and Yellow Warbler**

19 This section describes the effects of Alternative 4, including water conveyance facilities construction  
20 and implementation of other conservation components, on least Bell's vireo and yellow warbler.  
21 Least Bell's vireo and yellow warbler modeled habitat identifies suitable nesting and migratory  
22 habitat as those plant alliances from the valley/foothill riparian modeled habitat that contain a  
23 dense shrub component, including all willow-dominated alliances.

24 Construction and restoration associated with Alternative 4 conservation measures would result in  
25 both temporary and permanent losses of least Bell's vireo and yellow warbler modeled habitat as  
26 indicated in Table 12-4-33. Full implementation of Alternative 4 would also include the following  
27 conservation actions over the term of the BDCP to benefit least Bell's vireo and yellow warbler  
28 (BDCP Chapter 3, Section 3.3, *Biological Goals and Objectives*).

- 29 ● Restore or create at least 5,000 acres of valley/foothill riparian natural community with at least  
30 3,000 acres occurring on restored seasonally inundated floodplain (Objective VFRNC1.1,  
31 associated with CM7).
- 32 ● Protect at least 750 acres of existing valley/foothill riparian natural community in CZ 7 by year  
33 10 (Objective VFRNC1.2, associated with CM7).
- 34 ● Maintain and enhance structural heterogeneity (Objective VFRNC2.1, associated with CM7).
- 35 ● Maintain at least 1,000 acres of early- to mid-successional vegetation (Objective VFRNC2.2,  
36 associated with CM7).

37 As explained below, with the restoration and protection of these amounts of habitat, in addition to  
38 natural community enhancement and management commitments and implementation of *AMM1-*  
39 *AMM7*, *AMM22 Suisun Song Sparrow*, *Yellow-Breasted Chat*, *Least Bell's Vireo*, *Western Yellow-Billed*  
40 *Cuckoo*, and Mitigation Measure BIO-75, impacts on least Bell's vireo and yellow warbler would not  
41 be adverse for NEPA purposes and would be less than significant for CEQA purposes.

1 **Table 12-4-33. Changes in Least Bell’s Vireo and Yellow Warbler Modeled Habitat Associated with**  
2 **Alternative 4 (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	Migratory and breeding	29	29	23	23	NA	NA
<b>Total Impacts CM1</b>		<b>29</b>	<b>29</b>	<b>23</b>	<b>23</b>		
CM2–CM18	Migratory and breeding	382	656	88	109	48–85	148
<b>Total Impacts CM2–CM18</b>		<b>382</b>	<b>656</b>	<b>88</b>	<b>109</b>	<b>48–85</b>	<b>148</b>
<b>TOTAL IMPACTS</b>		<b>411</b>	<b>685</b>	<b>111</b>	<b>132</b>	<b>48–85</b>	<b>148</b>

<sup>a</sup> See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-75: Loss or Conversion of Habitat for and Direct Mortality of Least Bell’s Vireo**  
5 **and Yellow Warbler**

6 Alternative 4 conservation measures would result in the combined permanent and temporary loss  
7 of up to 817 acres of modeled habitat (685 acres of permanent loss and 132 acres of temporary loss)  
8 for least Bell’s vireo and yellow warbler (Table 12-4-33). Conservation measures that would result  
9 in these losses are conveyance facilities and transmission line construction, and establishment and  
10 use of borrow and spoil areas (CM1), Fremont Weir/Yolo Bypass fisheries improvements (CM2),  
11 tidal natural communities restoration (CM4), and seasonally inundated floodplain restoration  
12 (CM5). Habitat enhancement and management activities (CM11) which include ground disturbance  
13 or removal of nonnative vegetation, could result in local adverse habitat effects. In addition,  
14 maintenance activities associated with the long-term operation of the water conveyance facilities  
15 and other BDCP physical facilities could degrade or eliminate least Bell’s vireo and yellow warbler  
16 habitat. Each of these individual activities is described below. A summary statement of the combined  
17 impacts and NEPA effects and a CEQA conclusion follows the individual conservation measure  
18 discussions.

- 19 • *CM1 Water Facilities and Operation:* Construction of Alternative 4 conveyance facilities would  
20 result in the combined permanent and temporary loss of up to 52 acres of modeled least Bell’s  
21 vireo and yellow warbler habitat (Table 12-4-33). Of the 52 acres of modeled habitat that would  
22 be removed for the construction of the conveyance facilities, 29 acres would be a permanent  
23 loss and 23 acres would be a temporary loss of habitat. Activities that would impact modeled  
24 habitat consist of tunnel, forebay, and intake construction, temporary access roads, and

1 construction of transmission lines. Impacts from CM1 would occur in the central delta in CZs 3,  
2 4, 5, 6, and 8. There are no occurrences of least Bell's vireo or yellow warbler that intersect with  
3 the CM1 footprint. Refer to the Terrestrial Biology Map Book for a detailed view of Alternative 4  
4 construction locations. Impacts from CM1 would occur within the first 10 years of Alternative 4  
5 implementation.

- 6 ● *CM2 Yolo Bypass Fisheries Enhancement*: Construction of Yolo Bypass fisheries enhancements  
7 would permanently remove approximately 83 acres and temporarily remove 88 acres of  
8 modeled least Bell's vireo and yellow warbler habitat in the Yolo Bypass in CZ 2. The loss is  
9 expected to occur during the first 10 years of Alternative 4 implementation.
- 10 ● *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and  
11 inundation would permanently remove an estimated 545 acres of modeled least Bell's vireo and  
12 yellow warbler habitat.
- 13 ● *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore  
14 seasonally inundated floodplain would permanently remove approximately 28 acres and  
15 temporarily remove 21 acres of modeled least Bell's vireo and yellow warbler habitat. Based on  
16 the riparian habitat restoration assumptions, a minimum of 3,000 acres of valley/foothill  
17 riparian habitat would be restored as a component of seasonally inundated floodplain  
18 restoration actions.

19 The actual number of acres of valley/foothill riparian habitat that CM4 and CM5 would restore  
20 may differ from these estimates, depending on how closely the actual outcome of tidal habitat  
21 restoration approximates the assumed outcome. However, riparian restoration from CM4 and  
22 CM5 would increase the extent of least Bell's vireo and yellow warbler habitat within the study  
23 area once the restored riparian vegetation has developed habitat functions for these species.

- 24 ● *CM6 Channel Margin Enhancement*: Channel margin habitat enhancement could result in  
25 removal of small amounts of valley/foothill riparian habitat along 20 miles of river and sloughs.  
26 The extent of this loss cannot be quantified at this time, but the majority of the enhancement  
27 activity would occur along waterway margins where riparian habitat stringers exist, including  
28 levees and channel banks. The improvements would occur within the study area on sections of  
29 the Sacramento, San Joaquin and Mokelumne Rivers, and along Steamboat and Sutter Sloughs.
- 30 ● *CM11 Natural Communities Enhancement and Management*: Habitat protection and management  
31 activities that could be implemented in protected least Bell's vireo and yellow warbler habitats  
32 are expected to maintain and improve the functions of the habitat over the term of the BDCP.  
33 Least Bell's vireo and yellow warbler would be expected to benefit from the increase in  
34 protected habitat, which would maintain conditions favorable for future species establishment  
35 in the study area. If least Bell's vireo and yellow warbler established breeding populations in  
36 restored riparian habitats in the study area, occupied habitat would be monitored to determine  
37 if there were a need to implement controls on brood parasites (brown-headed cowbird) or nest  
38 predators. If implemented, these actions would be expected to benefit the least Bell's vireo and  
39 yellow warbler by removing a potential stressor that could, if not addressed, adversely affect the  
40 stability of newly established populations.

41 Habitat management- and enhancement-related activities could disturb least Bell's vireo and  
42 yellow warbler nests. If either species were to nest in the vicinity of a worksite, equipment  
43 operation could destroy nests, and noise and visual disturbances could lead to their  
44 abandonment, resulting in mortality of eggs and nestlings. The potential for these activities to

1 result in direct mortality of least Bell's vireo or yellow warbler would be minimized with the  
2 implementation of *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western*  
3 *Yellow-Billed Cuckoo* and Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird*  
4 *Surveys and Avoid Disturbance of Nesting Birds*.

- 5 ● Operations and Maintenance: Postconstruction operation and maintenance of the above-ground  
6 water conveyance facilities and restoration infrastructure could result in ongoing but periodic  
7 disturbances that could affect least Bell's vireo and yellow warbler use of the surrounding  
8 habitat. Maintenance activities would include vegetation management, levee and structure  
9 repair, and re-grading of roads and permanent work areas. These effects, however, would be  
10 reduced by AMMs and conservation actions as described below.
- 11 ● Injury and Direct Mortality: Although least Bell's vireo nesting has not been confirmed in the  
12 study area, recent occurrences in the Yolo Bypass and at the San Joaquin River National Wildlife  
13 Refuge suggest that the reestablishment of a breeding population is a possibility over the  
14 duration of the BDCP. Construction-related activities would not be expected to result in direct  
15 mortality of least Bell's vireo or yellow warbler because adults and fledged young would be  
16 expected to avoid contact with construction and other equipment. However, if either species  
17 were to nest in the construction area, equipment operation, noise and visual disturbances could  
18 destroy nests or lead to their abandonment, resulting in mortality of eggs and nestlings. These  
19 effects on least Bell's vireo would be avoided and minimized with the implementation of *AMM22*  
20 *Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo*. In  
21 addition, Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid*  
22 *Disturbance of Nesting Birds*, would be available to address adverse effects on nesting yellow  
23 warblers.
- 24 ● Temporarily affected areas would be restored as riparian habitat within 1 year following  
25 completion of construction activities. Although the effects are considered temporary, the  
26 restored riparian habitat would require a period of time for ecological succession to occur and  
27 for restored riparian habitat to functionally replace habitat that has been affected. However,  
28 restored riparian vegetation can have the habitat structure to support breeding vireos within 3  
29 to 5 years, particularly if the restored vegetation is adjacent to established riparian areas (Kus  
30 2002), and similar habitat would be suitable for yellow warbler. The majority of the riparian  
31 vegetation to be temporarily removed is early- to mid-successional; therefore, the replaced  
32 riparian vegetation would be expected to have structural components comparable to the  
33 temporarily removed vegetation within the first 5 to 10 years after the initial restoration  
34 activities are complete.

35 The following paragraphs summarize the combined effects discussed above and describe other  
36 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also  
37 included.

### 38 ***Near-Term Timeframe***

39 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
40 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
41 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
42 effects of construction would not be adverse under NEPA. Alternative 4 would remove 522 acres of  
43 modeled habitat for least Bell's vireo and yellow warbler in the study area in the near-term. These  
44 effects would result from the construction of the water conveyance facilities (CM1, 52 acres of

1 habitat), and implementing other conservation measures (Yolo Bypass fisheries improvements  
2 [CM2] tidal restoration [CM4], seasonally inundated floodplain restoration [CM5], 470 acres of  
3 habitat).

4 Typical NEPA and CEQA project-level mitigation ratios for those natural communities that would be  
5 affected and that are identified in the biological goals and objectives for least Bell's vireo in Chapter  
6 3 of the BDCP would be 1:1 for restoration/creation and 1:1 protection of dense shrubby  
7 successional valley/foothill riparian habitat. Using these ratios would indicate that 52 acres of  
8 valley/foothill riparian habitat should be restored/created and 52 acres should be protected to  
9 compensate for the CM1 losses of least Bell's vireo and yellow warbler habitat. The near-term effects  
10 of other conservation actions would remove 470 acres of modeled habitat, and therefore require  
11 470 acres of restoration and 470 acres of protection of dense shrubby valley/foothill riparian using  
12 the same typical NEPA and CEQA ratios (1:1 for restoration and 1:1 for protection).

13 The BDCP has committed to near-term goals of protecting 750 acres and restoring 800 acres of the  
14 valley/foothill riparian natural community in the Plan Area (Table 3-4 in Chapter 3, *Description of*  
15 *Alternatives*). These conservation actions are associated with CM3 and CM7 and would occur in the  
16 same timeframe as the construction and early restoration losses, thereby avoiding adverse effects of  
17 habitat loss on least Bell's vireo and yellow warbler. The majority of the riparian restoration acres  
18 would occur in CZ 7 as part of a reserve system with extensive wide bands or large patches of  
19 valley/foothill riparian natural community (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3,  
20 *Conservation Strategy*). This restoration would provide the large contiguous patches needed for  
21 suitable least Bell's vireo and yellow warbler breeding habitat. Goals and objectives in the Plan for  
22 riparian restoration also include the restoration, maintenance and enhancement of structural  
23 heterogeneity with adequate vertical and horizontal overlap among vegetation components and  
24 over adjacent riverine channels, freshwater emergent wetlands, and grasslands (Objective  
25 VFRNC2.1). These Plan objectives represent performance standards for considering the  
26 effectiveness of CM7 restoration and CM3 protection actions. The acres of protection contained in  
27 the near-term Plan goals and the additional detail in the biological objectives for least Bell's vireo  
28 satisfy the typical mitigation ratios that would be applied to the project-level effects of CM1, as well  
29 as mitigate the near-term effects of the other conservation measures. The restored riparian habitat  
30 could require 5 years to several decades, for ecological succession to occur and for restored riparian  
31 habitat to functionally replace habitat that has been affected. However, because the modeled habitat  
32 impacted largely consists of small patches of blackberry, willow, and riparian scrub, and because  
33 least Bell's vireo and yellow warbler are not known to be established breeders in the study area,  
34 BDCP actions would not be expected to have an adverse population-level effect on either species.

35 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
36 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
37 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
38 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
39 *Material*, *AMM7 Barge Operations Plan*, and *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat,*  
40 *Least Bell's Vireo, Western Yellow-Billed Cuckoo*. All of these AMMs include elements that would  
41 avoid or minimize the risk of affecting individuals and species habitats adjacent to work areas and  
42 storage sites. The AMMs are described in detail in BDCP Appendix 3.C, *Avoidance and Minimization*  
43 *Measures*. The yellow warbler is not a species that is covered under the BDCP. Although  
44 preconstruction surveys for least Bell's vireo may also detect yellow warblers (if they were to nest  
45 in the study area over the course of the BDCP), in order to have a less than adverse effect on  
46 individuals, preconstruction surveys for noncovered avian species would be required to ensure that

1 yellow warbler nests were detected and avoided. Mitigation Measure BIO-75 would be available to  
2 address adverse effects on nesting yellow warblers.

3 **Late Long-Term Timeframe**

4 The habitat model indicates that the study area supports approximately 14,850 acres of modeled  
5 habitat for least Bell's vireo and yellow warbler. Alternative 4 as a whole would result in the  
6 permanent loss of and temporary effects on 817 acres of habitat for these species during the term of  
7 the Plan (7% of the total habitat in the study area). These losses would occur from the construction  
8 of the water conveyance facilities (CM1) and from *CM2 Yolo Bypass Fisheries Enhancement, CM4*  
9 *Tidal Natural Communities Restoration, and CM5 Seasonally Inundated Floodplain Restoration*. The  
10 locations of these losses would be in fragmented riparian habitat throughout the study area.

11 The Plan includes conservation commitments through *CM7 Riparian Natural Community Restoration*  
12 and *CM3 Natural Communities Protection and Restoration* to restore or create at least 5,000 acres  
13 and protect at least 750 acres of valley/foothill riparian woodland. Of the 5,000 acres of restored  
14 riparian natural communities, a minimum of 3,000 acres of valley/foothill riparian would be  
15 restored within the seasonally inundated floodplain, and 1,000 acres would be managed as dense  
16 early to mid-successional riparian forest (Objectives VFRNC1.1 and VFRNC1.2). Goals and objectives  
17 in the Plan for riparian restoration also include the maintenance and enhancement of structural  
18 heterogeneity (Objective VFRNC2.1) which would provide suitable nesting and migratory habitat for  
19 the least Bell's vireo and yellow warbler.

20 The BDCP's beneficial effects analysis (BDCP Chapter, Section 5.6, *Effects on Covered Wildlife and*  
21 *Plant Species*) estimates that the restoration and protection actions discussed above could result in  
22 the restoration of 1,000 acres and the protection of 593 acres of habitat for the least Bell's vireo,  
23 which would also be suitable habitat for the yellow warbler.

24 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*  
25 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*  
26 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
27 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
28 *Material, AMM7 Barge Operations Plan, and AMM22 Suisun Song Sparrow, Yellow-Breasted Chat,*  
29 *Least Bell's Vireo, Western Yellow-Billed Cuckoo*. All of these AMMs include elements that would  
30 avoid or minimize the risk of affecting individuals and species habitats adjacent to work areas and  
31 storage sites. The AMMs are described in detail in BDCP Appendix 3.C, *Avoidance and Minimization*  
32 *Measures*.

33 **NEPA Effects:** The loss of least Bell's vireo and yellow warbler habitat and potential direct mortality  
34 of these special-status species under Alternative 4 would represent an adverse effect in the absence  
35 of other conservation actions. However, neither species is an established breeder in the study area  
36 and impacts would likely be limited to loss of migratory habitat. In addition, with habitat protection  
37 and restoration associated with CM3 and CM7, guided by biological goals and objectives and by  
38 *AMM1 Worker Awareness Training, AMM2 Construction Best Management Practices and Monitoring,*  
39 *AMM3 Stormwater Pollution Prevention Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill*  
40 *Prevention, Containment, and Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable*  
41 *Tunnel Material, and Dredged Material, AMM7 Barge Operations Plan, and AMM22 Suisun Song*  
42 *Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo*, which would be in  
43 place throughout the construction period, the effects of habitat loss and potential mortality on least  
44 Bell's vireo, and the effect of habitat loss on yellow warbler under Alternative 4 would not be

1 adverse. The yellow warbler is not a species that is covered under the BDCP, and the potential for  
2 mortality would be an adverse effect without preconstruction surveys to ensure that nests are  
3 detected and avoided. Mitigation Measure BIO-75 would be available to address this effect.

4 **CEQA Conclusion:**

5 **Near-Term Timeframe**

6 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
7 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
8 provide sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that  
9 the impacts of construction would be less than significant under CEQA. Alternative 4 would remove  
10 522 acres of modeled habitat for least Bell's vireo and yellow warbler in the study area in the near-  
11 term. These effects would result from the construction of the water conveyance facilities (CM1, 52  
12 acres of habitat), and implementing other conservation measures (Yolo Bypass fisheries  
13 improvements [CM2] tidal restoration [CM4], seasonally inundated floodplain restoration [CM5],  
14 470 acres of habitat).

15 Typical NEPA and CEQA project-level mitigation ratios for those natural communities that would be  
16 affected and that are identified in the biological goals and objectives for least Bell's vireo in Chapter  
17 3 of the BDCP would be 1:1 for restoration/creation and 1:1 protection of dense shrubby  
18 successional valley/foothill riparian habitat. Using these ratios would indicate that 52 acres of  
19 valley/foothill riparian habitat should be restored/created and 52 acres should be protected to  
20 mitigate the CM1 losses of least Bell's vireo and yellow warbler habitat. The near-term effects of  
21 other conservation actions would remove 470 acres of tidal natural communities, and therefore  
22 require 470 acres of restoration and 470 acres of protection of dense shrubby valley/foothill  
23 riparian using the same typical NEPA and CEQA ratios (1:1 for restoration and 1:1 for protection).

24 The BDCP has committed to near-term goals of protecting 750 acres and restoring 800 acres of the  
25 valley/foothill riparian natural community in the Plan Area (Table 3-4 in Chapter 3, *Description of*  
26 *Alternatives*). These conservation actions are associated with CM3 and CM7 and would occur in the  
27 same timeframe as the construction and early restoration losses, thereby avoiding adverse effects of  
28 habitat loss on least Bell's vireo and yellow warbler. The majority of the riparian restoration acres  
29 would occur in CZ 7 as part of a reserve system with extensive wide bands or large patches of  
30 valley/foothill riparian natural community (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3,  
31 *Conservation Strategy*). This restoration would provide the large contiguous patches needed for  
32 suitable least Bell's vireo and yellow warbler breeding habitat. Goals and objectives in the Plan for  
33 riparian restoration also include the restoration, maintenance and enhancement of structural  
34 heterogeneity with adequate vertical and horizontal overlap among vegetation components and  
35 over adjacent riverine channels, freshwater emergent wetlands, and grasslands (Objective  
36 VFRNC2.1). These Plan objectives represent performance standards for considering the  
37 effectiveness of CM7 restoration and CM3 protection actions. biological goals and objectives would  
38 inform the near-term protection and restoration efforts and represent performance standards for  
39 considering the effectiveness of restoration actions. The acres of protection contained in the near-  
40 term Plan goals and the additional detail in the biological objectives for least Bell's vireo satisfy the  
41 typical mitigation ratios that would be applied to the project-level effects of CM1, as well as mitigate  
42 the near-term effects of the other conservation measures. The restored riparian habitat could  
43 require 5 years to several decades, for ecological succession to occur and for restored riparian  
44 habitat to functionally replace habitat that has been affected. However, because the modeled habitat  
45 impacted largely consists of small patches of blackberry, willow, and riparian scrub, and because

1 least Bell's vireo and yellow warbler are not known to be established breeders in the study area,  
2 BDCP actions would not be expected to have an adverse population-level effect on either species.

3 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
4 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
5 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
6 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
7 *Material*, *AMM7 Barge Operations Plan*, and *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat,*  
8 *Least Bell's Vireo, Western Yellow-Billed Cuckoo*. All of these AMMs include elements that would  
9 avoid or minimize the risk of affecting individuals and species habitats adjacent to work areas and  
10 storage sites. The AMMs are described in detail in BDCP Appendix 3.C, *Avoidance and Minimization*  
11 *Measures*. The yellow warbler is not a species that is covered under the BDCP. Although  
12 preconstruction surveys for least Bell's vireo may also detect yellow warblers (if they were to nest  
13 in the study area over the course of the BDCP), in order to have a less than adverse effect on  
14 individuals, preconstruction surveys for noncovered avian species would be required to ensure that  
15 yellow warbler nests are detected and avoided. Mitigation Measure BIO-75 would reduce the  
16 potential impact on nesting yellow warblers to a less-than-significant impact, should they become  
17 established in the study area.

### 18 **Late Long-Term Timeframe**

19 The habitat model indicates that the study area supports approximately 14,850 acres of modeled  
20 habitat for least Bell's vireo and yellow warbler. Alternative 4 as a whole would result in the  
21 permanent loss of and temporary effects on 817 acres of habitat for these species during the term of  
22 the Plan (7% of the total habitat in the study area). These losses would occur from the construction  
23 of the water conveyance facilities (CM1) and from *CM2 Yolo Bypass Fisheries Enhancement*, *CM4*  
24 *Tidal Natural Communities Restoration*, and *CM5 Seasonally Inundated Floodplain Restoration*. The  
25 locations of these losses would be in fragmented riparian habitat throughout the study area.

26 The Plan includes conservation commitments through *CM7 Riparian Natural Community Restoration*  
27 and *CM3 Natural Communities Protection and Restoration* to restore or create at least 5,000 acres  
28 and protect at least 750 acres of valley/foothill riparian woodland. Of the 5,000 acres of restored  
29 riparian natural communities, a minimum of 3,000 acres of valley/foothill riparian would be  
30 restored within the seasonally inundated floodplain, and 1,000 acres would be managed as dense  
31 early to mid-successional riparian forest (Objectives VFRNC1.1 and VFRNC1.2). Goals and objectives  
32 in the Plan for riparian restoration also include the maintenance and enhancement of structural  
33 heterogeneity (Objective VFRNC2.1) which would provide suitable nesting and migratory habitat for  
34 the least Bell's vireo and yellow warbler. The restored riparian habitat could require 5 years to  
35 several decades, for ecological succession to occur and for restored riparian habitat to functionally  
36 replace habitat that has been affected. Therefore, there would be a time-lag before the restored  
37 habitat would benefit either species. However, neither species are established breeders in the study  
38 area and impacts would likely be limited to loss of migratory habitat for least Bell's vireo and yellow  
39 warbler.

40 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*  
41 *Plant Species*) estimates that the restoration and protection actions discussed above could result in  
42 the restoration of 1,000 acres and the protection of 593 acres of habitat for the least Bell's vireo,  
43 which would also be suitable habitat for the yellow warbler.

1 The loss of least Bell's vireo and yellow warbler habitat and potential direct mortality of these  
2 special-status species under Alternative 4 would represent an adverse effect in the absence of other  
3 conservation actions. However, neither species is an established breeder in the study area and  
4 impacts would likely be limited to loss of migratory habitat for least Bell's vireo and yellow warbler.  
5 In addition, with habitat protection and restoration associated with CM3 and CM7, guided by  
6 biological goals and objectives and by *AMM1 Worker Awareness Training*, *AMM2 Construction Best*  
7 *Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention Plan*, *AMM4 Erosion*  
8 *and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and Countermeasure Plan*, *AMM6*  
9 *Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged Material*, *AMM7 Barge*  
10 *Operations Plan*, and *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western*  
11 *Yellow-Billed Cuckoo*, which would be in place throughout the construction period, the impact of  
12 habitat loss and potential mortality on least Bell's vireo and the impact of habitat loss on yellow  
13 warbler under Alternative 4 would be less than significant. The yellow warbler is not a species that  
14 is covered under the BDCP. Although preconstruction surveys for least Bell's vireo may also detect  
15 nesting yellow warblers, for the BDCP to have a less-than-significant impact on individuals,  
16 preconstruction surveys for noncovered avian species would be required to ensure that yellow  
17 warbler nests are detected and avoided. Implementation of Mitigation Measure BIO-75 would  
18 reduce this potential impact on nesting yellow warblers, if present in the study area, to a less-than-  
19 significant level.

20 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**  
21 **Disturbance of Nesting Birds**

22 To reduce impacts on nesting birds, DWR will implement the measures listed below.

- 23 • To the maximum extent feasible, vegetation (trees, shrubs, ruderal areas) removal and  
24 trimming will be scheduled during the nonbreeding season of birds (September 1–January  
25 31). If vegetation removal cannot be removed in accordance with this timeframe,  
26 preconstruction/preactivity surveys for nesting birds and additional protective measures  
27 will be implemented as described below.
- 28 • A qualified wildlife biologist with knowledge of the relevant species will conduct nesting  
29 surveys before the start of construction. A minimum of three separate surveys will be  
30 conducted within 30 days prior to construction, with the last survey within 3 days prior to  
31 construction. Surveys will include a search of all suitable nesting habitat (trees, shrubs,  
32 ruderal areas, field crops) in the construction area. In addition, a 500-foot area around the  
33 project area will be surveyed for nesting raptors, and a 250-foot buffer area will be surveyed  
34 for other nesting birds. If no active nests are detected during these surveys, no additional  
35 measures are required.
- 36 • If active nests are found in the survey area, no-disturbance buffers will be established  
37 around the nest sites to avoid disturbance or destruction of the nest site until the end of the  
38 breeding season (approximately September 1) or until a qualified wildlife biologist  
39 determines that the young have fledged and moved out of the project area (this date varies  
40 by species). A qualified wildlife biologist will monitor construction activities in the vicinity  
41 of the nests to ensure that construction activities do not affect nest success. The extent of the  
42 buffers will be determined by the biologists in coordination with USFWS and CDFW and will  
43 depend on the level of noise or construction disturbance, line-of-sight between the nest and  
44 the disturbance, ambient levels of noise and other disturbances, and other topographical or  
45 artificial barriers. Suitable buffer distances may vary between species.

1       **Impact BIO-76: Fragmentation of Least Bell's Vireo and Yellow Warbler Habitat**

2       Grading, filling, contouring, and other initial ground-disturbing operations may temporarily  
3       fragment modeled least Bell's vireo and yellow warbler habitat. This could temporarily reduce the  
4       affected habitat's extent and functions. Because there are only two recent occurrences of least Bell's  
5       vireo within the study area, and no occurrences of yellow warbler breeding in the study area, future  
6       occupancy would likely consist of only a small number of individuals, and any such habitat  
7       fragmentation is expected to have no or minimal effect on the species.

8       **NEPA Effects:** Because there are only two recent occurrences of least Bell's vireo within the study  
9       area, and no occurrences of yellow warbler breeding in the study area, habitat fragmentation  
10      resulting from ground-disturbing operations would not have an adverse effect on least Bell's vireo  
11      or yellow warbler.

12      **CEQA Conclusion:** Because there are only two recent occurrences of least Bell's vireo within the  
13      study area, and no occurrences of yellow warbler breeding in the study area, habitat fragmentation  
14      resulting from ground-disturbing operations would have a less-than-significant impact on least  
15      Bell's vireo or yellow warbler.

16      **Impact BIO-77: Effects on Least Bell's Vireo and Yellow Warbler Associated with Electrical**  
17      **Transmission Facilities**

18      New transmission lines would increase the risk for bird-power line strikes, which could result in  
19      injury or mortality of least Bell's vireo and yellow warbler. While both species could recolonize the  
20      study area during the permit term, recolonization would be expected to result primarily in response  
21      to BDCP riparian restoration, which would occur largely in CZ 7, which does not overlap with the  
22      proposed footprint for new transmission lines. The lack of occurrences in the study area, the lack of  
23      current and future higher value habitat patches in the vicinity of the proposed transmission lines,  
24      and the behavior and habitat requirements of least Bell's vireo and yellow warbler make collision  
25      with the proposed transmission lines highly unlikely.

26      **NEPA Effects:** Installation and presence of new transmission lines would not result in an adverse  
27      effect on least Bell's vireo or yellow warbler because the probability of bird-powerline strikes is  
28      unlikely due to the lack of occurrences in the study area, the lack of current and future higher value  
29      habitat patches in the vicinity of the proposed transmission lines, and the behavior and habitat  
30      requirements of these species.

31      **CEQA Conclusion:** Installation and presence of new transmission lines would result in less-than-  
32      significant impact on least Bell's vireo or yellow warbler because the probability of bird-powerline  
33      strikes is unlikely due to the lack of occurrences in the study area, the lack of current and future  
34      higher value habitat patches in the vicinity of the proposed transmission lines, and the behavior and  
35      habitat requirements of these species.

36      **Impact BIO-78: Indirect Effects of Plan Implementation on Least Bell's Vireo and Yellow**  
37      **Warbler**

38      **Indirect construction- and operation-related effects:** If least Bell's vireo or yellow warbler were  
39      to nest in or adjacent to work areas, construction and subsequent maintenance-related noise and  
40      visual disturbances could mask calls, disrupt foraging and nesting behaviors, and reduce the  
41      functions of suitable nesting habitat for these species. Construction noise above background noise  
42      levels (greater than 50 dBA) could extend 500 to 5,250 feet from the edge of construction activities

1 (BDCP Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of the BDCP Conveyance*  
2 *Facility on Sandhill Crane*, Table 4), although there are no available data to determine the extent to  
3 which these noise levels could affect least Bell's vireo or yellow warbler. *AMM22 Suisun Song*  
4 *Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo* would reduce the  
5 potential for adverse effects of construction-related activities on survival and productivity of nesting  
6 least Bell's vireo and a 500 foot no-disturbance buffer would be established around the active nest.  
7 Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of*  
8 *Nesting Birds*, would be available to reduce the potential for adverse effects of construction-related  
9 activities on nesting yellow warbler. The use of mechanical equipment during water conveyance  
10 facilities construction could cause the accidental release of petroleum or other contaminants that  
11 could affect least Bell's vireo and yellow warbler in the surrounding habitat. The inadvertent  
12 discharge of sediment or excessive dust adjacent to suitable habitat could also have an adverse  
13 effect on these species. *AMM2 Construction Best Management Practices and Monitoring* would  
14 minimize the likelihood of such spills and ensure that measures are in place to prevent runoff from  
15 the construction area and negative effects of dust on active nests.

16 **Methylmercury Exposure:** Covered activities have the potential to exacerbate bioaccumulation of  
17 mercury in avian species, including the least Bell's vireo and yellow warbler. Marsh (tidal and  
18 nontidal) and floodplain restoration have the potential to increase exposure to methylmercury.  
19 Mercury is transformed into the more bioavailable form of methylmercury in aquatic systems,  
20 especially areas subjected to regular wetting and drying such as tidal marshes and flood plains  
21 (Alpers et al. 2008). Thus, BDCP restoration activities that create newly inundated areas could  
22 increase bioavailability of mercury (see BDCP Chapter 3, *Conservation Strategy*, for details of  
23 restoration). Species sensitivity to methylmercury differs widely and there is a large amount of  
24 uncertainty with respect to species-specific effects. Increased methylmercury associated with  
25 natural community and floodplain restoration could indirectly affect least Bell's vireo and yellow  
26 warbler, via uptake in lower trophic levels (as described in the BDCP, Appendix 5.D, *Contaminants*).

27 The potential mobilization or creation of methylmercury within the study area varies with site-  
28 specific conditions and would need to be assessed at the project level. *CM12 Methylmercury*  
29 *Management* contains provisions for project-specific Mercury Management Plans. Site-specific  
30 restoration plans that address the creation and mobilization of mercury, as well as monitoring and  
31 adaptive management as described in CM12 would be available to address the uncertainty of  
32 methylmercury levels in restored tidal marsh and potential impacts on least Bell's vireo and yellow  
33 warbler.

34 **NEPA Effects:** Impacts of noise, the potential for hazardous spills, increased dust and sedimentation,  
35 and operations and maintenance of the water conveyance facilities on least Bell's vireo would not be  
36 adverse with the implementation of AMM1-AMM7, and *AMM22 Suisun Song Sparrow, Yellow-*  
37 *Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo*. Mitigation Measure BIO-75, *Conduct*  
38 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to  
39 address adverse effects on nesting yellow warblers. The implementation of tidal natural  
40 communities restoration or floodplain restoration could result in increased exposure of least Bell's  
41 vireo or yellow warbler to methylmercury, should they begin to nest in the study area. However, it is  
42 unknown what concentrations of methylmercury are harmful to these species. Site-specific  
43 restoration plans that address the creation and mobilization of mercury, as well as monitoring and  
44 adaptive management as described in *CM12 Methylmercury Management*, would be available to  
45 address the uncertainty of methylmercury levels in restored tidal marsh and potential adverse  
46 effects of methylmercury on least Bell's vireo and yellow warbler.

1 **CEQA Conclusion:** Impacts of noise, the potential for hazardous spills, increased dust and  
2 sedimentation, and operations and maintenance of the water conveyance facilities would have a  
3 less-than-significant impact on least Bell's vireo and yellow warbler with the implementation of  
4 *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo,*  
5 *Mitigation Measure BIO-75, Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of*  
6 *Nesting Birds, and AMM2 Construction Best Management Practices and Monitoring.* The  
7 implementation of tidal natural communities restoration or floodplain restoration could result in  
8 increased exposure of least Bell's vireo or yellow warbler to methylmercury, should they begin to  
9 nest in the study area. However, it is unknown what concentrations of methylmercury are harmful  
10 to these species. Sites-specific restoration plans that address the creation and mobilization of  
11 mercury, as well as monitoring and adaptive management as described in *CM12 Methylmercury*  
12 *Management*, would be available to address the uncertainty of methylmercury levels in restored  
13 tidal marsh and significant impacts on least Bell's vireo and yellow warbler.

14 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**  
15 **Disturbance of Nesting Birds**

16 See Mitigation Measure BIO-75 under Impact BIO-75.

17 **Impact BIO-79: Periodic Effects of Inundation of Least Bell's Vireo and Yellow Warbler**  
18 **Habitat as a Result of Implementation of Conservation Components**

19 Flooding of the Yolo Bypass from Fremont Weir operations (CM2) would increase the frequency and  
20 duration of inundation of approximately 48–85 acres of modeled least Bell's vireo and yellow  
21 warbler habitat in CZ 2. No adverse effects of increased inundation frequency on least Bell's vireo,  
22 yellow warbler, or their habitat would be expected, because riparian vegetation supporting habitat  
23 has persisted under the existing Yolo Bypass flooding regime and changes to frequency and  
24 inundation would be within the tolerance of these vegetation types.

25 Based on hypothetical floodplain restoration for CM5, construction of setback levees could result in  
26 periodic inundation of up to 148 acres of modeled least Bell's vireo and yellow warbler habitat in CZ  
27 7. Inundation of restored floodplains would not be expected to affect least Bell's vireo, yellow  
28 warbler, or their habitat because the breeding period is outside the period when floodplains would  
29 likely be inundated. Additionally, periodic inundation of floodplains would be expected to restore a  
30 more natural flood regime in support of riparian vegetation types that support least Bell's vireo and  
31 yellow warbler habitat. The overall effect of seasonal inundation in existing riparian natural  
32 communities would be beneficial, because, historically, flooding was the main natural disturbance  
33 regulating ecological processes in riparian areas, and flooding promotes the germination and  
34 establishment of many native riparian plants.

35 **NEPA Effects:** Implementation of CM2 and CM5 would result in periodic inundation of 48–85 acres  
36 (CM2) and 148 acres (CM5) of modeled habitat for least Bell's vireo and yellow warbler. However,  
37 periodic effects of inundation would not result in an adverse effect on least Bell's vireo or yellow  
38 warbler because inundation would occur primarily during the nonbreeding season and would  
39 promote a more natural flood regime in support of habitat for these species. The effect would be  
40 beneficial.

41 **CEQA Conclusion:** Implementation of CM2 and CM5 would result in periodic inundation of 48–85  
42 acres (CM2) and 148 acres (CM5) of modeled habitat for least Bell's vireo and yellow warbler.  
43 However, periodic effects of inundation would have a less-than-significant impact on least Bell's

1 vireo or yellow warbler because inundation would occur during the nonbreeding season. Flooding  
2 promotes the germination and establishment of many native riparian plants. Therefore, the overall  
3 impact of seasonal inundation in existing riparian natural communities would be beneficial for least  
4 Bell's vireo and yellow warbler.

#### 5 **Suisun Song Sparrow and Saltmarsh Common Yellowthroat**

6 This section describes the effects of Alternative 4, including water conveyance facilities construction  
7 and implementation of other conservation components, on Suisun song sparrow and saltmarsh  
8 common yellowthroat. The habitat model used to assess effects on Suisun song sparrow and  
9 saltmarsh common yellowthroat is based on primary breeding habitat and secondary habitat.  
10 Suisun song sparrow and saltmarsh common yellowthroat primary habitat consists of all *Salicornia*-  
11 dominated tidal brackish emergent wetland and all *Typha*-, *Scirpus*-, and *Juncus*-dominated tidal  
12 freshwater emergent wetland in the study area west of Sherman Island, with the exception that  
13 *Scirpus acutus* and *S. californicus* plant communities (low marsh) and all of the plant communities  
14 listed below that occur in managed wetlands were classified as secondary habitat. Upland  
15 transitional zones, providing refugia during high tides, within 150 feet of the wetland edge were also  
16 included as secondary habitat. Secondary habitats generally provide only a few ecological functions  
17 such as foraging (low marsh and managed wetlands) or extreme high tide refuge (upland transition  
18 zones), while primary habitats provide multiple functions, including breeding, effective predator  
19 cover, and value forage.

20 Construction and restoration associated with Alternative 4 conservation measures would result in  
21 both temporary and permanent losses of Suisun song sparrow and saltmarsh common yellowthroat  
22 modeled habitat as indicated in Table 12-4-34. The majority of the losses would take place over an  
23 extended period of time as tidal marsh is restored in the study area. Full implementation of  
24 Alternative 4 would also include the following conservation actions over the term of the BDCP to  
25 benefit the Suisun song sparrow and the saltmarsh common yellowthroat (BDCP Chapter 3, Section  
26 3.3, *Biological Goals and Objectives*).

- 27 ● Restore or create at least 6,000 acres of tidal brackish emergent wetland in CZ 11 including at  
28 least 1,500 acres of middle and high marsh (Objectives TBEWNC1.1 and TBEWNC1.2, associated  
29 with CM4).
- 30 ● Protect and enhance at least 8,100 acres of managed wetland, at least 1,500 acres of which are  
31 in the Grizzly Island Marsh Complex (Objective MWNC1.1, associated with CM3).
- 32 ● Protect at least 200 feet of adjacent grasslands beyond the sea level rise accommodation area  
33 (Objective GNC1.4, associated with CM3).

34 As explained below, with the restoration and protection of these amounts of habitat, in addition to  
35 natural community enhancement and management commitments (including *CM12 Methylmercury*  
36 *Management*) and implementation of AMM1–AMM7, AMM22 *Suisun Song Sparrow, Yellow-Breasted*  
37 *Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo*, and Mitigation Measure BIO-75, *Conduct*  
38 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, impacts on Suisun song  
39 sparrow and saltmarsh common yellowthroat would not be adverse for NEPA purposes and would  
40 be less than significant for CEQA purposes.

1 **Table 12-4-34. Changes in Suisun Song Sparrow Saltmarsh Common Yellowthroat Modeled Habitat**  
2 **Associated with Alternative 4 (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	Primary	0	0	0	0	NA	NA
	Secondary	0	0	0	0	NA	NA
<b>Total Impacts CM1</b>							
CM2-CM18	Primary	54	55	0	0	0	0
	Secondary	1,098	3,633	0	0	0	0
<b>Total Impacts CM2-CM18</b>		<b>1,152</b>	<b>3,633</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>TOTAL IMPACTS</b>		<b>1,152</b>	<b>3,688</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

<sup>a</sup> See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only.

NT = near-term

LLT = late long-term

NA = not applicable

3  
4 **Impact BIO-80: Loss or Conversion of Habitat for and Direct Mortality of Suisun Song Sparrow**  
5 **and Saltmarsh Common Yellowthroat**

6 Alternative 4 conservation measures would result in the permanent loss of up to 3,510 acres of  
7 Suisun song sparrow and saltmarsh common yellowthroat habitat, which would include the  
8 conversion of 55 acres of primary habitat to secondary low marsh, and the conversion of 123 acres  
9 of secondary habitat to middle or high marsh (Table 12-4-34). The only conservation measure that  
10 would affect modeled habitat for Suisun song sparrow and saltmarsh common yellowthroat is *CM4*  
11 *Tidal Natural Communities Restoration*. Habitat enhancement and management activities (CM11),  
12 which include ground disturbance or removal of nonnative vegetation, could also result in local  
13 adverse habitat effects. Each of these individual activities is described below. A summary statement  
14 of the combined impacts and NEPA effects and a CEQA conclusion follows the individual  
15 conservation measure discussions.

- 16 • *CM4 Tidal Natural Communities Restoration*: Site preparation and inundation would  
17 permanently remove approximately 3,510 acres of modeled secondary Suisun song sparrow and  
18 saltmarsh common yellowthroat habitat from CZ 11 (Table 12-4-34). In addition, 55 acres of  
19 primary habitat would be converted to secondary low marsh, and 123 acres of secondary  
20 habitat would be converted to middle or high marsh. Most areas proposed for removal would be  
21 managed wetlands that serve as relatively marginal habitat for Suisun song sparrow and  
22 saltmarsh common yellowthroat, which primarily use brackish tidal wetlands. Approximately  
23 2% of primary habitat for these species would be converted to foraging habitat. Full  
24 implementation of CM4 would restore or create at least 6,000 acres of tidal brackish emergent  
25 wetland natural community in CZ 11, which would be expected to support Suisun song sparrow

1 and saltmarsh common yellowthroat habitat. It is expected that restoring tidal wetland  
2 communities that are self-sustaining and not reliant on ongoing management actions necessary  
3 to maintain the existing managed wetland habitats would better ensure the long-term viability  
4 of these populations. Furthermore, effects of tidal habitat restoration on sparrow and  
5 yellowthroat abundance and distribution would be monitored, and the restoration of tidal  
6 habitat would be sequenced and located in a manner that minimizes effects on occupied habitats  
7 until functional habitats were restored (see BDCP Chapter 3, Section 3.4.4, *Conservation Measure 4*  
8 *Tidal Natural Communities Restoration*, and Section 3.6, *Adaptive Management and Monitoring*  
9 *Program*).

- 10 • *CM11 Natural Communities Enhancement and Management*: Control of nonnative Suisun song  
11 sparrow and saltmarsh common yellowthroat predators, if deemed necessary, would be  
12 expected to reduce predation loss of nests and, consequently, increase and maintain the  
13 abundance of Suisun song sparrow and saltmarsh common yellowthroat in restored tidal  
14 habitats over the term of the BDCP. Habitat management- and enhancement-related activities  
15 could disturb Suisun song sparrow or saltmarsh common yellowthroat nests if they are located  
16 near work sites. The potential for these activities to have an adverse effect on Suisun song  
17 sparrow would be avoided and minimized through *AMM22 Suisun Song Sparrow, Yellow-*  
18 *Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo*. In addition, Mitigation Measure  
19 *BIO-75, Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*,  
20 would be available to address these effects on saltmarsh common yellowthroat. A variety of  
21 *CM11 Natural Communities Enhancement and Management* habitat management actions that are  
22 designed to enhance wildlife values in restored and protected tidal wetland habitats may result  
23 in localized ground disturbances that could temporarily remove small amounts of Suisun song  
24 sparrow and saltmarsh common yellowthroat habitat in CZ 11. Ground-disturbing activities,  
25 such as removal of nonnative vegetation and road and other infrastructure maintenance  
26 activities, are expected to have minor adverse effects on available species' habitat.
- 27 • *Operations and Maintenance*: Postconstruction operation and maintenance of the restoration  
28 infrastructure could result in ongoing but periodic disturbances that could affect Suisun song  
29 sparrow and saltmarsh common yellowthroat use of the surrounding habitat in Suisun.  
30 Maintenance activities could include vegetation management, and levee repair. These effects,  
31 however, would be reduced by AMMs and conservation actions as described below.
- 32 • Construction-related activities could result in nest destruction or disturbance resulting in  
33 mortality of eggs and nestlings if restoration activities took place within the nesting period for  
34 these species. *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western*  
35 *Yellow-Billed Cuckoo* would minimize these potential effects on Suisun song sparrow. Mitigation  
36 Measure *BIO-75, Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting*  
37 *Birds*, would be available to address these effects on saltmarsh common yellowthroat. Grading,  
38 filling, contouring, and other initial ground-disturbing operations during restoration activities  
39 could temporarily fragment existing modeled tidal brackish emergent wetland habitat for  
40 Suisun song sparrow and saltmarsh common yellowthroat which could temporarily reduce the  
41 extent and functions of the affected habitat. These temporary effects would be minimized  
42 through sequencing of restoration activities and through *AMM22 Suisun Song Sparrow, Yellow-*  
43 *Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo* and Mitigation Measure *BIO-75*.

44 The following paragraphs summarize the combined effects discussed above and describe other  
45 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also  
46 included.

1       **Near-Term Timeframe**

2       Under Alternative 4, there would be no impacts resulting from the construction of the water  
3       conveyance facilities (CM1). However, there would be a permanent loss of 1,040 acres of modeled  
4       secondary habitat for Suisun song sparrow and saltmarsh common yellowthroat in the study area in  
5       the near-term. In addition, 54 acres of primary habitat would be converted to secondary foraging  
6       habitat, and 58 acres of secondary habitat would be converted to mid to high marsh, which would  
7       provide primary nesting habitat for these species. Although there would be a temporal lag in these  
8       conversions, there would be no net loss of primary habitat in the near-term. These effects would  
9       result from implementing *CM4 Tidal Natural Communities Restoration* and would all occur in Suisun  
10      Marsh in CZ 11.

11      The typical NEPA and CEQA project-level mitigation ratio for those natural communities that would  
12      be affected and that are identified in the biological goals and objectives for Suisun song sparrow in  
13      Chapter 3 of the BDCP would be 1:1 for restoration/creation of tidal brackish emergent habitat.  
14      Using this ratio would indicate that 1,152 acres of tidal brackish emergent wetland should be  
15      restored/created to compensate for the near-term losses of Suisun song sparrow and saltmarsh  
16      common yellowthroat habitat.

17      The BDCP has committed to near-term goals of restoring 8,850 acres of tidal brackish emergent  
18      wetland and 4,800 acres of managed wetland in the study area. These conservation actions are  
19      associated with CM4 and CM3 and would occur in the same timeframe as the construction and early  
20      restoration losses, thereby avoiding adverse effects of habitat loss on Suisun song sparrow and  
21      saltmarsh common yellowthroat. The tidal brackish emergent wetland would be restored in CZ 11  
22      among the Western Suisun/Hill Slough Marsh Complex, the Suisun Slough/Cutoff Slough Marsh  
23      Complex, and the Nurse Slough/Denverton Marsh complex (Objective TBEWNC1.1 in BDCP Chapter  
24      3, *Conservation Strategy*) and would be restored in a way that creates topographic heterogeneity and  
25      in areas that increase connectivity among protected lands (Objective TBEWNC1.4). Portions of the  
26      4,800 acres of managed wetland would benefit both the Suisun song sparrow and the saltmarsh  
27      common yellowthroat through the enhancement of degraded areas to provide dense native  
28      vegetation, which is required for nesting sites, song perches, and refuge from predators. Tidal  
29      wetlands would be restored in a mosaic of large, interconnected and biologically diverse patches.  
30      Larger and more interconnected patches of suitable habitat would be expected to reduce the effects  
31      of habitat fragmentation that currently exist in Suisun marsh in CZ 11. Nonnative predators would  
32      be controlled as needed to reduce nest predation and to help maintain species abundance (CM11).  
33      Restoration would be sequenced over the term of the Plan and occur in a manner that would  
34      minimize any temporary, initial loss and fragmentation of habitat. The acres of restoration and  
35      protection contained in the near-term Plan goals, and the incorporation of the additional measures  
36      in the biological goals and objectives (BDCP Chapter 3) would be sufficient to mitigate the near-term  
37      effects of tidal restoration.

38      The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
39      *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
40      *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
41      *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
42      *Material*, *AMM7 Barge Operations Plan*, and *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat,*  
43      *Least Bell's Vireo, Western Yellow-Billed Cuckoo*. All of these AMMs include elements that would  
44      avoid or minimize the risk of affecting individuals and species habitats adjacent to work areas. The  
45      AMMs are described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*. The

1 saltmarsh common yellowthroat is not a species that is covered under the BDCP. Although  
2 preconstruction surveys for Suisun song sparrow would likely also detect nesting saltmarsh  
3 common yellowthroat, in order to avoid adverse effects on individuals, preconstruction surveys for  
4 noncovered avian species would be required to ensure that saltmarsh common yellowthroat nests  
5 are detected and avoided. Mitigation Measure BIO-75 would be available to address adverse effects  
6 of construction activities on nesting saltmarsh common yellowthroat.

#### 7 **Late Long-Term Timeframe**

8 The habitat model indicates that the study area supports approximately 3,722 acres of primary and  
9 23,986 acres of secondary habitat for Suisun song sparrow and saltmarsh common yellowthroat.  
10 Alternative 4 as a whole would result in the permanent loss of 3,510 acres of habitat (15% of the  
11 total habitat in the study area) from the implementation of *CM4 Tidal Natural Communities*  
12 *Restoration*. Within this habitat loss, 55 acres of primary habitat would be converted to secondary  
13 foraging habitat, and 123 acres of secondary habitat would be converted to primary habitat.

14 The Plan includes a commitment through *CM4 Tidal Natural Communities Restoration* to restore or  
15 create at least 6,000 acres of tidal brackish emergent wetland in CZ 11 (Objective TBEWNC1.1)  
16 These tidal wetlands would be restored as a mosaic of large, interconnected and biologically diverse  
17 patches, and at least 1,500 acres of restored marsh would consist of middle-and high-marsh  
18 vegetation with dense, tall stands of pickleweed and bulrush cover, serving as primary habitat for  
19 Suisun song sparrow and saltmarsh common yellowthroat (Objective TBEWNC1.2). In addition,  
20 grasslands adjacent to restored tidal brackish emergent wetlands would be protected or restored, to  
21 provide at least 200 feet of adjacent grasslands beyond the sea level rise accommodation. This  
22 adjacent upland habitat would provide high tide refugia during high tide events, after sea-level rise  
23 has converted the lower-level grasslands to tidal natural communities. Tidal wetlands would be  
24 restored in a mosaic of large, interconnected and biologically diverse patches. Larger and more  
25 interconnected patches of suitable habitat would be expected to reduce the effects of habitat  
26 fragmentation that currently exist in Suisun marsh in CZ 11. Nonnative predators would be  
27 controlled as needed to reduce nest predation and to help maintain species abundance (CM11).  
28 Restoration would be sequenced over the term of the Plan and occur in a manner that would  
29 minimize any temporary, initial loss and fragmentation of habitat.

30 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*  
31 *Plant Species*) estimates that the restoration and protection actions discussed above could result in  
32 the restoration of 1,500 acres of primary habitat and 4,500 acres of secondary habitat in addition to  
33 the protection of 384 acres of secondary habitat for Suisun song sparrow, which would also benefit  
34 the saltmarsh common yellowthroat.

35 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
36 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
37 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
38 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
39 *Material*, *AMM7 Barge Operations Plan*, and *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat,*  
40 *Least Bell's Vireo, Western Yellow-Billed Cuckoo*. All of these AMMs include elements that would  
41 avoid or minimize the risk of affecting individuals and species habitats adjacent to work areas and  
42 storage sites. The AMMs are described in detail in BDCP Appendix 3.C, *Avoidance and Minimization*  
43 *Measures*.

1 **NEPA Effects:** The loss of Suisun song sparrow and saltmarsh common yellowthroat habitat and  
2 potential direct mortality of these special-status species under Alternative 4 would represent an  
3 adverse effect in the absence of other conservation actions. However, with habitat protection and  
4 restoration associated with CM4, with the management and enhancement actions (CM11), and with  
5 the incorporation of additional measures in the biological goals and objectives, guided by AMM1–  
6 AMM7 and AMM22 *Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-*  
7 *Billed Cuckoo*, which would be in place throughout the construction period, the effects of habitat loss  
8 and potential mortality on Suisun song sparrow would not be adverse, and the effects of habitat loss  
9 and conversion on saltmarsh common yellowthroat would not be adverse under Alternative 4. The  
10 saltmarsh common yellowthroat is not a species that is covered under the BDCP. Although  
11 preconstruction surveys for Suisun song sparrow would likely also detect nesting saltmarsh  
12 common yellowthroat, for the BDCP to avoid adverse effects on individuals, preconstruction surveys  
13 for noncovered avian species would be required to ensure that saltmarsh common yellowthroat  
14 nests are detected and avoided. Mitigation Measure BIO-75 would be available to address this  
15 adverse effect.

16 **CEQA Conclusion:**

17 ***Near-Term Timeframe***

18 Under Alternative 4, there would be no impacts resulting from the construction of the water  
19 conveyance facilities (CM1). However, there would be a permanent loss of 1,040 acres of modeled  
20 secondary habitat for Suisun song sparrow and saltmarsh common yellowthroat in the study area in  
21 the near-term. In addition, 54 acres of primary habitat would be converted to secondary foraging  
22 habitat, and 58 acres of secondary habitat would be converted to mid to high marsh, which would  
23 provide primary nesting habitat for these species. Although there would be a temporal lag in these  
24 conversions, there would be no net loss of primary habitat in the near-term. These effects would  
25 result from implementing *CM4 Tidal Natural Communities Restoration* and would all occur in Suisun  
26 Marsh in CZ 11.

27 The typical NEPA and CEQA project-level mitigation ratio for those natural communities that would  
28 be affected and that are identified in the biological goals and objectives for Suisun song sparrow in  
29 Chapter 3 of the BDCP would be 1:1 for restoration/creation of tidal brackish emergent habitat.  
30 Using this ratio would indicate that 1,152 acres of tidal brackish emergent wetland should be  
31 restored/created to mitigate the near-term losses of Suisun song sparrow and saltmarsh common  
32 yellowthroat habitat.

33 The BDCP has committed to near-term goals of restoring 8,850 acres of tidal brackish emergent  
34 wetland and 4,800 acres of managed wetland in the study area. These conservation actions are  
35 associated with CM4 and CM3 and would occur in the same timeframe as the construction and early  
36 restoration losses, thereby avoiding adverse effects of habitat loss on Suisun song sparrow and  
37 saltmarsh common yellowthroat. The tidal brackish emergent wetland would be restored in CZ 11  
38 among the Western Suisun/Hill Slough Marsh Complex, the Suisun Slough/Cutoff Slough Marsh  
39 Complex, and the Nurse Slough/Denverton Marsh complex (Objective TBEWNC1.1 in BDCP Chapter  
40 3, *Conservation Strategy*) and would be restored in a way that creates topographic heterogeneity and  
41 in areas that increase connectivity among protected lands (Objective TBEWNC1.4). Portions of the  
42 4,800 acres of managed wetland would benefit both the Suisun song sparrow and the saltmarsh  
43 common yellowthroat through the enhancement of degraded areas to provide dense native  
44 vegetation, which is required for nesting sites, song perches, and refuge from predators. Tidal

1 wetlands would be restored in a mosaic of large, interconnected and biologically diverse patches.  
2 Larger and more interconnected patches of suitable habitat would be expected to reduce the effects  
3 of habitat fragmentation that currently exist in Suisun marsh in CZ 11. Nonnative predators would  
4 be controlled as needed to reduce nest predation and to help maintain species abundance (CM11).  
5 Restoration would be sequenced over the term of the Plan and occur in a manner that would  
6 minimize any temporary, initial loss and fragmentation of habitat. The acres of restoration and  
7 protection contained in the near-term Plan goals, and the incorporation of the additional measures  
8 in the biological goals and objectives (BDCP Chapter 3) would be sufficient to mitigate the near-term  
9 effects of tidal restoration.

10 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
11 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
12 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
13 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
14 *Material*, *AMM7 Barge Operations Plan*, and *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat,*  
15 *Least Bell's Vireo, Western Yellow-Billed Cuckoo*. All of these AMMs include elements that would  
16 avoid or minimize the risk of affecting individuals and species habitats adjacent to work areas. The  
17 AMMs are described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*. The  
18 saltmarsh common yellowthroat is not a species that is covered under the BDCP. Although  
19 preconstruction surveys for Suisun song sparrow would likely also detect nesting saltmarsh  
20 common yellowthroat, in order to avoid adverse effects on individuals, preconstruction surveys for  
21 noncovered avian species would be required to ensure that saltmarsh common yellowthroat nests  
22 are detected and avoided. Mitigation Measure BIO-75 would reduce the impact of construction  
23 activities on nesting saltmarsh common yellowthroat to a less-than-significant level.

24 Because the number of acres required to meet the typical mitigation ratio described above would be  
25 only 3,590 acres of restored/created tidal natural communities, the 6,000 acres of tidal brackish and  
26 tidal freshwater emergent wetland restoration and the 4,100 acres of managed wetland protection  
27 and enhancement contained in the near-term Plan goals, and the additional detail in the biological  
28 objectives for Suisun song sparrow, are more than sufficient to support the conclusion that the near-  
29 term impacts of habitat loss and direct mortality of Suisun song sparrow or saltmarsh common  
30 yellowthroat under Alternative 4 would be less than significant under CEQA.

### 31 ***Late Long-Term Timeframe***

32 The habitat model indicates that the study area supports approximately 3,722 acres of primary and  
33 23,986 acres of secondary habitat for Suisun song sparrow and saltmarsh common yellowthroat.  
34 Alternative 4 as a whole would result in the permanent loss of 3,510 acres of habitat (15% of the  
35 total habitat in the study area) from the implementation of *CM4 Tidal Natural Communities*  
36 *Restoration*. Within this habitat loss, 55 acres of primary habitat would be converted to secondary  
37 foraging habitat, and 123 acres of secondary habitat would be converted to primary habitat.

38 The Plan includes a commitment through *CM4 Tidal Natural Communities Restoration* to restore or  
39 create at least 6,000 acres of tidal brackish emergent wetland in CZ 11 (Objective TBEWNC1.1)  
40 These tidal wetlands would be restored as a mosaic of large, interconnected and biologically diverse  
41 patches, and at least 1,500 acres of restored marsh would consist of middle-and high-marsh  
42 vegetation with dense, tall stands of pickleweed and bulrush cover, serving as primary habitat for  
43 Suisun song sparrow and saltmarsh common yellowthroat (Objective TBEWNC1.2). In addition,  
44 grasslands adjacent to restored tidal brackish emergent wetlands would be protected or restored, to

1 provide at least 200 feet of adjacent grasslands beyond the sea level rise accommodation. This  
2 adjacent upland habitat would provide high tide refugia during high tide events, after sea-level rise  
3 has converted the lower-level grasslands to tidal natural communities. Tidal wetlands would be  
4 restored in a mosaic of large, interconnected and biologically diverse patches. Larger and more  
5 interconnected patches of suitable habitat would be expected to reduce the effects of habitat  
6 fragmentation that currently exist in Suisun marsh in CZ 11. Nonnative predators would be  
7 controlled as needed to reduce nest predation and to help maintain species abundance (CM11).  
8 Restoration would be sequenced over the term of the Plan and occur in a manner that would  
9 minimize any temporary, initial loss and fragmentation of habitat.

10 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*  
11 *Plant Species*) estimates that the restoration and protection actions discussed above could result in  
12 the restoration of 1,500 acres of primary habitat and 4,500 acres of secondary habitat in addition to  
13 the protection of 384 acres of secondary habitat for Suisun song sparrow, which would also benefit  
14 the saltmarsh common yellowthroat.

15 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*  
16 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*  
17 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
18 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
19 *Material, AMM7 Barge Operations Plan, and AMM22 Suisun Song Sparrow, Yellow-Breasted Chat,*  
20 *Least Bell's Vireo, Western Yellow-Billed Cuckoo.* All of these AMMs include elements that would  
21 avoid or minimize the risk of affecting individuals and species habitats adjacent to work areas and  
22 storage sites. The AMMs are described in detail in BDCP Appendix 3.C, *Avoidance and Minimization*  
23 *Measures.* The saltmarsh common yellowthroat is not a covered species under the BDCP. Although  
24 preconstruction surveys for Suisun song sparrow may detect nesting saltmarsh common  
25 yellowthroat, for the BDCP to have a less-than-significant impact on individuals, preconstruction  
26 surveys for noncovered avian species would be required to ensure that saltmarsh common  
27 yellowthroat nests are detected and avoided. Mitigation Measure BIO-75 would reduce this potential  
28 impact on nesting saltmarsh common yellowthroat to a less-than-significant level.

29 Considering Alternative 4's restoration provisions, which would replace low-value secondary  
30 habitat with high-value tidal brackish emergent habitat, including both foraging and primary  
31 habitat, and provide upland refugia for Suisun song sparrow and saltmarsh common yellowthroat,  
32 the acreages of restoration would be sufficient to mitigate habitats lost to construction and  
33 restoration activities. Loss of habitat or direct mortality through implementation of Alternative 4,  
34 with the implementation of AMM1-AMM7, AMM22, and Mitigation Measure BIO-75, *Conduct*  
35 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds,* would not result in a  
36 substantial adverse effect through habitat modifications and would not substantially reduce the  
37 number or restrict the range of the species. Therefore, the loss of habitat or potential mortality  
38 under this alternative would have a less-than-significant impact on Suisun song sparrow and  
39 saltmarsh common yellowthroat.

40 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**  
41 **Disturbance of Nesting Birds**

42 See Mitigation Measure BIO-75 under Impact BIO-75.

1 **Impact BIO-81: Indirect Effects of Plan Implementation on Suisun Song Sparrow and**  
2 **Saltmarsh Common Yellowthroat**

3 **Indirect construction-related effects:** If Suisun song sparrow or saltmarsh common yellowthroat  
4 were to nest in or adjacent to work areas, construction and subsequent maintenance-related noise  
5 and visual disturbances could mask calls, disrupt foraging and nesting behaviors, and reduce the  
6 functions of suitable nesting habitat for these species. Suisun song sparrow and saltmarsh common  
7 yellowthroat habitat adjacent to restoration work areas could be affected by such disturbances,  
8 which could temporarily result in diminished use of habitat. Construction noise above background  
9 noise levels (greater than 50 dBA) could extend 500 to 5,250 feet from the edge of construction  
10 activities (BDCP Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of the BDCP*  
11 *Conveyance Facility on Sandhill Crane*, Table 4), although there are no available data to determine  
12 the extent to which these noise levels could affect either species. If construction occurred during the  
13 nesting season, these indirect effects could result in the loss or abandonment of nests and mortality  
14 of any eggs and/or nestlings. *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo,*  
15 *Western Yellow-Billed Cuckoo* and Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird*  
16 *Surveys and Avoid Disturbance of Nesting Birds*, would avoid the potential for adverse effects of  
17 construction-related activities on survival and productivity of Suisun song sparrow and saltmarsh  
18 common yellowthroat by requiring preconstruction surveys and, if nests are present, the  
19 establishment of a no-disturbance buffer within 250 feet of a nest site. The use of mechanical  
20 equipment during water conveyance facilities construction could cause the accidental release of  
21 petroleum or other contaminants that could affect species in the surrounding habitat. The  
22 inadvertent discharge of sediment or excessive dust adjacent to suitable habitat could also have an  
23 adverse effect on Suisun song sparrow and saltmarsh common yellowthroat. *AMM2 Construction*  
24 *Best Management Practices and Monitoring* would minimize the likelihood of such spills and ensure  
25 that measures are in place to prevent runoff from the construction area and any adverse effects of  
26 dust on active nests.

27 **Salinity:** Water conveyance facilities operations would have an effect on salinity gradients in Suisun  
28 Marsh; however, these effects cannot be reasonably disaggregated from effects resulting from tidal  
29 habitat restoration. It is expected that the salinity of water in Suisun Marsh would generally increase  
30 as a result of water conveyance facilities operations and operations of salinity control gates to mimic  
31 a more natural water flow. This would likely encourage the establishment of tidal wetland plant  
32 communities tolerant of more saline environments, which should have a beneficial effect on Suisun  
33 song sparrow and saltmarsh common yellowthroat because their historical natural Suisun Marsh  
34 habitat is brackish tidal marsh. However, the degree to which salinity changes in all tidal channels  
35 and sloughs in and around Suisun Marsh would be highly variable.

36 **Methylmercury Exposure:** Marsh (tidal and nontidal) and floodplain restoration have the potential  
37 to increase exposure to methylmercury. Mercury is transformed into the more bioavailable form of  
38 methylmercury in aquatic systems, especially areas subjected to regular wetting and drying such as  
39 tidal marshes and flood plains (Alpers et al. 2008). Thus, BDCP restoration activities that create  
40 newly inundated areas could increase bioavailability of mercury (see BDCP Chapter 3, *Conservation*  
41 *Strategy*, for details of restoration). Although tidal habitat restoration might increase methylation of  
42 mercury export to other habitats, restoration is unlikely to significantly increase the exposure of  
43 Suisun song sparrow or saltmarsh common yellowthroat to methylmercury, as they currently reside  
44 in tidal marshes where elevated methylmercury levels exist. Robinson et al. (2011) found toxic  
45 levels of methylmercury levels in song sparrow populations from southern San Francisco Bay,  
46 although populations near Suisun Marsh (i.e., San Pablo and Simas Creeks) were much lower. The

1 potential mobilization or creation of methylmercury within the study area varies with site-specific  
2 conditions and would need to be assessed at the project level. The Suisun Marsh Plan anticipates  
3 that restored tidal wetlands would generate less methylmercury than the existing managed  
4 wetlands to be restored (Bureau of Reclamation et al. 2010). *CM12 Methylmercury Management*  
5 includes provisions for project-specific Mercury Management Plans. Along with avoidance and  
6 minimization measures and adaptive management and monitoring, CM12 would be available to  
7 address the uncertainty of methylmercury levels resulting from restored tidal marsh in the study  
8 area.

9 **NEPA Effects:** Noise and visual disturbances would not have an adverse effect on Suisun song  
10 sparrow with the implementation of *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's*  
11 *Vireo, Western Yellow-Billed Cuckoo*. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting*  
12 *Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to address adverse effects of  
13 noise and visual disturbance on saltmarsh common yellowthroat. AMM1–AMM7, including *AMM2*  
14 *Construction Best Management Practices and Monitoring*, would minimize the likelihood of spills, and  
15 ensure that measures were in place to prevent runoff from the construction area and to avoid  
16 adverse effects of dust on the species. Implementation of Operational Scenario A, including  
17 operation of salinity-control gates, and tidal habitat restoration would be expected to increase water  
18 salinity in Suisun Marsh, which would be expected to establish tidal marsh similar to historic  
19 conditions. Tidal habitat restoration is unlikely to have a substantial impact on Suisun song sparrow  
20 and saltmarsh common yellowthroat through increased exposure to methylmercury, as these  
21 species currently reside in tidal marshes where elevated methylmercury levels exist. However, it is  
22 unknown what concentrations of methylmercury are harmful to the species and the potential for  
23 increased exposure varies substantially within the study area. Site-specific restoration plans in  
24 addition to monitoring and adaptive management, described in *CM12 Methylmercury Management*,  
25 would address the uncertainty of methylmercury levels in restored tidal marsh. The site-specific  
26 planning phase of marsh restoration would be the appropriate place to assess the potential for risk  
27 of methylmercury exposure for these species, once site specific sampling and other information  
28 could be developed.

29 **CEQA Conclusion:** Impacts of noise, the potential for hazardous spills, increased dust and  
30 sedimentation, and operations and maintenance of the water conveyance facilities would be less  
31 than significant with the implementation of *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat,*  
32 *Least Bell's Vireo, Western Yellow-Billed Cuckoo*, Mitigation Measure BIO-75, *Conduct Preconstruction*  
33 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, and *AMM2 Construction Best*  
34 *Management Practices and Monitoring*. Changes in salinity gradients would be expected to have a  
35 beneficial impact on Suisun song sparrow and saltmarsh common yellowthroat through the  
36 establishment of tidal marsh similar to historic conditions. The implementation of tidal natural  
37 communities restoration (CM4) is unlikely to substantially increase the exposure of Suisun song  
38 sparrow or saltmarsh common yellowthroat to methylmercury, as they currently reside in tidal  
39 marshes where elevated methylmercury levels exist. However, it is unknown what concentrations of  
40 methylmercury are harmful to these species. Sites-specific restoration plans that address the  
41 creation and mobilization of mercury, as well as monitoring and adaptive management as described  
42 in *CM12 Methylmercury Management*, would better inform potential impacts and address the  
43 uncertainty of methylmercury levels in restored tidal marsh in the study area. With these additional  
44 avoidance and minimization measures, Mitigation Measure BIO-75, and *CM12 Methylmercury*  
45 *Management*, indirect effects of Alternative 4 implementation would have a less-than-significant  
46 impact on Suisun song sparrow and saltmarsh common yellowthroat.

1           **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**  
2           **Disturbance of Nesting Birds**

3           See Mitigation Measure BIO-75 under Impact BIO-75.

4           **Impact BIO-82: Effects on Suisun Song Sparrow and Saltmarsh Common Yellowthroat**  
5           **Associated with Electrical Transmission Facilities**

6           The range of the Suisun song sparrow extends eastward into the study area to approximately  
7           Kimball Island. There are several reported occurrences from Kimball Island, Browns Island, and in  
8           the Suisun Marsh in the western portion of the study area. The easternmost range of the saltmarsh  
9           common yellowthroat also ends in Suisun Marsh. These species ranges, along with areas of suitable  
10          habitat, are far from the proposed transmission line routes (BDCP Attachment 5.J-2, *Memorandum:*  
11          *Analysis of Potential Bird Collisions at Proposed BDCP Transmission Lines*). Location of the current  
12          populations, species ranges, and suitable habitat in the study area make collision with the proposed  
13          transmission lines highly unlikely. Therefore the construction and presence of new transmission  
14          lines would not have an adverse effect on Suisun song sparrow and saltmarsh common  
15          yellowthroat.

16          **NEPA Effects:** The construction and presence of new transmission lines would not have an adverse  
17          effect on Suisun song sparrow and saltmarsh common yellowthroat because the location of the  
18          current populations, species ranges, and suitable habitat for the species make collision with the  
19          proposed transmission lines highly unlikely.

20          **CEQA Conclusion:** The construction and presence of new transmission lines would have a less-than-  
21          significant impact on Suisun song sparrow and saltmarsh common yellowthroat because the  
22          location of the current populations, species ranges, and suitable habitat for the species make  
23          collision with the proposed transmission lines highly unlikely.

24          **Swainson's Hawk**

25          This section describes the effects of Alternative 4, including water conveyance facilities construction  
26          and implementation of other conservation components, on Swainson's hawk. The habitat model  
27          used to assess impacts on Swainson's hawk includes plant alliances and land cover types associated  
28          with Swainson's hawk nesting and foraging habitat. Construction and restoration associated with  
29          Alternative 4 conservation measures would result in both temporary and permanent losses of  
30          Swainson's hawk modeled habitat as indicated in Table 12-4-35. The majority of the losses would  
31          take place over an extended period of time as tidal marsh is restored in the study area. Although  
32          protection and restoration for the loss of nesting and foraging habitat would be initiated in the same  
33          timeframe as the losses, it could take one or more decades (for nesting habitat) for restored habitats  
34          to replace the functions of habitat lost. This time lag between impacts and restoration of habitat  
35          function would be minimized through specific requirements of *AMM18 Swainson's Hawk and White-*  
36          *Tailed Kite*, including transplanting mature trees in the near-term time period. Full implementation  
37          of Alternative 4 would also include the following conservation actions over the term of the BDCP to  
38          benefit the Swainson's hawk (BDCP Chapter 3, Section 3.3, *Biological Goals and Objectives*).

- 39
  - 40              • Restore or create at least 5,000 acres of valley/foothill riparian natural community, with at least  
41              3,000 acres occurring on restored seasonally inundated floodplain (Objective VFRNC1.1,  
            associated with CM7)

- 1 • Protect at least 750 acres of existing valley/foothill riparian natural community in CZ 7 by year  
2 10 (Objective VFRNC1.2, associated with CM3).
  - 3 • Plant and maintain native trees along roadsides and field borders within protected cultivated  
4 lands at a rate of one tree per 10 acres (Objective SH2.1, associated with CM11).
  - 5 • Establish 20- to 30- foot-wide hedgerows along fields and roadsides to promote prey  
6 populations throughout protected cultivated lands (Objective SH2.2, associated with CM11).
  - 7 • Increase prey abundance and accessibility for grassland-foraging species (Objectives ASWNC2.4,  
8 VPNC2.5, and GNC2.4, associated with CM11).
  - 9 • Conserve at least 1 acre of Swainson’s hawk foraging habitat for each acre of lost foraging  
10 habitat (Objective SH1.1, associated with CM3 and CM11).
  - 11 • Protect at least 42,275 acres of cultivated lands as Swainson’s hawk foraging habitat with at  
12 least 50% in very high-value habitat in CZs 2, 3, 4, 5, 7, 8, 9, and 11 (Objective SH1.2, associated  
13 with CM3 and CM11).
  - 14 • Of the at least 42,275 acres of cultivated lands protected as Swainson’s hawk foraging habitat  
15 under Objective SH1.2, up to 1,500 acres can occur in CZs 5 and 6, and must have land surface  
16 elevations greater than –1 foot NAVD88 (Objective SH1.3, associated with CM3).
  - 17 • Protect at least 10,750 acres of grassland, vernal pool, and alkali seasonal wetland as Swainson’s  
18 hawk foraging habitat (Objective SH1.4, associated with CM3).
  - 19 • Protect and enhance at least 8,100 acres of managed wetland, at least 1,500 acres of which are  
20 in the Grizzly Island Marsh Complex (Objective MWNC1.1, associated with CM3).
  - 21 • Maintain and protect the small patches of important wildlife habitats associated with cultivated  
22 lands within the reserve system including isolated valley oak trees, trees and shrubs along field  
23 borders and roadsides, remnant groves, riparian corridors, water conveyance channels,  
24 grasslands, ponds, and wetlands (Objective CLNC1.3, associated with CM3).
- 25 As explained below, with the restoration or protection of these amounts of habitat, in addition to  
26 management activities that would enhance habitat for the species and implementation of AMM1–  
27 AMM7 and AMM18 *Swainson’s Hawk and White-Tailed Kite* to minimize potential effects, impacts on  
28 Swainson’s hawk would not be adverse for NEPA purposes and would be less than significant for  
29 CEQA purposes.

1 **Table 12-4-35. Changes in Swainson’s Hawk Modeled Habitat Associated with Alternative 4**  
2 **(acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT	CM2	CM5
CM1	Nesting	18	18	18	18	NA	NA
	Foraging	4,335	4,335	1,296	1,296	NA	NA
<b>Total Impacts CM1</b>		<b>4,353</b>	<b>4,353</b>	<b>1,314</b>	<b>1,314</b>		
CM2-CM18	Nesting	252	412	54	85	41-70	189
	Foraging	8,903	48,511	504	1,540	3,025-6,635	8,008
<b>Total Impacts CM2-CM18</b>		<b>9,155</b>	<b>48,923</b>	<b>558</b>	<b>1,625</b>	<b>3,066-6,705</b>	<b>8,197</b>
<b>Total Nesting</b>		<b>270</b>	<b>430</b>	<b>72</b>	<b>103</b>		
<b>Total Foraging</b>		<b>13,238</b>	<b>48,511</b>	<b>1,800</b>	<b>2,836</b>		
<b>TOTAL IMPACTS</b>		<b>13,508</b>	<b>53,276</b>	<b>1,872</b>	<b>2,939</b>	<b>3,066-6,705</b>	<b>8,197</b>

<sup>a</sup> See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-83: Loss or Conversion of Habitat for and Direct Mortality of Swainson’s Hawk**

5 Alternative 4 conservation measures would result in the combined permanent and temporary loss  
6 of up to 56,215 acres of modeled habitat (533 acres of nesting habitat and 55,682 acres of foraging  
7 habitat) for Swainson’s hawk (Table 12-4-35). Conservation measures that would result in these  
8 losses are conveyance facilities and transmission line construction, and establishment and use of  
9 borrow and spoil areas (CM1), Yolo Bypass fisheries improvements (CM2), tidal habitat restoration  
10 (CM4), floodplain restoration (CM5), riparian restoration, (CM7), grassland restoration (CM8),  
11 vernal pool and wetland restoration (CM9), nontidal marsh restoration (CM10), and construction of  
12 conservation hatcheries (CM18). Habitat enhancement and management activities (CM11), which  
13 include ground disturbance or removal of nonnative vegetation, could result in local habitat effects.  
14 In addition, maintenance activities associated with the long-term operation of the water conveyance  
15 facilities and other BDCP physical facilities could affect Swainson’s hawk modeled habitat. Each of  
16 these individual activities is described below. A summary statement of the combined impacts and  
17 NEPA effects, and a CEQA conclusion follow the individual conservation measure discussions.

- 18 • *CM1 Water Facilities and Operation*: Construction of Alternative 4 water conveyance facilities  
19 would result in the combined permanent and temporary loss of up to 36 acres of Swainson’s  
20 hawk nesting habitat (18 acres of permanent loss habitat and 18 acres of temporary loss). In  
21 addition, 5,631 acres of foraging habitat would be removed (4,335 acres of permanent loss,

1 1,296 acres of temporary loss; Table 12-4-35). Activities that would impact modeled Swainson’s  
 2 hawk habitat consist of tunnel, forebay, and intake construction, temporary access roads, and  
 3 construction of transmission lines. Most of the permanent loss of nesting habitat would occur  
 4 where Intakes 2, 3, and 5 impact the Sacramento River’s east bank between Freeport and  
 5 Courtland. The riparian areas here are very small patches, some dominated by valley oak and  
 6 others by nonnative trees. Temporary losses of nesting habitat would occur where pipelines  
 7 cross Snodgrass Slough and other small waterways east of the Sacramento River, and where  
 8 temporary work areas surround intake sites. The riparian habitat in these areas is also  
 9 composed of very small patches or stringers bordering waterways, which are composed of  
 10 valley oak and scrub vegetation. There are at least 12 occurrences of nesting Swainson’s hawk  
 11 that overlap with the construction footprint of CM1, primarily from the construction of intakes  
 12 2, 3, and 5, and the construction footprint for the permanent and temporary transmission lines.  
 13 The implementation of *AMM18 Swainson’s Hawk and White-Tailed Kite* (BDCP Appendix 3.C,  
 14 *Avoidance and Minimization Measures*) would minimize the effects of construction on nesting  
 15 Swainson’s hawks if present in the area. Impacts on foraging habitat would occur throughout  
 16 the central Delta in CZs 3- 6, and CZ 8. Permanent foraging habitat impacts would include 908  
 17 acres of very high-value habitat (Table 12-4-36). Refer to the Terrestrial Biology Map Book for a  
 18 detailed view of Alternative 4 construction locations. Impacts from CM1 would occur within the  
 19 first 10 years of Alternative 4 implementation.

20 **Table 12-4-36. Acres of Impacted Foraging Habitat by Value Classes for Swainson’s Hawk**

Foraging Habitat Value Class	Cultivated Land and Other Land Cover Types	CM1 Permanent (temporary)	CM2-18 permanent (temporary)
Very high	Alfalfa hay	908 (120)	12,002 (345)
Moderate	Irrigated pasture, other hay crops	1,188 (705)	24,865 (642)
Low	Other irrigated field and truck/berry crops	86 (100)	5,911 (313)
Very low	Safflower, sunflower, corn, grain sorghum	2,152 (371)	5,732 (241)

- 21
- 22 • *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo bypass fisheries enhancement  
 23 would result in the combined permanent and temporary loss of up to 133 acres of nesting  
 24 habitat (79 acres of permanent loss, 54 acres of temporary loss) in the Yolo Bypass in CZ 2. In  
 25 addition, 1,500 acres of foraging habitat would be removed (996 acres of permanent loss, 554  
 26 acres of temporary loss). Activities through CM2 could involve excavation and grading in  
 27 valley/foothill riparian areas to improve passage of fish through the bypasses. Most of the  
 28 riparian losses would occur at the north end of Yolo Bypass where major fish passage  
 29 improvements are planned. Excavation to improve water movement in the Toe Drain and in the  
 30 Sacramento Weir would also remove Swainson’s hawk habitat. The loss is expected to occur  
 31 during the first 10 years of Alternative 4 implementation.
  - 32 • *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and  
 33 inundation would permanently remove an estimated 295 acres of Swainson’s hawk nesting  
 34 habitat and 37,359 acres of foraging habitat. The majority of the acres lost would consist of  
 35 cultivated lands in CZs 1, 2, 4, 5, 6, and/or 7. Grassland losses would likely occur in the vicinity  
 36 of Cache Slough, on Decker Island in the West Delta ROA, on the upslope fringes of Suisun Marsh,  
 37 and along narrow bands adjacent to waterways in the South Delta ROA. Tidal restoration would

1 directly impact and fragment grassland just north of Rio Vista in and around French and  
 2 Prospect Islands, and in an area south of Rio Vista around Threemile Slough. Losses of alkali  
 3 seasonal wetland complex habitat would likely occur in the south end of the Yolo Bypass and on  
 4 the northern fringes of Suisun Marsh. Impacts on foraging habitat from CM4 would consist of  
 5 10,757 acres of very high-value (alfalfa), 18,565 acres of moderate-value, and 4,098 acres of  
 6 low-value habitat (See Table 12-4-36 for land cover types classified by habitat value). Because  
 7 the species is highly mobile and wide-ranging, habitat fragmentation is not expected to reduce  
 8 the use of remaining cultivated lands or preclude access to surrounding lands. However, the  
 9 conversion of cultivated lands to tidal wetlands over fairly broad areas within the tidal  
 10 restoration footprints could result in the removal or abandonment of nesting territories that  
 11 occur within or adjacent to the restoration areas. Trees would not be actively removed but tree  
 12 mortality would be expected over time as areas became tidally inundated. Depending on the  
 13 extent and value of remaining habitat, this could reduce the local nesting population. There are  
 14 at least 27 Swainson's hawk nest sites that overlap with the hypothetical restoration areas for  
 15 CM4, suggesting that numerous nest sites could be directly affected by inundation from tidal  
 16 restoration activities.

- 17 ● *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore  
 18 seasonally inundated floodplain and riparian restoration actions would remove approximately  
 19 69 acres of Swainson's hawk nesting habitat (38 acres of permanent loss, 31 acres of temporary  
 20 loss) and 2,856 acres of foraging habitat (1,820 acres of permanent loss, 1,036 acres of  
 21 temporary loss). These losses would be expected after the first 10 years of Alternative 4  
 22 implementation along the San Joaquin River and other major waterways in CZ 7.
- 23 ● *CM7 Riparian Natural Community Restoration*: Riparian restoration would permanently remove  
 24 approximately 953 acres of Swainson's hawk foraging habitat as part of tidal restoration and  
 25 3,991 acres as part of seasonal floodplain restoration through CM7. There are at least 27  
 26 Swainson's hawk nest sites that overlap with the hypothetical restoration areas for CM7.
- 27 ● *CM8 Grassland Natural Community Restoration*: Restoration of grassland is expected to be  
 28 implemented on agricultural lands and would result in the conversion of 1,849 acres of  
 29 Swainson's hawk agricultural foraging habitat to grassland foraging habitat in CZs 1, 2, 4, 5, 7, 8,  
 30 and 11. If agricultural lands supporting higher value foraging habitat than the restored  
 31 grassland were removed, there would be a loss of Swainson's hawk foraging habitat value.
- 32 ● *CM10 Nontidal Marsh Restoration*: Restoration and creation of nontidal freshwater marsh would  
 33 result in the permanent removal of 1,440 acres of Swainson's hawk foraging habitat in CZ 2 and  
 34 CZ 4. Small patches of riparian vegetation that support Swainson's hawk nesting habitat may  
 35 develop along the margins of restored nontidal marsh if appropriate site conditions are present.
- 36 ● *CM11 Natural Communities Enhancement and Management*: Habitat management- and  
 37 enhancement-related activities could disturb Swainson's hawk nests if they were present near  
 38 work sites. A variety of habitat management actions that are designed to enhance wildlife values  
 39 in BDCP-protected habitats may result in localized ground disturbances that could temporarily  
 40 remove small amounts of Swainson's hawk habitat and reduce the functions of habitat until  
 41 restoration is complete. Ground-disturbing activities, such as removal of nonnative vegetation  
 42 and road and other infrastructure maintenance, are expected to have minor effects on available  
 43 Swainson's hawk habitat and are expected to result in overall improvements to and  
 44 maintenance of habitat values over the term of the BDCP. These effects cannot be quantified, but  
 45 are expected to be minimal and would be avoided and minimized by the AMMs listed below.

1 CM11 would also include the construction of recreational-related facilities including trails,  
2 interpretive signs, and picnic tables (BDCP Chapter 4, *Covered Activities and Associated Federal*  
3 *Actions*). The construction of trailhead facilities, signs, staging areas, picnic areas, bathrooms,  
4 etc. would be placed on existing, disturbed areas when and where possible. However,  
5 approximately 50 acres of Swainson's hawk grassland foraging habitat would be lost from the  
6 construction of trails and facilities.

- 7 • *CM18 Conservation Hatcheries*: Implementation of CM18 would remove up to 35 acres of  
8 Swainson's hawk foraging habitat for the development of a delta and longfin smelt conservation  
9 hatchery in CZ 1. The loss is expected to occur during the first 10 years of Plan implementation.

10 Permanent and temporary nesting habitat losses from the above conservation measures, would  
11 primarily consist of small, fragmented riparian stands. Temporarily affected nesting habitat  
12 would be restored as riparian habitat within 1 year following completion of construction  
13 activities. The restored riparian habitat would require 1 to several decades to functionally  
14 replace habitat that has been affected and for trees to attain sufficient size and structure suitable  
15 for nesting by Swainson's hawks. *AMM18 Swainson's Hawk and White-Tailed Kite* contains  
16 actions described below to reduce the effect of temporal loss of nesting habitat, including the  
17 transplanting of mature trees and planting of trees near high-value foraging habitat. The  
18 functions of cultivated lands and grassland communities that provide foraging habitat for  
19 Swainson's hawk are expected to be restored relatively quickly.

- 20 • *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground  
21 water conveyance facilities and restoration infrastructure could result in ongoing but periodic  
22 disturbances that could affect Swainson's hawk use of the surrounding habitat. Maintenance  
23 activities would include vegetation management, levee and structure repair, and re-grading of  
24 roads and permanent work areas. These effects, however, would be reduced by AMM1-AMM7  
25 and *AMM18 Swainson's Hawk and White-Tailed Kite* in addition to conservation actions as  
26 described below.

- 27 • *Injury and Direct Mortality*: Construction-related activities would not be expected to result in  
28 direct mortality of adult or fledged Swainson's hawk if they were present in the study area,  
29 because they would be expected to avoid contact with construction and other equipment.  
30 However, if Swainson's hawk were to nest in the construction area, construction-related  
31 activities, including equipment operation, noise and visual disturbances could affect nests or  
32 lead to their abandonment, potentially resulting in mortality of eggs and nestlings. These effects  
33 would be avoided and minimized with the incorporation of *AMM18 Swainson's Hawk and White-*  
34 *Tailed Kite* into the BDCP.

35 The following paragraphs summarize the combined effects discussed above and describe other  
36 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also  
37 included.

### 38 ***Near-Term Timeframe***

39 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
40 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
41 provide sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that  
42 the effect of construction would not be adverse under NEPA. Alternative 4 would remove 342 acres  
43 (270 permanent, 72 temporary) of Swainson's hawk nesting habitat in the study area in the near-  
44 term. These effects would result from the construction of the water conveyance facilities (CM1, 36

1 acres), and implementing other conservation measures (*CM2 Yolo Bypass Fisheries Enhancement*,  
2 *CM4 Tidal Natural Communities Restoration*, and *CM5 Seasonally Inundated Floodplain Restoration*,  
3 and *CM7 Riparian Natural Community Restoration*—306 acres). In addition, 15,038 acres of  
4 Swainson’s hawk foraging habitat would be removed or converted in the near-term (*CM1*, 5,631  
5 acres; *CM2 Yolo Bypass Fisheries Enhancement*, *CM4 Tidal Natural Communities Restoration*, *CM5*  
6 *Seasonally Inundated Floodplain Restoration*, *CM7 Riparian Natural Community Restoration*, *CM8*  
7 *Grassland Natural Community Restoration*, *CM9 Vernal Pool and Alkali Seasonal Wetland Complex*  
8 *Restoration*, *CM11 Natural Communities Enhancement and Management* and *CM18 Conservation*  
9 *Hatcheries*—9,407 acres).

10 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected and  
11 those that are identified in the biological goals and objectives for Swainson’s hawk in Chapter 3 of  
12 the BDCP would be 1:1 for restoration/creation and 1:1 protection of valley/foothill riparian habitat  
13 for nesting habitat, and 1:1 protection for foraging habitat. Using these ratios would indicate that 36  
14 acres of nesting habitat should be restored/ created and 36 acres should be protected to  
15 compensate for the *CM1* losses of Swainson’s hawk nesting habitat. In addition, 5,631 acres of  
16 foraging habitat should be protected to mitigate the *CM1* losses of Swainson’s hawk foraging habitat.  
17 The near-term effects of other conservation actions would remove 306 acres of modeled nesting  
18 habitat, and therefore require 306 acres of restoration and 306 acres of protection of nesting  
19 habitat. Similarly, the near-term effects of other conservation actions would remove 9,407 acres of  
20 modeled foraging habitat, and therefore require 9,407 acres of protection of foraging habitat using  
21 the same typical NEPA and CEQA ratios (1:1 restoration and 1:1 protection for the loss of nesting  
22 habitat; 1:1 protection for the loss of foraging habitat).

23 The BDCP has committed to near-term goals of protecting 750 acres and restoring 800 acres of  
24 valley/foothill riparian natural community, protecting 2,000 acres and restoring 1,140 acres of  
25 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of  
26 alkali seasonal wetland complex, protecting 4,800 acres of managed wetland natural community,  
27 and protecting 15,400 acres of non-rice cultivated lands (Table 3-4 in Chapter 3, *Description of*  
28 *Alternatives*). These conservation actions are associated with *CM3*, *CM5*, *CM7*, and *CM8*, and would  
29 occur in the same timeframe as the construction and early restoration losses.

30 The majority of riparian protection and restoration acres would occur in CZ 7 as part of a reserve  
31 system with extensive wide bands or large patches of valley/foothill riparian natural community  
32 (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*). Riparian  
33 restoration would expand the patches of existing riparian forest in order to support nesting habitat  
34 for the species. The distribution and abundance of potential Swainson’s hawk nest trees would be  
35 increased by planting and maintaining native trees along roadsides and field borders within  
36 protected cultivated lands at a rate of one tree per 10 acres (Objective SWHA2.1). In addition, small  
37 but essential nesting habitat for Swainson’s hawk associated with cultivated lands would also be  
38 maintained and protected such as isolated trees, tree rows along field borders or roads, or small  
39 clusters of trees in farmyards or at rural residences (Objective CLNC1.3).

40 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1  
41 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali  
42 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous  
43 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would  
44 provide foraging habitat for Swainson’s hawk and reduce the effects of current levels of habitat  
45 fragmentation. Small mammal populations would also be increased on protected lands, enhancing

1 the foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4).  
2 Foraging opportunities would also be improved by enhancing prey populations through the  
3 establishment of 20- to 30-foot-wide hedgerows along field borders and roadsides within protected  
4 cultivated lands (Objective SWHA2.2). Remnant patches of grassland or other uncultivated areas  
5 would also be protected and maintained as part of the cultivated lands reserve system which would  
6 provide additional foraging habitat and a source of rodent prey that could recolonize cultivated  
7 fields (Objective CLNC1.3). The protection of managed wetlands (including upland grassland  
8 components) that dry during the spring would also serve as foraging habitat for Swainson's hawks  
9 as prey species recolonize the fields (Objective MWNC1.1). These biological goals and objectives  
10 would inform the near-term protection and restoration efforts and represent performance  
11 standards for considering the effectiveness of restoration actions. At least 15,400 acres of cultivated  
12 lands that provide habitat for covered and other native wildlife species would be protected in the  
13 near-term time period (Objective CLNC1.1) A minimum of 87% of cultivated lands protected by the  
14 late long-term time period would be in very high- and high-value crop types for Swainson's hawk  
15 (Objective SH1.2). This biological objective provides an estimate for the proportion of cultivated  
16 lands protected in the near-term time period which would provide high-value habitat for Swainson's  
17 hawk. The acres of restoration and protection contained in the near-term Plan goals and the  
18 additional detail in the biological objectives satisfy the typical mitigation that would be applied to  
19 the project-level effects of CM1 on Swainson's hawk foraging habitat, as well as mitigate the near-  
20 term effects of the other conservation measures.

21 The 750 acres of protection and 800 acres of restoration contained in the near-term Plan goals  
22 satisfy the typical mitigation ratios that would be applied to the project-level effects of CM1 and  
23 other near-term impacts on Swainson's hawk nesting habitat. The 800 acres of restored riparian  
24 habitat would be initiated in the near-term to offset the loss of modeled nesting habitat, but would  
25 require one to several decades to functionally replace habitat that has been affected and for trees to  
26 attain sufficient size and structure suitable for nesting by Swainson's hawks. This time lag between  
27 the removal and restoration of nesting habitat could have a substantial impact on Swainson's hawk  
28 in the near-term time period. Nesting habitat is limited throughout much of the study area,  
29 consisting mainly of intermittent riparian, isolated trees, small groves, tree rows along field borders,  
30 roadside trees, and ornamental trees near rural residences. The removal of nest trees or nesting  
31 habitat would further reduce this limited resource and could reduce or restrict the number of active  
32 Swainson's hawk nests within the study area until restored riparian habitat is sufficiently  
33 developed.

34 *AMM18 Swainson's Hawk and White-Tailed Kite* would implement a program to plant large mature  
35 trees, including transplanting trees scheduled for removal. These would be supplemented with  
36 additional saplings and would be expected to reduce the temporal effects of loss of nesting habitat.  
37 The plantings would occur prior to or concurrent with (in the case of transplanting) the loss of trees.  
38 In addition, at least 5 trees (five gallon container size) would be planted within the BDCP reserve  
39 system for every tree anticipated to be removed by construction during the near-term period that  
40 was suitable for nesting by Swainson's hawks (20 feet or taller). A variety of native tree species  
41 would be planted to provide trees with differing growth rates, maturation, and life span. Trees  
42 would be planted within the BDCP reserve system in areas that support high value foraging habitat  
43 in clumps of at least 3 trees each at appropriate sites within or adjacent to conserved cultivated  
44 lands, or they could be incorporated as a component of the riparian restoration (CM5, CM7) where  
45 they are in close proximity to suitable foraging habitat. Replacement trees that were incorporated

1 into the riparian restoration would not be clustered in a single region of the study area, but would  
2 be distributed throughout the lands protected as foraging habitat for Swainson's hawk.

3 To enhance Swainson's hawk and reproductive output until the replacement nest trees become  
4 suitable for nesting, 100 acres of high-quality foraging habitat (alfalfa rotation) would be protected  
5 in the near-term for each potential nest site removed (a nest site is defined as a 125-acre block in  
6 which more than 50% of nest trees are 20 feet or greater in height) as a result of construction  
7 activity during the near-term. The foraging habitat to be protected would be within 6 kilometers of  
8 the removed tree within an otherwise suitable foraging landscape and on land not subject to threat  
9 of seasonal flooding, construction disturbances, or other conditions that would reduce the foraging  
10 value of the land. With this program in place, Alternative 4 would not have a substantial adverse  
11 effect on Swainson's hawk in the near-term timeframe, either through direct mortality or through  
12 habitat modifications.

13 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
14 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
15 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
16 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
17 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
18 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
19 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

#### 20 ***Late Long-Term Timeframe***

21 The study area supports approximately 9,796 acres of modeled nesting habitat and 477,879 acres of  
22 modeled foraging habitat for Swainson's hawk. Alternative 4 as a whole would result in the  
23 permanent loss of and temporary effects on 533 acres of potential nesting habitat (5% of the  
24 potential nesting habitat in the study area) and 55,682 acres of foraging habitat (12% of the foraging  
25 habitat in the study area).

26 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*  
27 *Restoration*, *CM5 Seasonally Inundated Floodplain Restoration*, *CM7 Riparian Natural Community*  
28 *Restoration*, and *CM8 Grassland Natural Community Restoration* to restore or create at least 5,000  
29 acres and protect at least 750 acres of valley/foothill riparian natural community, protect 8,000  
30 acres and restore 2,000 acres of grassland natural community, protect 600 acres of vernal pool  
31 complex, protect 150 acres of alkali seasonal wetland complex, protect 8,100 acres of managed  
32 wetland, and protect 48,625 acres of cultivated lands that provide suitable habitat for native wildlife  
33 species (Table 3-4 in Chapter 3, *Description of Alternatives*).

34 The majority of riparian protection and restoration acres would occur in CZ 7 as part of a reserve  
35 system with extensive wide bands or large patches of valley/foothill riparian natural community  
36 (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*). Riparian  
37 restoration would expand the patches of existing riparian forest in order to support nesting habitat  
38 for the species. The distribution and abundance of potential Swainson's hawk nest trees would be  
39 increased by planting and maintaining native trees along roadsides and field borders within  
40 protected cultivated lands at a rate of one tree per 10 acres (Objective SH2.1). In addition, small but  
41 essential nesting habitat for Swainson's hawk associated with cultivated lands would also be  
42 maintained and protected such as isolated trees, tree rows along field borders or roads, or small  
43 clusters of trees in farmyards or at rural residences (Objective CLNC1.3).

1 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1  
2 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali  
3 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous  
4 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would  
5 provide foraging habitat for Swainson's hawk and reduce the effects of current levels of habitat  
6 fragmentation. Small mammal populations would also be increased on protected lands, enhancing  
7 the foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4).  
8 Foraging opportunities would also be improved by enhancing prey populations through the  
9 establishment of 20- to 30-foot-wide hedgerows along field borders and roadsides within protected  
10 cultivated lands (Objective SH2.2). Remnant patches of grassland or other uncultivated areas would  
11 also be protected and maintained as part of the cultivated lands reserve system which would  
12 provide additional foraging habitat and a source of rodent prey that could recolonize cultivated  
13 fields (Objective CLNC1.3). The protection of managed wetlands (including upland grassland  
14 components) that dry during the spring would also serve as foraging habitat for Swainson's hawks  
15 as prey species recolonize the fields (Objective MWNC1.1). These biological goals and objectives  
16 would inform the near-term protection and restoration efforts and represent performance  
17 standards for considering the effectiveness of restoration actions. Foraging habitat would be  
18 conserved at a ratio of 1:1 (Objective SH1.1) and at least 42,275 acres of cultivated lands that  
19 provide Swainson's hawk foraging habitat would be protected by the late long-term, 50% of which  
20 would be in very high-value habitat production in CZs 1-4, 7-9, and 11 (Objective SH1.2).

21 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
22 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
23 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
24 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
25 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
26 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
27 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

28 **NEPA Effects:** The loss of Swainson's hawk habitat and potential direct mortality of this special-  
29 status species under Alternative 4 would represent an adverse effect in the absence of other  
30 conservation actions. With habitat protection and restoration associated with CM3, CM5, CM7, CM8,  
31 CM9, and CM11, guided by biological goals and objectives and by AMM1-AMM7 and *AMM18*  
32 *Swainson's Hawk and White-Tailed Kite*, which would be in place throughout the construction period,  
33 the effects of habitat loss and potential mortality on Swainson's hawk under Alternative 4 would not  
34 be adverse.

### 35 **CEQA Conclusion:**

#### 36 **Near-Term Timeframe**

37 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
38 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
39 provide sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that  
40 the effect of construction would be less than significant under CEQA. Alternative 4 would remove  
41 342 acres (270 permanent, 72 temporary) of Swainson's hawk nesting habitat in the study area in  
42 the near-term. These effects would result from the construction of the water conveyance facilities  
43 (CM1, 36 acres), and implementing other conservation measures (*CM2 Yolo Bypass Fisheries*  
44 *Enhancement*, *CM4 Tidal Natural Communities Restoration*, and *CM5 Seasonally Inundated Floodplain*  
45 *Restoration*, and *CM7 Riparian Natural Community Restoration*—306 acres). In addition, 15,038

1 acres of Swainson’s hawk foraging habitat would be removed or converted in the near-term (CM1,  
2 5,631 acres; *CM2 Yolo Bypass Fisheries Enhancement*, *CM4 Tidal Natural Communities Restoration*,  
3 *CM5 Seasonally Inundated Floodplain Restoration*, *CM7 Riparian Natural Community Restoration*, *CM8*  
4 *Grassland Natural Community Restoration*, *CM9 Vernal Pool and Alkali Seasonal Wetland Complex*  
5 *Restoration*, *CM11 Natural Communities Enhancement and Management* and *CM18 Conservation*  
6 *Hatcheries*—9,407 acres).

7 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected and  
8 those that are identified in the biological goals and objectives for Swainson’s hawk in Chapter 3 of  
9 the BDCP would be 1:1 for restoration/creation and 1:1 protection of valley/foothill riparian habitat  
10 for nesting habitat, and 1:1 protection for foraging habitat. Using these ratios would indicate that 36  
11 acres of nesting habitat should be restored/ created and 36 acres should be protected to mitigate  
12 the CM1 losses of Swainson’s hawk nesting habitat. In addition, 5,631 acres of foraging habitat  
13 should be protected to mitigate the CM1 losses of Swainson’s hawk foraging habitat. The near-term  
14 effects of other conservation actions would remove 306 acres of modeled nesting habitat, and  
15 therefore require 306 acres of restoration and 306 acres of protection of nesting habitat. Similarly,  
16 the near-term effects of other conservation actions would remove 9,407 acres of modeled foraging  
17 habitat, and therefore require 9,407 acres of protection of foraging habitat using the same typical  
18 NEPA and CEQA ratios (1:1 restoration and 1:1 protection for the loss of nesting habitat; 1:1  
19 protection for the loss of foraging habitat).

20 The BDCP has committed to near-term goals of protecting 750 acres and restoring 800 acres of  
21 valley/foothill riparian natural community, protecting 2,000 acres and restoring 1,140 acres of  
22 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of  
23 alkali seasonal wetland complex, protecting 4,800 acres of managed wetland natural community,  
24 and protecting 15,400 acres of non-rice cultivated lands (Table 3-4 in Chapter 3, *Description of*  
25 *Alternatives*). These conservation actions are associated with CM3, CM5, CM7, and CM8, and would  
26 occur in the same timeframe as the construction and early restoration losses.

27 The majority of riparian protection and restoration acres would occur in CZ 7 as part of a reserve  
28 system with extensive wide bands or large patches of valley/foothill riparian natural community  
29 (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*). Riparian  
30 restoration would expand the patches of existing riparian forest in order to support nesting habitat  
31 for the species. The distribution and abundance of potential Swainson’s hawk nest trees would be  
32 increased by planting and maintaining native trees along roadsides and field borders within  
33 protected cultivated lands at a rate of one tree per 10 acres (Objective SWHA2.1). In addition, small  
34 but essential nesting habitat for Swainson’s hawk associated with cultivated lands would also be  
35 maintained and protected such as isolated trees, tree rows along field borders or roads, or small  
36 clusters of trees in farmyards or at rural residences (Objective CLNC1.3).

37 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1  
38 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali  
39 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous  
40 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would  
41 provide foraging habitat for Swainson’s hawk and reduce the effects of current levels of habitat  
42 fragmentation. Small mammal populations would also be increased on protected lands, enhancing  
43 the foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4).  
44 Foraging opportunities would also be improved by enhancing prey populations through the  
45 establishment of 20- to 30-foot-wide hedgerows along field borders and roadsides within protected

1 cultivated lands (Objective SWHA2.2). Remnant patches of grassland or other uncultivated areas  
2 would also be protected and maintained as part of the cultivated lands reserve system which would  
3 provide additional foraging habitat and a source of rodent prey that could recolonize cultivated  
4 fields (Objective CLNC1.3). The protection of managed wetlands (including upland grassland  
5 components) that dry during the spring would also serve as foraging habitat for Swainson's hawks  
6 as prey species recolonize the fields (Objective MWNC1.1). These biological goals and objectives  
7 would inform the near-term protection and restoration efforts and represent performance  
8 standards for considering the effectiveness of restoration actions. At least 15,400 acres of cultivated  
9 lands that provide habitat for covered and other native wildlife species would be protected in the  
10 near-term time period (Objective CLNC1.1) A minimum of 87% of cultivated lands protected by the  
11 late long-term time period would be in very high- and high-value crop types for Swainson's hawk  
12 (Objective SH1.2). This biological objective provides an estimate for the proportion of cultivated  
13 lands protected in the near-term time period which would provide high-value habitat for Swainson's  
14 hawk. The acres of restoration and protection contained in the near-term Plan goals and the  
15 additional detail in the biological objectives satisfy the typical mitigation that would be applied to  
16 the project-level effects of CM1 on Swainson's hawk foraging habitat, as well as mitigate the near-  
17 term effects of the other conservation measures.

18 The 750 acres of protection and 800 acres of restoration contained in the near-term Plan goals  
19 satisfy the typical mitigation ratios that would be applied to the project-level effects of CM1 and  
20 other near-term impacts on Swainson's hawk nesting habitat. The 800 acres of restored riparian  
21 habitat would be initiated in the near-term to offset the loss of modeled nesting habitat, but would  
22 require one to several decades to functionally replace habitat that has been affected and for trees to  
23 attain sufficient size and structure suitable for nesting by Swainson's hawks. This time lag between  
24 the removal and restoration of nesting habitat could have a substantial impact on Swainson's hawk  
25 in the near-term time period. Nesting habitat is limited throughout much of the study area,  
26 consisting mainly of intermittent riparian, isolated trees, small groves, tree rows along field borders,  
27 roadside trees, and ornamental trees near rural residences. The removal of nest trees or nesting  
28 habitat would further reduce this limited resource and could reduce or restrict the number of active  
29 Swainson's hawk within the study area until restored riparian habitat is sufficiently developed.

30 *AMM18 Swainson's Hawk and White-Tailed Kite* would implement a program to plant large mature  
31 trees, including transplanting trees scheduled for removal. These would be supplemented with  
32 additional saplings and would be expected to reduce the temporal effects of loss of nesting habitat.  
33 The plantings would occur prior to or concurrent with (in the case of transplanting) the loss of trees.  
34 In addition, at least five trees (5-gallon container size) would be planted within the BDCP reserve  
35 system for every tree anticipated to be removed by construction during the near-term period that  
36 was suitable for nesting by Swainson's hawks (20 feet or taller). A variety of native tree species  
37 would be planted to provide trees with differing growth rates, maturation, and life span. Trees  
38 would be planted within the BDCP reserve system in areas that support high value foraging habitat  
39 in clumps of at least three trees each at appropriate sites within or adjacent to conserved cultivated  
40 lands, or they may be incorporated as a component of the riparian restoration (CM5, CM7) where  
41 they are in close proximity to suitable foraging habitat. Replacement trees that are incorporated into  
42 the riparian restoration would not be clustered in a single region of the study area, but would be  
43 distributed throughout the lands protected as foraging habitat for Swainson's hawk.

44 To enhance Swainson's hawk reproductive output until the replacement nest trees become suitable  
45 for nesting, 100 acres of high-quality foraging habitat (alfalfa rotation) would be protected in the  
46 near-term for each potential nest site removed (a nest site is defined as a 125-acre block in which

1 more than 50% of nest trees are 20 feet or greater in height) as a result of construction activity  
2 during the near-term. The foraging habitat to be protected would be within 6 kilometers of the  
3 removed tree within an otherwise suitable foraging landscape and on land not subject to threat of  
4 seasonal flooding, construction disturbances, or other conditions that would reduce the foraging  
5 value of the land. With this program in place, Alternative 4 would not have a substantial adverse  
6 effect on Swainson's hawk in the near-term timeframe, either through direct mortality or through  
7 habitat modifications.

8 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
9 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
10 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
11 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
12 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
13 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
14 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

### 15 **Late Long-Term Timeframe**

16 The study area supports approximately 9,796 acres of modeled nesting habitat and 477,879 acres of  
17 modeled foraging habitat for Swainson's hawk. Alternative 4 as a whole would result in the  
18 permanent loss of and temporary effects on 533 acres of potential nesting habitat (5% of the  
19 potential nesting habitat in the study area) and 55,682 acres of foraging habitat (12% of the foraging  
20 habitat in the study area).

21 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*  
22 *Restoration*, *CM5 Seasonally Inundated Floodplain Restoration*, *CM7 Riparian Natural Community*  
23 *Restoration*, and *CM8 Grassland Natural Community Restoration* to restore or create at least 5,000  
24 acres and protect at least 750 acres of valley/foothill riparian natural community, protect 8,000  
25 acres and restore 2,000 acres of grassland natural community, protect 600 acres of vernal pool  
26 complex, protect 150 acres of alkali seasonal wetland complex, protect 8,100 acres of managed  
27 wetland, and protect 48,625 acres of cultivated lands that provide suitable habitat for native wildlife  
28 species (Table 3-4 in Chapter 3, *Description of Alternatives*).

29 The majority of riparian protection and restoration acres would occur in CZ 7 as part of a reserve  
30 system with extensive wide bands or large patches of valley/foothill riparian natural community  
31 (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*). Riparian  
32 restoration would expand the patches of existing riparian forest in order to support nesting habitat  
33 for the species. The distribution and abundance of potential Swainson's hawk nest trees would be  
34 increased by planting and maintaining native trees along roadsides and field borders within  
35 protected cultivated lands at a rate of one tree per 10 acres (Objective SH2.1). In addition, small but  
36 essential nesting habitat for Swainson's hawk associated with cultivated lands would also be  
37 maintained and protected such as isolated trees, tree rows along field borders or roads, or small  
38 clusters of trees in farmyards or at rural residences (Objective CLNC1.3).

39 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1  
40 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali  
41 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous  
42 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would  
43 provide foraging habitat for Swainson's hawk and reduce the effects of current levels of habitat  
44 fragmentation. Small mammal populations would also be increased on protected lands, enhancing

1 the foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4).  
2 Foraging opportunities would also be improved by enhancing prey populations through the  
3 establishment of 20- to 30-foot-wide hedgerows along field borders and roadsides within protected  
4 cultivated lands (Objective SH2.2). Remnant patches of grassland or other uncultivated areas would  
5 also be protected and maintained as part of the cultivated lands reserve system which would  
6 provide additional foraging habitat and a source of rodent prey that could recolonize cultivated  
7 fields (Objective CLNC1.3). The protection of managed wetlands (including upland grassland  
8 components) that dry during the spring would also serve as foraging habitat for Swainson's hawks  
9 as prey species recolonize the fields (Objective MWNC1.1). These biological goals and objectives  
10 would inform the near-term protection and restoration efforts and represent performance  
11 standards for considering the effectiveness of restoration actions. Foraging habitat would be  
12 conserved at a ratio of 1:1 (Objective SH1.1) and at least 42,275 acres of cultivated lands that  
13 provide Swainson's hawk foraging habitat would be protected by the late long-term, 50% of which  
14 would be in very high-value habitat production in CZs 1-4, 7- 9, and 11 (Objective SH1.2).

15 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
16 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
17 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
18 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
19 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
20 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
21 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

22 Considering Alternative 4's protection and restoration provisions, which would provide acreages of  
23 new or enhanced habitat in amounts greater than necessary to compensate for the time lag of  
24 restoring riparian and foraging habitats lost to construction and restoration activities, and with  
25 implementation of AMM1-AMM7 and *AMM18 Swainson's Hawk and White-Tailed Kite*, the loss of  
26 habitat or direct mortality through implementation of Alternative 4 would not result in a substantial  
27 adverse effect through habitat modifications and would not substantially reduce the number or  
28 restrict the range of the species. Therefore, the loss of habitat or potential mortality under this  
29 alternative would have a less-than-significant impact on Swainson's hawk.

### 30 **Impact BIO-84: Effects on Swainson's Hawk Associated with Electrical Transmission Facilities**

31 New transmission lines would increase the risk that Swainson's hawks could be subject to power  
32 line strikes, which could result in injury or mortality of Swainson's hawks. This species would be at  
33 low risk of bird strike mortality based on factors assessed in the bird strike vulnerability analysis  
34 (BDCP Attachment 5.J-2, *Memorandum: Analysis of Potential Bird Collisions at Proposed BDCP*  
35 *Transmission Lines*). Factors analyzed include the height of the new transmission lines and the flight  
36 behavior of the species. The existing network of transmission lines in the study area currently poses  
37 the same small risk for Swainson's hawk, and any incremental risk associated with the new power  
38 line corridors would also be expected to be low. *AMM20 Greater Sandhill Crane* would further reduce  
39 any potential effects.

40 **NEPA Effects:** New transmission lines would minimally increase the risk for Swainson's hawk power  
41 line strikes. With the implementation of *AMM20 Greater Sandhill Crane* the potential effect of the  
42 construction of new transmission lines on Swainson's hawk would not be adverse.

1 **CEQA Conclusion:** New transmission lines would minimally increase the risk for Swainson's hawk  
2 power line strikes. *AMM20 Greater Sandhill Crane* would reduce the potential impact of the  
3 construction of new transmission lines on Swainson's hawk to a less-than-significant level.

#### 4 **Impact BIO-85: Indirect Effects of Plan Implementation on Swainson's Hawk**

5 Noise and visual disturbances from the construction of water conveyance facilities and other  
6 conservation measures could reduce Swainson's hawk use of modeled habitat adjacent to work  
7 areas. Construction noise above background noise levels (greater than 50 dBA) could extend 500 to  
8 5,250 feet from the edge of construction activities (BDCP Appendix 5.J, Attachment 5J.D, *Indirect*  
9 *Effects of the Construction of the BDCP Conveyance Facility on Sandhill Crane*, Table 4), although there  
10 are no available data to determine the extent to which these noise levels could affect Swainson's  
11 hawk. Moreover, operation and maintenance of the water conveyance facilities, including the  
12 transmission facilities, could result in ongoing but periodic postconstruction disturbances that could  
13 affect Swainson's hawk use of the surrounding habitat. These construction activities would include  
14 water conveyance construction, tidal restoration activities, floodplain restoration, and Fremont  
15 Weir/Yolo Bypass Enhancements. Swainson's hawks are seasonally abundant across much of the  
16 study area wherever adequate nest trees occur within a cultivated landscape that supports suitable  
17 foraging habitat. There would be a potential for noise and visual disturbances associated with BDCP  
18 actions to temporarily displace Swainson's hawks and temporarily reduce the use of suitable habitat  
19 adjacent to construction areas. These adverse effects would be minimized with the implementation  
20 of *AMM18 Swainson's Hawk and White-Tailed Kite*.

21 The use of mechanical equipment during water conveyance facilities construction could cause the  
22 accidental release of petroleum or other contaminants that could affect Swainson's hawk foraging in  
23 the surrounding habitat. The inadvertent discharge of sediment or excessive dust adjacent to  
24 suitable habitat could also have an adverse effect on these species. *AMM2 Construction Best*  
25 *Management Practices and Monitoring* would minimize the likelihood of such spills and ensure that  
26 measures are in place to prevent runoff from the construction area and negative effects of dust on  
27 habitat.

28 **NEPA Effects:** Noise and visual disturbances from the construction of water conveyance facilities  
29 could reduce Swainson's hawk use of modeled habitat adjacent to work areas. Moreover, operation  
30 and maintenance of the water conveyance facilities, including the transmission facilities, could result  
31 in ongoing but periodic postconstruction disturbances that could affect Swainson's hawk use of the  
32 surrounding habitat. Noise, the potential for hazardous spills, increased dust and sedimentation, and  
33 operations and maintenance of the water conveyance facilities would not have an adverse effect on  
34 Swainson's hawk with the implementation of *AMM1-AMM7*, and *AMM18 Swainson's Hawk and*  
35 *White-Tailed Kite*.

36 **CEQA Conclusion:** Noise and visual disturbances from the construction of water conveyance  
37 facilities could reduce Swainson's hawk use of modeled habitat adjacent to work areas. Moreover,  
38 operation and maintenance of the water conveyance facilities, including the transmission facilities,  
39 could result in ongoing but periodic postconstruction disturbances that could affect Swainson's  
40 hawk use of the surrounding habitat. The effects of noise, the potential for hazardous spills,  
41 increased dust and sedimentation, and operations and maintenance of the water conveyance  
42 facilities would result in a less-than-significant impact on Swainson's hawk with the implementation  
43 of *AMM1-AMM7*, and *AMM18 Swainson's Hawk and White-Tailed Kite*.

1 **Impact BIO-86: Periodic Effects of Inundation of Swainson’s Hawk Nesting and Foraging**  
2 **Habitat as a Result of Implementation of Conservation Components**

3 Flooding of the Yolo Bypass from Fremont Weir operations (*CM2 Yolo Bypass Fisheries*  
4 *Enhancement*) would increase the frequency and duration of inundation on approximately 3,066–  
5 6,706 acres of modeled Swainson’s hawk habitat (consisting of approximately 41–70 acres of  
6 nesting habitat and 3,025–6,635 acres of foraging habitat; Table 12-4-35). However, project-  
7 associated inundation of areas that would not otherwise have been inundated would be expected to  
8 occur in no more than 30% of all years, since Fremont Weir is expected to overtop the remaining  
9 estimated 70% of all years, and during those years notch operations would not typically affect the  
10 maximum extent of inundation. In more than half of all years under Existing Conditions, an area  
11 greater than the project-related inundation area already inundates in the bypass. Therefore, habitat  
12 conditions in the bypass would not be expected to change substantially as a result of Yolo Bypass  
13 operations. However, increased duration of inundation during years of Fremont Weir operation,  
14 may delay the period for which foraging habitat is available to Swainson’s hawks by up to several  
15 weeks.

16 Based on hypothetical footprints, implementation of *CM5 Seasonally Inundated Floodplain*  
17 *Restoration* could result in the periodic inundation of up to approximately 8,197 acres of modeled  
18 Swainson’s hawk habitat (Table 12-4-35), consisting of 189 acres of nesting and 8,008 acres of  
19 foraging habitat. Floodplain restoration would be expected to restore a more natural flood regime  
20 and sustain riparian vegetation types that support regeneration of Swainson’s hawk nesting habitat.  
21 The restored floodplains would transition from areas that flood frequently (e.g., every 1 to 2 years)  
22 to areas that flood infrequently (e.g., every 10 years or more). Foraging habitat that is inundated  
23 after Swainson’s hawks arrive in the Central Valley in mid-March could result in a periodic loss of  
24 available foraging habitat due to the reduction in available prey. Inundated habitats would be  
25 expected to recover following draw-down and provide suitable foraging conditions until the  
26 following inundation period. Thus, this is considered a periodic and short term effect that is unlikely  
27 to affect Swainson’s hawk distribution and abundance, or foraging use of the study area.

28 **NEPA Effects:** Increased periodic flooding would not be expected to cause any adverse effect on nest  
29 sites because trees in which nest sites are situated already withstand floods, the increase in  
30 inundation frequency and duration is expected to remain within the range of tolerance of riparian  
31 trees, and nest sites are located above floodwaters. Although foraging habitat would be periodically  
32 unavailable to Swainson’s hawk, inundated habitats are expected to recover following draw down.  
33 This would be considered a short-term effect that would not result in an adverse effect on  
34 Swainson’s hawk.

35 **CEQA Conclusion:** Increased periodic flooding would not be expected to cause any adverse effect on  
36 nest sites because trees in which nest sites are situated already withstand floods, the increase in  
37 inundation frequency and duration is expected to remain within the range of tolerance of riparian  
38 trees, and nest sites are located above floodwaters. Although foraging habitat would be periodically  
39 unavailable to Swainson’s hawk, inundated habitats are expected to recover following draw down.  
40 This would be considered a short-term effect that would have a less-than-significant impact on  
41 Swainson’s hawk.

42 **Tricolored Blackbird**

43 This section describes the effects of Alternative 4, including water conveyance facilities construction  
44 and implementation of other conservation components, on tricolored blackbird. The habitat model

1 used to assess effects for tricolored blackbird is based on breeding habitat and nonbreeding habitat.  
2 Although nesting colonies have been documented along the fringe of Suisun Marsh, in the Yolo  
3 Bypass and along the southwestern perimeter of the study area, breeding colonies are uncommon in  
4 the study area. Modeled breeding habitat includes bulrush/cattail wetlands and shrub communities  
5 that may provide suitable nesting substrate, and adjacent high-value foraging areas that occur  
6 within 5 miles of nesting colonies documented in the study area. The foraging component includes  
7 cultivated lands and noncultivated land cover types known to support abundant insect populations  
8 such as grasslands, pasturelands (including alfalfa), natural seasonal wetlands, and sunflower  
9 croplands. The Delta is recognized as a major wintering area for tricolored blackbird (Hamilton  
10 2004, Beedy 2008). Modeled nonbreeding habitat includes emergent wetlands and shrub stands  
11 that provide suitable roosting habitat, as well as cultivated lands and noncultivated lands that  
12 provide foods sought by tricolored blackbirds during the winter. Outside of the breeding season,  
13 tricolored blackbirds are primarily granivores that forage opportunistically across the study area in  
14 grasslands, pasturelands, croplands, dairies, and livestock feed lots. Factors considered in assessing  
15 the value of affected habitat for the tricolored blackbird, include patch size, suitability of vegetation,  
16 and proximity to recorded occurrences.

17 Construction and restoration associated with Alternative 4 conservation measures would result in  
18 both temporary and permanent losses of tricolored blackbird modeled habitat as indicated in Table  
19 12-4-37. Full implementation of Alternative 4 would also include the following conservation actions  
20 over the term of the BDCP to benefit the tricolored blackbird (BDCP Chapter 3, Section 3.3, *Biological*  
21 *Goals and Objectives*).

- 22 ● Protect and manage at least 50 acres of occupied or recently occupied (within the last 15 years)  
23 tricolored blackbird nesting habitat located within 5 miles of high-value foraging habitat in CZs  
24 1, 2, 8, or 11. (Objective TRBL1.1).
- 25 ● Protect at least 26,300 acres of moderate-, high-, or very high-value cultivated lands as  
26 nonbreeding foraging habitat, 50% of which is of high or very high value (Objective TRBL1.2).
- 27 ● Protect at least 11,050 acres of high- to very high-value breeding-foraging habitat within 5 miles  
28 of occupied or recently occupied (within the last 15 years) tricolored blackbird nesting habitat  
29 in CZs 1, 2, 3, 4, 7, 8, or 11. At least 1,000 acres of this protected breeding-foraging habitat will  
30 be within 5 miles of the 50 acres of nesting habitat protected under Objective TRBL1.1  
31 (Objective TRBL1.3).
- 32 ● Maintain and protect the small patches of important wildlife habitats associated with cultivated  
33 lands within the reserve system including isolated valley oak trees, trees and shrubs along field  
34 borders and roadsides, remnant groves, riparian corridors, water conveyance channels,  
35 grasslands, ponds, and wetlands (Objective CLNC1.3, associated with CM3).
- 36 ● Protect at least 8,000 acres of grassland with at least 2,000 acres protected in CZ 1, at least 1,000  
37 acres protected in CZ 8, at least 2,000 acres protected in CZ 11, and the remainder distributed  
38 among CZs 1, 2, 4, 5, 7, 8, and 11 (Objective GNC1.1, associated with CM3).
- 39 ● Restore at least 2,000 acres of grasslands (Objective GNC1.2, associated with CM8).
- 40 ● Protect at least 150 acres of alkali seasonal wetland and at least 600 acres of existing vernal pool  
41 complex in CZs 1, 8, and/or 11 (Objectives ASWNC1.1 and VPNC1.1, associated with CM3).
- 42 ● Increase prey abundance and accessibility for grassland-foraging species (Objectives ASWNC2.4,  
43 VPNC2.5, and GNC2.4, associated with CM11).

1 As explained below, with the restoration or protection of these amounts of habitat, in addition to  
 2 management activities that would enhance these natural communities for the species and  
 3 implementation of AMM1–AMM7 and AMM21 *Tricolored Blackbird*, impacts on tricolored blackbird  
 4 would not be adverse for NEPA purposes and would be less than significant for CEQA purposes.

5 **Table 12-4-37. Changes to Tricolored Modeled Habitat Associated with Alternative 4 (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>		
		NT	LLT	NT	LLT	CM2	CM5	
CM1	Breeding	Nesting	4	4	3	3	NA	NA
		Foraging - cultivated	1,429	1,429	229	229	NA	NA
		Foraging - noncultivated	213	213	114	114	NA	NA
	Nonbreeding	Roosting	19	19	20	20	NA	NA
		Foraging - cultivated	2,327	2,327	575	575	NA	NA
		Foraging - noncultivated	245	245	47	47	NA	NA
<b>Total Impacts CM1</b>		<b>4,237</b>	<b>4,237</b>	<b>988</b>	<b>988</b>			
CM2–CM18	Breeding	Nesting	13	72	75	77	11-26	30
		Foraging - cultivated	1,657	9,525	84	359	1,837-2,598	2,124
		Foraging noncultivated	704	1,991	155	184	600-1,689	355
	Nonbreeding	Roosting	570	1,642	0	1	0-4	29
		Foraging - cultivated	3,747	23,955	54	420	222-1,057	2,506
		Foraging - noncultivated	459	1,341	0	3	42-191	158
<b>Total Impacts CM2–CM18</b>		<b>7,150</b>	<b>38,526</b>	<b>368</b>	<b>1,044</b>	<b>2,711</b>	<b>5,766</b>	
<b>Total Breeding</b>		<b>4,020</b>	<b>13,234</b>	<b>660</b>	<b>966</b>	<b>2,447-4,312</b>	<b>2,509</b>	
<b>Total Nonbreeding</b>		<b>7,367</b>	<b>29,569</b>	<b>696</b>	<b>1,066</b>	<b>263-1,252</b>	<b>2,694</b>	
<b>TOTAL IMPACTS</b>		<b>11,387</b>	<b>42,763</b>	<b>1,356</b>	<b>2,032</b>	<b>2,711</b>	<b>5,766</b>	

<sup>a</sup> See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

## 1 **Impact BIO-87: Loss or Conversion of Habitat for and Direct Mortality of Tricolored Blackbird**

2 Alternative 4 conservation measures would result in the combined permanent and temporary loss  
3 of up to 44,795 acres of modeled habitat (14,200 acres of breeding habitat and up to 30,595 acres of  
4 nonbreeding habitat) for tricolored blackbird (Table 12-4-37). Conservation measures that would  
5 result in these losses are conveyance facilities and transmission line construction, and establishment  
6 and use of borrow and spoil areas (CM1), Yolo Bypass improvements (CM2), tidal habitat  
7 restoration (CM4), floodplain restoration (CM5), riparian restoration (CM7), grassland restoration  
8 (CM8), marsh restoration (CM10), and construction of conservation hatcheries (CM18). Habitat  
9 enhancement and management activities (CM11), which include ground disturbance or removal of  
10 nonnative vegetation, could result in local adverse habitat effects. In addition, maintenance activities  
11 associated with the long-term operation of the water conveyance facilities and other BDCP physical  
12 facilities could degrade or eliminate tricolored blackbird habitat. Each of these individual activities  
13 is described below. A summary statement of the combined impacts and NEPA effects and a CEQA  
14 conclusion follow the individual conservation measure discussions.

15 *CM1 Water Facilities and Operation:* Construction of Alternative 4 conveyance facilities would  
16 result in the permanent loss of 1,646 acres of tricolored blackbird breeding habitat (4 acres  
17 nesting habitat, 1,429 acres of cultivated lands, and 213 acres of noncultivated lands suitable for  
18 foraging) and 2,592 acres of nonbreeding habitat (19 acres roosting habitat, 2,327 acres of  
19 cultivated lands, and 245 acres of noncultivated lands suitable for foraging, Table 12-4-37).  
20 Approximately 847 of the 1,646 acres permanently impacted would be lost as reusable tunnel  
21 material storage areas, which would likely be moved to other sites for use in levee build-up and  
22 restoration, and the affected area would likely be restored. While this effect is categorized as  
23 permanent because there is no assurance that the material would eventually be moved, the  
24 effect would likely be temporary. In addition, CM1 would result in the temporary removal of  
25 692 acres of breeding habitat (3 acres nesting habitat, 229 acres of cultivated lands, and 114  
26 acres of noncultivated lands suitable for foraging) and 642 acres of nonbreeding habitat (20  
27 acres roosting habitat, 575 acres of cultivated lands, and 47 acres of noncultivated lands suitable  
28 for foraging, Table 12-4-37).

29 Most of the habitat that would be lost is located in the central Delta, from CZs 3-6 and CZ 8.  
30 There are no occurrences of tricolored blackbird that overlap with the construction footprint for  
31 CM1. However, records exist throughout the study area. *AMM21 Tricolored Blackbird* (BDCP  
32 Appendix 3.C, *Avoidance and Minimization Measures*) would minimize the effects of construction  
33 on nesting tricolored blackbirds if present in the area. Refer to the Terrestrial Biology Map Book  
34 for a detailed view of Alternative 4 construction locations. Impacts from CM1 would occur  
35 within the first 10 years of Plan implementation.

- 36 • *CM2 Yolo Bypass Fisheries Enhancement:* Construction activity associated with fisheries  
37 improvements in the Yolo Bypass would permanent loss of 595 acres of tricolored blackbird  
38 breeding habitat (13 acres nesting habitat, 477 acres of cultivated lands, and 105 acres of  
39 noncultivated lands suitable for foraging) and 8 acres of nonbreeding habitat (consisting  
40 entirely of roosting habitat). In addition, CM2 construction would result in the temporary  
41 removal of 314 acres of breeding habitat (75 acres nesting habitat, 84 acres of cultivated lands,  
42 and 155 acres of noncultivated lands suitable for foraging) and 54 acres of nonbreeding habitat  
43 (consisting entirely of cultivated lands). The loss is expected to occur during the first 10 years of  
44 Alternative 4 implementation.

- 1       • *CM4 Tidal Natural Communities Restoration*: Tidal natural communities restoration would result  
2       in the inundation of approximately 3,937 acres of tricolored blackbird breeding habitat (21  
3       acres of nesting, 2,814 acres of cultivated lands, and 1,102 acres of noncultivated lands suitable  
4       for foraging) and 10,794 acres of nonbreeding habitat (1,633 acres of roosting, 18,489 acres of  
5       cultivated lands, and 672 acres of noncultivated lands suitable for foraging). An estimated  
6       13,692 acres of the 28,424 acres to be permanently lost would be expected to convert to tidal  
7       emergent wetland communities that could provide nonbreeding season roosting habitat for  
8       tricolored blackbirds, depending on future vegetation density and composition. Conversion  
9       would result in the loss of an estimated 4,316 acres of tricolored blackbird breeding habitat (34  
10       acres of nesting habitat; plus 3,635 acres of cultivated lands and 647 acres of noncultivated  
11       habitats suitable for foraging) and 9,375 acres of nonbreeding habitat (8,716 acres of cultivated  
12       lands and 659 acres of noncultivated habitats suitable for foraging). These habitat losses and  
13       conversions would occur in CZs 1, 2, 4, 5, 6, 7, 8, and 11. Although considered to be a permanent  
14       loss, due to the uncertainty of the quantity of restored suitable habitat, any areas that develop  
15       into riparian scrub-shrub could provide suitable nesting and roosting habitat for tricolored  
16       blackbird.
- 17       • *CM5 Seasonally Inundated Floodplain Restoration*: Levee construction and riparian restoration  
18       associated with floodplain restoration in the south Delta (CZ 7) would result in the permanent  
19       removal of up to 554 acres of tricolored blackbird breeding habitat (4 acres of nesting habitat,  
20       503 acres of cultivated lands, and 47 acres of noncultivated habitats suitable for foraging) and  
21       656 acres of nonbreeding habitat (1 acre of roosting habitat, 652 acres of cultivated lands, and 3  
22       acres of noncultivated habitats suitable for foraging) in CZ 7. Patches of riparian scrub  
23       associated with the restoration of approximately 1,000 acres of valley/foothill riparian habitat  
24       managed as early- to mid-successional habitats (as a component of CM5) could provide suitable  
25       nesting, roosting or foraging habitat for tricolored blackbird once these restored habitats have  
26       developed habitat functions for the species.
- 27       • *CM8 Grassland Natural Community Restoration*: Restoration of grassland would result in the  
28       permanent removal of 1,521 acres of tricolored breeding habitat and 210 acres of nonbreeding  
29       habitat. Grassland restoration would be implemented on cultivated lands and would therefore  
30       result in the conversion of tricolored blackbird cultivated foraging habitat to high-value  
31       grassland foraging habitat in CZs 2, 4, and 5.
- 32       • *CM10 Nontidal Marsh Restoration*: Marsh restoration activities would result in the permanent  
33       removal or conversion of approximately 568 acres of tricolored blackbird breeding habitat and  
34       945 acres of nonbreeding habitat (all cultivated lands suitable for foraging). About two-thirds of  
35       the restored nontidal marsh would be open water, and the remainder would support emergent  
36       wetland vegetation that could provide low-value roosting habitat for tricolored blackbird  
37       depending on vegetation density and composition.
- 38       • *CM11 Natural Communities Enhancement and Management*: A variety of habitat management  
39       actions that are designed to enhance wildlife values in BDCP-protected habitats could result in  
40       localized ground disturbances that could temporarily remove small amounts of tricolored  
41       blackbird habitat. Ground-disturbing activities, such as removal of nonnative vegetation and  
42       road and other infrastructure maintenance, would be expected to have minor effects on  
43       available tricolored blackbird habitat and are expected to result in overall improvements to and  
44       maintenance of tricolored blackbird habitat values over the term of the BDCP. These effects  
45       cannot be quantified, but are expected to be minimal and would be avoided and minimized by  
46       the AMMs listed below. CM11 would also include the construction of recreational-related

1 facilities including trails, interpretive signs, and picnic tables (BDCP Chapter 4, *Covered Activities*  
2 *and Associated Federal Actions*). Trailhead facilities, signs, staging areas, picnic areas, bathrooms,  
3 etc. would be placed on existing, disturbed areas when and where possible. However,  
4 approximately 43.5 acres of breeding habitat and 6.5 acres of nonbreeding habitat (all grassland  
5 suitable for foraging) would be lost as a result of construction of trails and facilities. Impacts  
6 from recreational-related facilities that would occur within the first 10 years of Alternative 4  
7 implementation would include a loss of 13 acres of breeding habitat.

- 8 ● *CM18 Conservation Hatcheries*: Implementation of CM18 would remove up to 35 acres of  
9 tricolored blackbird grassland foraging habitat in CZ 1.
- 10 ● *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground  
11 water conveyance facilities and restoration infrastructure could result in ongoing but periodic  
12 disturbances that could affect tricolored blackbird use of the surrounding habitat in or adjacent  
13 to work areas. Maintenance activities would include vegetation management, levee and  
14 structure repair, and re-grading of roads and permanent work areas. These effects, however,  
15 would be reduced by AMMs and conservation actions as described below.
- 16 ● *Injury and Direct Mortality*: Operation of construction equipment may cause injury to or  
17 mortality of tricolored blackbirds. Risk would be greatest to eggs and nestlings susceptible to  
18 land clearing activities, nest abandonment, or increased exposure to the elements or to  
19 predators. Injury to or mortality of adults and fledged juveniles would not be expected as  
20 individuals would be expected to avoid contact with construction equipment. Construction  
21 activities could temporarily fragment existing tricolored blackbird habitat during grading, filling,  
22 contouring, and other initial ground-disturbing operations that could temporarily reduce the  
23 extent and functions supported by the affected habitat. To the maximum extent practicable,  
24 construction activity will be avoided up to 1,300 feet, but not less than a minimum of 250 feet,  
25 from an active tricolored blackbird nesting colony. If monitoring determines an activity is  
26 adversely affecting a nesting colony, construction will be modified, as practicable, by either  
27 delaying construction until the colony site is abandoned or until the end of the breeding season,  
28 whichever occurs first, by temporarily relocating staging areas, or temporarily rerouting access  
29 to the construction site. These measures to avoid injury or mortality of nesting tricolored  
30 blackbirds are described in *AMM21 Tricolored Blackbird* (Appendix 3.C, *Avoidance and*  
31 *Minimization Measures*).

32 The following paragraphs summarize the combined effects discussed above and describe other  
33 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also  
34 included.

### 35 ***Near-Term Timeframe***

36 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
37 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
38 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
39 effects of construction would not be adverse under NEPA. Alternative 4 would remove 4,680 acres  
40 of breeding habitat (95 acres of nesting, 3,399 acres of cultivated lands, and 1,186 acres of  
41 noncultivated lands suitable for foraging) and 8,063 acres of nonbreeding habitat (610 acres of  
42 roosting, 6,702 acres of cultivated lands, and 751 acres of noncultivated lands suitable for foraging)  
43 for tricolored blackbird in the study area in the near-term. These effects would result from the  
44 construction of the water conveyance facilities (CM1, 1,992 acres of breeding, 3,233 acres of

1 nonbreeding), and implementing other conservation measures (*CM2 Yolo Bypass Fisheries*  
2 *Enhancement, CM4 Tidal Natural Communities Restoration, and CM5 Seasonally Inundated Floodplain*  
3 *Restoration, and CM7 Riparian Natural Community Restoration*—2,688 acres of breeding, 4,830 acres  
4 of nonbreeding).

5 Typical NEPA and CEQA project-level mitigation ratios would be 1:1 for restoration/creation and  
6 1:1 for protection for the loss of nesting and roosting wetland habitat, 2:1 protection for loss of  
7 noncultivated lands suitable for foraging (for the breeding and nonbreeding season), and 1:1  
8 protection for the loss of cultivated lands.

9 Using these ratios would indicate that the compensation for loss or conversion of tricolored  
10 blackbird habitat from CM1 would require 7 acres of restoration and 7 acres of protection of nesting  
11 habitat, 40 acres of restoration and 40 acres of protection of roosting habitat, 1,238 acres of  
12 protection of noncultivated lands that provide foraging habitat, 1,658 acres of protection of  
13 cultivated lands suitable for foraging during the breeding season, and 2,901 acres of cultivated lands  
14 that provide foraging habitat during the nonbreeding season. The near-term effects of other  
15 conservation actions would remove or convert 88 acres of nesting habitat, 570 acres of roosting  
16 habitat, 619 acres of noncultivated lands suitable for foraging, 1,741 acres of cultivated lands that  
17 provide foraging habitat during the breeding season, and 3,801 acres of cultivated lands during the  
18 nonbreeding season. Compensation for these losses from other conservation measures would  
19 therefore require 88 acres of restoration and 88 acres of protection of nesting habitat, 570 acres of  
20 restoration and 570 acres of protection of roosting habitat, 1,238 acres of protection of  
21 noncultivated lands that provide foraging habitat, 1,741 acres of protection of cultivated lands  
22 suitable for foraging during the breeding season, and 3,801 acres of cultivated lands that provide  
23 foraging habitat during the nonbreeding season. using the same typical NEPA and CEQA ratios.

24 Total compensation for near-term loss or conversion of tricolored blackbird required using the  
25 typical ratios above would be 95 acres of restoration and 95 acres of protection for nesting habitat,  
26 610 acres of restoration and 610 acres of protection for roosting habitat, 3,873 acres of protection of  
27 noncultivated foraging habitat, 3,399 acres of protection for cultivated lands that provide foraging  
28 habitat during the breeding season, and 6,702 acres of cultivated lands that provide foraging habitat  
29 during the nonbreeding season.

30 The BDCP has committed to near-term goals of protecting 25 acres and restoring protecting 750  
31 acres and restoring 800 acres of valley/foothill riparian natural community, protecting 2,000 acres  
32 and restoring 1,140 acres of grassland natural community, protecting 400 acres of vernal pool  
33 complex, protecting 120 acres of alkali seasonal wetland complex, protecting 4,800 acres of  
34 managed wetland natural community, protecting 15,400 acres of non-rice cultivated lands,  
35 protecting 900 acres of rice or rice equivalent habitat, restoring 8,850 acres of tidal freshwater  
36 emergent wetlands and 2,000 acres of tidal brackish emergent wetlands (Table 3-4 in Chapter 3,  
37 *Description of Alternatives*). These conservation actions are associated with CM3, CM4, CM5, CM7,  
38 and CM8 and would occur in the same timeframe as the construction and early restoration losses.  
39 Some proportion of these natural communities provide suitable habitat for tricolored blackbird as  
40 described below.

41 Nesting by tricolored blackbirds is currently limited by the availability of high-value breeding  
42 habitat, which is represented by suitable nesting substrate, such as cattail/bulrush emergent  
43 wetland, in close association with highly productive foraging areas that support abundant insect  
44 prey, such as grasslands, seasonal wetlands, pasturelands, alfalfa and other hay crops, and some

1 croplands. The nesting habitat would be located within 5 miles of high-value foraging habitat in CZs  
 2 1, 2, 8, or 11 (see Table 12-4-38 for foraging habitat values) and would be actively managed to  
 3 maintain actively growing stands of bulrush/cattail emergent vegetation through mechanical  
 4 habitat manipulation, prescribed fire, or other measures described in *CM11 Natural Communities*  
 5 *Enhancement and Management*. In addition to the actively managed nesting habitat, a portion of the  
 6 750 acres of protection and 800 acres of restoration of valley/foothill riparian natural community,  
 7 and the restoration of 900 acres nontidal marsh would provide nesting habitat for tricolored  
 8 blackbird. The Plan estimates that modeled nesting habitat in the study area currently includes 8%  
 9 of valley/foothill riparian and 22% of nontidal freshwater emergent marsh (BDCP Chapter 5, Section  
 10 5.6.12.2, *Beneficial Effects*). Assuming similar proportions of modeled habitat on conservation lands  
 11 restored in the near-term, approximately 64 acres of valley foothill riparian and 198 acres of  
 12 nontidal marsh restored would provide nesting habitat for tricolored blackbird.

13 **Table 12-4-38. Tricolored Blackbird Foraging Habitat Value Classes**

Foraging Habitat Value Class	Agricultural Crop Type/Habitats	
	Breeding Season <sup>a</sup> Foraging Habitat	Nonbreeding Season Foraging Habitat
Very high	Native pasture, nonirrigated native pasture, annual grasslands, vernal pool grasslands, alkali grasslands	Livestock feed lots
High	Sunflower, alfalfa and mixed alfalfa, mixed pasture, induced high water table native pasture, nonirrigated mixed pasture, dairies	Corn, sunflower, millet, alfalfa and mixed alfalfa, mixed pasture, native pasture, induced high water table native pasture, nonirrigated native pasture, rice, dairies, annual grasslands, vernal pool grasslands, alkali grasslands
Moderate	Miscellaneous grass pasture, fallow lands cropped within 3 years, new lands prepped for crop production, livestock feed lots	Miscellaneous grass pasture, nonirrigated mixed pasture, fallow lands cropped within 3 years, new lands prepped for crop production
Low	Wheat, mixed grain and hay, farmsteads	Wheat, oats, mixed grain and hay, farmsteads
Marginal	Rice	None
None	All remaining crop types	All remaining crop types

<sup>a</sup> Generally March through August; occasional breeding in fall (September through November).

14  
 15  
 16 The Plan estimates that modeled roosting habitat in the study area currently includes 95% of tidal  
 17 freshwater emergent wetland, 57% of brackish emergent wetland, 21% of valley/foothill riparian,  
 18 75% of nontidal marsh, and 15% of managed wetlands (BDCP Chapter 5, Section 5.6.12.2, *Beneficial*  
 19 *Effects*). Assuming similar proportions of modeled habitat on conservation lands restored in the  
 20 near-term, the restoration of approximately 8,408 acres of tidal freshwater emergent wetland, 1,140  
 21 acres of tidal brackish emergent wetland, 675 acres of nontidal marsh, and 168 acres of valley  
 22 foothill riparian would provide 10,391 acres of nesting habitat for tricolored blackbird. An estimated  
 23 878 acres of roosting habitat would also be protected in the near-term time period (158 acres of  
 24 valley/foothill riparian, 720 acres managed wetland).

1 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1  
2 and GNC1.2). Grassland protection in CZs 1, 8, and 11 would be associated with vernal pool and  
3 alkali seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) which would result in a  
4 contiguous matrix of grassland, alkali seasonal wetland, and vernal pool natural communities. The  
5 protection and restoration of grasslands, alkali seasonal wetlands, and vernal pool complexes would  
6 provide improved foraging opportunities for tricolored blackbirds during both the breeding and  
7 nonbreeding seasons. Proximity of nesting colonies to suitable foraging habitat contributes to high  
8 reproductive success in tricolored blackbirds. These natural communities are known to support  
9 large insect populations, a vital food resource for successful rearing and fledging of young. Those  
10 conservation lands that lie within a few miles of active nesting colonies would provide high-value  
11 foraging areas to support breeding tricolored blackbirds. Under *CM11 Natural Communities*  
12 *Enhancement and Management*, insect prey populations would be increased on protected lands,  
13 further enhancing the foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5,  
14 and GNC2.4).

15 Cultivated lands that provide habitat for covered and other native wildlife species would provide  
16 approximately 15,600 acres of potential foraging habitat for tricolored blackbird in the near-term  
17 (Objective CLNC1.1). Objective TRBL1.3 commits to protecting 11,050 acres (23% of the total  
18 cultivated lands commitment) of high- to very high-value breeding-foraging habitat by the late long-  
19 term. Assuming that lands would be protected proportional to the conservation objectives for  
20 covered species, approximately 3,588 acres of high- to very high-value breeding foraging habitat  
21 consisting of cultivated lands would be protected in the near-term. These lands would be protected  
22 within 5 miles of occupied or recently occupied tricolored blackbird nesting habitat in CZs 1, 2, 3, 4,  
23 7, 8, or 11. In addition, Objective TRBL1.2 states that of the cultivated lands protected in the late  
24 long-term time period, 26,300 acres (54% of all cultivated lands protected) would be maintained in  
25 moderate – high, or very high-value cultivated lands, at least 50% of which would be high- to very  
26 high-value. Assuming proportional conservation in the near-term, an estimated 8,424 acres of  
27 cultivated lands that provide foraging habitat for tricolored blackbird would be protected in the  
28 near-term, 4,212 of which would be in high- to very high-value cultivated lands. Small but essential  
29 habitats for species including tricolored blackbird would also be protected that occur within the  
30 agricultural matrix. This would include the retention of wetlands, grassland patches, shrub stands,  
31 and herbaceous edge habitats, which could provide suitable nesting, foraging or roosting habitat for  
32 tricolored blackbird (Objective CLNC1.3).

33 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
34 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
35 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
36 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
37 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
38 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
39 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

40 The acres of protection and restoration contained in the near-term Plan goals, in addition to the  
41 detailed habitat value goals that would be applied to near-term acres, are more than sufficient to  
42 satisfy the typical mitigation ratios that would be applied to the project-level effects of CM1 and the  
43 near-term impacts from other conservation measures on nesting, roosting, and cultivated lands  
44 foraging habitat. The 3,660 acres of grassland protection in the near-term are 213 acres short of the  
45 2:1 protection mitigation ratio. However, the acres of permanent impact would be compensated for  
46 by this acreage and temporary impacts on grassland would be restored to preproject conditions

1 (including revegetation with native vegetation if within 1 year of completion of construction under  
2 *AMM2 Construction Best Management Practices and Monitoring*. With the enhancement of grasslands  
3 described above, and the restoration of temporary habitat impacts, this difference between  
4 impacted and conserved grassland acreages in the near-term time period would not result in an  
5 adverse effect on tricolored blackbird.

### 6 ***Late Long-Term Timeframe***

7 Based on the habitat model, the study area approximately 164,947 acres of breeding and 259,093  
8 acres of nonbreeding habitat for tricolored blackbird. The Delta is an important wintering area for  
9 the tricolored blackbird (Hamilton 2004, Beedy 2008). Although there is a large acreage of modeled  
10 breeding habitat available, the study area does not currently support many nesting tricolored  
11 blackbirds with the exception of a few occurrences on the fringes of the Suisun Marsh, in the Yolo  
12 Bypass, and along the southwestern perimeter of the study area (BDCP Chapter 5, *Effects Analysis*).  
13 Alternative 4 as a whole would result in the permanent loss of and temporary effects on 14,200  
14 acres of breeding habitat and 30,595 acres of nonbreeding habitat for tricolored blackbird during  
15 the term of the Plan (9% of the total breeding habitat in the study area and 12% of the total  
16 nonbreeding habitat in the study area). The locations of these losses are described above in the  
17 analyses of individual conservation measures.

18 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*  
19 *Restoration*, *CM4 Tidal Natural Communities Restoration*, *CM5 Seasonally Inundated Floodplain*  
20 *Restoration*, *CM7 Riparian Natural Community Restoration*, and *CM8 Grassland Natural Community*  
21 *Restoration* to restore or create at least 5,000 acres and protect at least 750 acres of valley/foothill  
22 riparian natural community, protect 8,000 acres and restore 2,000 acres of grassland natural  
23 community, protect 600 acres of vernal pool complex, protect 150 acres of alkali seasonal wetland  
24 complex, protect 8,100 acres of managed wetland, and protect 48,625 acres of cultivated lands that  
25 provide suitable habitat for native wildlife species (Table 3-4 in Chapter 3, *Description of*  
26 *Alternatives*). In addition, species specific biological goals and objectives for tricolored blackbird  
27 commit to protecting or restoring at least 50 acres of occupied or recently occupied (within the last  
28 15 years) tricolored blackbird nesting habitat located within 5 miles of high-value foraging habitat  
29 in CZs 1, 2, 8, or 11 (Objective TRBL1.1). Foraging habitat value classes for tricolored blackbird are  
30 found in Table 12-4-38. To ensure that natural community conservation benefits tricolored  
31 blackbird, the Plan further specifies that cultivated lands protected for tricolored blackbird retain  
32 residual wetland, grassland patches, shrub stands, and herbaceous edge habitats which may provide  
33 suitable nesting, foraging or roosting habitat for the species (Objective CLNC1.3). In addition, 26,300  
34 acres of moderate-, high-, or very high-value cultivated lands would be conserved and managed as  
35 nonbreeding foraging habitat, 50% of which would be of high- or very high-value (Objective  
36 TRBL1.2). At least 11,050 acres of cultivated lands managed as high to very high breeding foraging  
37 habitat would be conserved within 5 miles of occupied or recently occupied (within the last 15  
38 years) tricolored blackbird nesting habitat in CZs 1, 2, 3, 4, 7, 8, or 11 (Objective TRBL1.2). Most of  
39 the loss of breeding and nonbreeding habitat would be to cultivated lands that are abundant  
40 throughout the study area, so the loss is not expected to adversely affect the population in the study  
41 area.

42 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*  
43 *Plant Species*) estimates that the restoration and protection actions discussed above could result in  
44 the protection of an estimated 46,566 acres of tricolored blackbird habitat (16,476 acres breeding

1 habitat and 31,090 acres nonbreeding habitat) and restoration of 31,001 acres of tricolored  
2 blackbird habitat (2,190 acres breeding habitat and 28,811 acres nonbreeding habitat).

3 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
4 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
5 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
6 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
7 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
8 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
9 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

10 **NEPA Effects:** The losses of tricolored blackbird habitat and potential direct mortality of a special-  
11 status species under Alternative 4 would represent an adverse effect in the absence of other  
12 conservation actions. However, with habitat protection and restoration associated with CM3, CM4,  
13 CM5, CM7, CM8, and CM11, guided by species-specific goals and objectives and by AMM1–AMM7  
14 and *AMM21 Tricolored Blackbird*, which would be in place throughout the construction period, the  
15 effects of habitat loss or potential mortality on tricolored blackbird under Alternative 4 would not  
16 be adverse.

17 **CEQA Conclusion:**

18 **Near-Term Timeframe**

19 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
20 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
21 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
22 effects of construction would be less than significant under CEQA. Alternative 4 would remove 4,680  
23 acres of breeding habitat (95 acres of nesting, 3,399 acres of cultivated lands, and 1,186 acres of  
24 noncultivated lands suitable for foraging) and 8,063 acres of nonbreeding habitat (610 acres of  
25 roosting, 6,702 acres of cultivated lands, and 751 acres of noncultivated lands suitable for foraging)  
26 for tricolored blackbird in the study area in the near-term. These effects would result from the  
27 construction of the water conveyance facilities (CM1, 1,992 acres of breeding, 3,233 acres of  
28 nonbreeding), and implementing other conservation measures (*CM2 Yolo Bypass Fisheries*  
29 *Enhancement*, *CM4 Tidal Natural Communities Restoration*, *CM5 Seasonally Inundated Floodplain*  
30 *Restoration*, and *CM7 Riparian Natural Community Restoration*—2,688 acres of breeding, 4,830 acres  
31 of nonbreeding).

32 Typical NEPA and CEQA project-level mitigation ratios would be 1:1 for restoration/creation and  
33 1:1 for protection for the loss of nesting and roosting wetland habitat, 2:1 protection for loss of  
34 noncultivated lands suitable for foraging (for the breeding and nonbreeding season), and 1:1  
35 protection for the loss of cultivated lands.

36 Using these ratios would indicate that the compensation for loss or conversion of tricolored  
37 blackbird habitat from CM1 would require 7 acres of restoration and 7 acres of protection of nesting  
38 habitat, 40 acres of restoration and 40 acres of protection of roosting habitat, 1,238 acres of  
39 protection of noncultivated lands that provide foraging habitat, 1,658 acres of protection of  
40 cultivated lands suitable for foraging during the breeding season, and 2,901 acres of cultivated lands  
41 that provide foraging habitat during the nonbreeding season. The near-term effects of other  
42 conservation actions would remove or convert 88 acres of nesting habitat, 570 acres of roosting  
43 habitat, 619 acres of noncultivated lands suitable for foraging, 1,741 acres of cultivated lands that

1 provide foraging habitat during the breeding season, and 3,801 acres of cultivated lands during the  
2 nonbreeding season. Compensation for these losses from other conservation measures would  
3 therefore require 88 acres of restoration and 88 acres of protection of nesting habitat, 570 acres of  
4 restoration and 570 acres of protection of roosting habitat, 1,238 acres of protection of  
5 noncultivated lands that provide foraging habitat, 1,741 acres of protection of cultivated lands  
6 suitable for foraging during the breeding season, and 3,801 acres of cultivated lands that provide  
7 foraging habitat during the nonbreeding season. using the same typical NEPA and CEQA ratios.

8 Total compensation for near-term loss or conversion of tricolored blackbird required using the  
9 typical ratios above would be 95 acres of restoration and 95 acres of protection for nesting habitat,  
10 610 acres of restoration and 610 acres of protection for roosting habitat, 3,873 acres of protection of  
11 noncultivated foraging habitat, 3,399 acres of protection for cultivated lands that provide foraging  
12 habitat during the breeding season, and 6,702 acres of cultivated lands that provide foraging habitat  
13 during the nonbreeding season.

14 The BDCP has committed to near-term goals of protecting 25 acres and restoring protecting 750  
15 acres and restoring 800 acres of valley/foothill riparian natural community, protecting 2,000 acres  
16 and restoring 1,140 acres of grassland natural community, protecting 400 acres of vernal pool  
17 complex, protecting 120 acres of alkali seasonal wetland complex, protecting 4,800 acres of  
18 managed wetland natural community, protecting 15,400 acres of non-rice cultivated lands,  
19 protecting 900 acres of rice or rice equivalent habitat, restoring 8,850 acres of tidal freshwater  
20 emergent wetlands and 2,000 acres of tidal brackish emergent wetlands (Table 3-4 in Chapter 3,  
21 *Description of Alternatives*). These conservation actions are associated with CM3, CM4, CM5, CM7,  
22 and CM8 and would occur in the same timeframe as the construction and early restoration losses.  
23 Some proportion of these natural communities provide suitable habitat for tricolored blackbird as  
24 described below.

25 Nesting by tricolored blackbirds is currently limited by the availability of high-value breeding  
26 habitat, which is represented by suitable nesting substrate, such as cattail/bulrush emergent  
27 wetland, in close association with highly productive foraging areas that support abundant insect  
28 prey, such as grasslands, seasonal wetlands, pasturelands, alfalfa and other hay crops, and some  
29 croplands. The nesting habitat would be located within 5 miles of high-value foraging habitat in CZs  
30 1, 2, 8, or 11 (see Table 12-4-38 for foraging habitat values) and would be actively managed to  
31 maintain actively growing stands of bulrush/cattail emergent vegetation through mechanical  
32 habitat manipulation, prescribed fire, or other measures described in *CM11 Natural Communities  
33 Enhancement and Management*. In addition to the actively managed nesting habitat, a portion of the  
34 750 acres of protection and 800 acres of restoration of valley/foothill riparian natural community,  
35 and the restoration of 900 acres nontidal marsh would provide nesting habitat for tricolored  
36 blackbird. The Plan estimates that modeled nesting habitat in the study area currently includes 8%  
37 of valley/foothill riparian and 22% of nontidal freshwater emergent marsh (BDCP Chapter 5, Section  
38 5.6.12.2, *Beneficial Effects*). Assuming similar proportions of modeled habitat on conservation lands  
39 restored in the near-term, approximately 64 acres of valley foothill riparian and 198 acres of  
40 nontidal marsh restored would provide nesting habitat for tricolored blackbird.

41 The Plan estimates that modeled roosting habitat in the study area currently includes 95% of tidal  
42 freshwater emergent wetland, 57% of brackish emergent wetland, 21% of valley/foothill riparian,  
43 75% of nontidal marsh, and 15% of managed wetlands (BDCP Chapter 5, Section 5.6.12.2, *Beneficial  
44 Effects*). Assuming similar proportions of modeled habitat on conservation lands restored in the  
45 near-term, the restoration of approximately 8,408 acres of tidal freshwater emergent wetland, 1,140

1 acres of tidal brackish emergent wetland, 675 acres of nontidal marsh, and 168 acres of valley  
2 foothill riparian would provide 10,391 acres of nesting habitat for tricolored blackbird. An estimated  
3 878 acres of roosting habitat would also be protected in the near-term time period (158 acres of  
4 valley/foothill riparian, 720 acres managed wetland).

5 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1  
6 and GNC1.2). Grassland protection in CZs 1, 8, and 11 would be associated with vernal pool and  
7 alkali seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) which would result in a  
8 contiguous matrix of grassland, alkali seasonal wetland, and vernal pool natural communities. The  
9 protection and restoration of grasslands, alkali seasonal wetlands, and vernal pool complexes would  
10 provide improved foraging opportunities for tricolored blackbirds during both the breeding and  
11 nonbreeding seasons. Proximity of nesting colonies to suitable foraging habitat contributes to high  
12 reproductive success in tricolored blackbirds. These natural communities are known to support  
13 large insect populations, a vital food resource for successful rearing and fledging of young. Those  
14 conservation lands that lie within a few miles of active nesting colonies would provide high-value  
15 foraging areas to support breeding tricolored blackbirds. Under *CM11 Natural Communities*  
16 *Enhancement and Management*, insect prey populations would be increased on protected lands,  
17 further enhancing the foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5,  
18 and GNC2.4).

19 Cultivated lands that provide habitat for covered and other native wildlife species would provide  
20 approximately 15,600 acres of potential foraging habitat for tricolored blackbird in the near-term  
21 (Objective CLNC1.1). Objective TRBL1.3 commits to protecting 11,050 acres (23% of the total  
22 cultivated lands commitment) of high- to very high-value breeding-foraging habitat by the late long-  
23 term. Assuming that lands would be protected proportional to the conservation objectives for  
24 covered species, approximately 3,588 acres of high- to very high-value breeding foraging habitat  
25 consisting of cultivated lands would be protected in the near-term. These lands would be protected  
26 within 5 miles of occupied or recently occupied tricolored blackbird nesting habitat in CZs 1, 2, 3, 4,  
27 7, 8 or 11. In addition, Objective TRBL1.2 states that of the cultivated lands protected in the late  
28 long-term time period, 26,300 acres (54% of all cultivated lands protected) would be maintained in  
29 moderate – high, or very high-value cultivated lands, at least 50% of which would be high- to very  
30 high-value. Assuming proportional conservation in the near-term, an estimated 8,424 acres of  
31 cultivated lands that provide foraging habitat for tricolored blackbird would be protected in the  
32 near-term, 4,212 of which would be in high- to very high-value cultivated lands. Small but essential  
33 habitats for species including tricolored blackbird would also be protected that occur within the  
34 agricultural matrix. This would include the retention of wetlands, grassland patches, shrub stands,  
35 and herbaceous edge habitats, which could provide suitable nesting, foraging or roosting habitat for  
36 tricolored blackbird (Objective CLNC1.3).

37 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
38 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
39 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
40 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
41 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
42 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
43 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

44 The acres of protection and restoration contained in the near-term Plan goals, in addition to the  
45 detailed habitat value goals that would be applied to near-term acres, are more than sufficient to

1 satisfy the typical mitigation ratios that would be applied to the project-level effects of CM1 and the  
2 near-term impacts from other conservation measures on nesting, roosting, and cultivated lands  
3 foraging habitat. The 3,660 acres of grassland protection in the near-term are 213 acres short of the  
4 2:1 protection mitigation ratio. However, the acres of permanent impact would be compensated for  
5 by this acreage and temporary impacts on grassland would be restored to preproject conditions  
6 (including revegetation with native vegetation if within 1 year of completion of construction under  
7 *AMM2 Construction Best Management Practices and Monitoring*. With the enhancement of grasslands  
8 described above, and the restoration of temporary habitat impacts, this difference between  
9 impacted and conserved grassland acreages in the near-term time period would result in a less-  
10 than-significant impact on tricolored blackbird.

### 11 **Late Long-Term Timeframe**

12 Based on the habitat model, the study area approximately 164,947 acres of breeding and 259,093  
13 acres of nonbreeding habitat for tricolored blackbird. The Delta is an important wintering area for  
14 the tricolored blackbird (Hamilton 2004, Beedy 2008). Although there is a large acreage of modeled  
15 breeding habitat available, the study area does not currently support many nesting tricolored  
16 blackbirds with the exception of a few occurrences on the fringes of the Suisun Marsh, in the Yolo  
17 Bypass, and along the southwestern perimeter of the study area (BDCP Chapter 5, *Effects Analysis*).  
18 Alternative 4 as a whole would result in the permanent loss of and temporary effects on 14,200  
19 acres of breeding habitat and 30,595 acres of nonbreeding habitat for tricolored blackbird during  
20 the term of the Plan (9% of the total breeding habitat in the study area and 12% of the total  
21 nonbreeding habitat in the study area). The locations of these losses are described above in the  
22 analyses of individual conservation measures.

23 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*  
24 *Restoration*, *CM4 Tidal Natural Communities Restoration*, *CM5 Seasonally Inundated Floodplain*  
25 *Restoration*, *CM7 Riparian Natural Community Restoration*, and *CM8 Grassland Natural Community*  
26 *Restoration* to restore or create at least 5,000 acres and protect at least 750 acres of valley/foothill  
27 riparian natural community, protect 8,000 acres and restore 2,000 acres of grassland natural  
28 community, protect 600 acres of vernal pool complex, protect 150 acres of alkali seasonal wetland  
29 complex, protect 8,100 acres of managed wetland, and protect 48,625 acres of cultivated lands that  
30 provide suitable habitat for native wildlife species (Table 3-4 in Chapter 3, *Description of*  
31 *Alternatives*). In addition,

32 Species specific biological goals and objectives for tricolored blackbird commit to protecting or  
33 restoring at least 50 acres of occupied or recently occupied (within the last 15 years) tricolored  
34 blackbird nesting habitat located within 5 miles of high-value foraging habitat in CZs 1, 2, 8, or 11  
35 (Objective TRBL1.1). Foraging habitat value classes for tricolored blackbird are found in Table 12-4-  
36 38. To ensure that natural community conservation benefits tricolored blackbird, the Plan further  
37 specifies that cultivated lands protected for tricolored blackbird retain residual wetland, grassland  
38 patches, shrub stands, and herbaceous edge habitats which may provide suitable nesting, foraging  
39 or roosting habitat for the species (Objective CLNC1.3). In addition, 26,300 acres of moderate-, high-,  
40 or very high-value cultivated lands would be conserved and managed as nonbreeding foraging  
41 habitat, 50% of which would be of high- or very high-value (Objective TRBL1.2). At least 11,050  
42 acres of cultivated lands managed as high to very high breeding foraging habitat would be conserved  
43 within 5 miles of occupied or recently occupied (within the last 15 years) tricolored blackbird  
44 nesting habitat in CZs 1, 2, 3, 4, 7, 8, or 11 (Objective TRBL1.2). Most of the loss of breeding and

1 nonbreeding habitat would be to cultivated lands that are abundant throughout the study area, so  
2 the loss is not expected to adversely affect the population in the study area.

3 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*  
4 *Plant Species*) estimates that the restoration and protection actions discussed above could result in  
5 the protection of an estimated 46,566 acres of tricolored blackbird habitat (16,476 acres breeding  
6 habitat and 31,090 acres nonbreeding habitat) and restoration of 31,001 acres of tricolored  
7 blackbird habitat (2,190 acres breeding habitat and 28,811 acres nonbreeding habitat).

8 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
9 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
10 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
11 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
12 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
13 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
14 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

15 Considering Alternative 4's protection and restoration provisions, which would provide acreages of  
16 new or enhanced habitat in amounts greater than necessary to compensate for habitats lost to  
17 construction and restoration activities, and with implementation of AMM1–AMM7 and *AMM21*  
18 *Tricolored Blackbird*, the loss of habitat or direct mortality though the implementation of Alternative  
19 4 as a whole would not result in a substantial adverse effect through habitat modifications and  
20 would not substantially reduce the number or restrict the range of the species. Therefore, the  
21 alternative would have a less-than-significant impact on tricolored blackbird.

## 22 **Impact BIO-88: Effects on Tricolored Blackbird Associated with Electrical Transmission** 23 **Facilities**

24 New transmission lines would increase the risk that tricolored blackbirds could be subject to power  
25 line strikes, which could result in injury or mortality of individuals. Tricolored blackbirds would  
26 have the potential to intersect the proposed transmission lines largely due to winter movements  
27 throughout the study area, when individuals are migrating in large flocks and dense fog is common  
28 in the area). Although migratory movements may increase the risk of strike hazard, daily flights  
29 associated with winter foraging likely occurs in smaller flocks at heights that are lower than the  
30 transmission lines (BDCP Attachment 5.J-2, *Memorandum: Analysis of Potential Bird Collisions at*  
31 *Proposed BDCP Transmission Lines*). Transmission line poles and towers provide perching substrate  
32 for raptors, which could result in increased predation pressure on local tricolored blackbirds. The  
33 existing network of transmission lines in the study area currently poses these risks and any  
34 incremental risk associated with the new power line corridors would not be expected to affect the  
35 study area population. *AMM20 Greater Sandhill Crane*, would further reduce any potential effects of  
36 transmission lines on tricolored blackbird.

37 **NEPA Effects:** New transmission lines would increase the risk for tricolored blackbird powerline  
38 strikes, primarily in winter during migration movements. *AMM20 Greater Sandhill Crane* would  
39 reduce the potential impact of the construction of new transmission lines on tricolored blackbird  
40 and would not result in an adverse effect on the species.

41 **CEQA Conclusion:** New transmission lines would increase the risk for tricolored blackbird  
42 powerline strikes, primarily in winter during migration movements. *AMM20 Greater Sandhill Crane*,

1 would reduce the potential impact of the construction of new transmission lines on tricolored  
2 blackbird to a less-than-significant level.

### 3 **Impact BIO-89: Indirect Effects of Plan Implementation on Tricolored Blackbird**

4 **Indirect construction- and operation-related effects:** Tricolored blackbird nesting habitat within  
5 the vicinity of proposed construction areas that could be indirectly affected by construction  
6 activities. Construction noise above background noise levels (greater than 50 dBA) could extend 500  
7 to 5,250 feet from the edge of construction activities (BDCP Appendix 5.J, Attachment 5J.D, *Indirect*  
8 *Effects of the Construction of the BDCP Conveyance Facility on Sandhill Crane*, Table 4), although there  
9 are no available data to determine the extent to which these noise levels could affect tricolored  
10 blackbird. Indirect effects associated with construction include noise, dust, and visual disturbance  
11 caused by grading, filling, contouring, and other ground-disturbing operations outside the project  
12 footprint but within 1,300 feet from the construction edge. Construction and subsequent  
13 maintenance-related noise and visual disturbances could mask calls, disrupt foraging and nesting  
14 behaviors, and reduce the functions of suitable nesting habitat for these species. *AMM21 Tricolored*  
15 *Blackbird* would require preconstruction surveys, and if detected, covered activities would be  
16 avoided within a minimum 250 feet of an active nesting colony and up to 1,300 feet where  
17 practicable until breeding has ceased. In addition, monitoring would be implemented to ensure that  
18 construction does not adversely affect the nesting colony. The use of mechanical equipment during  
19 water conveyance facilities construction could cause the accidental release of petroleum or other  
20 contaminants that could affect tricolored blackbird in the surrounding habitat. The inadvertent  
21 discharge of sediment or excessive dust adjacent to tricolored blackbird habitat could also affect the  
22 species. AMM1–AMM7, including *AMM2 Construction Best Management Practices and Monitoring*,  
23 would minimize the likelihood of such spills and ensure that measures are in place to prevent runoff  
24 from the construction area and negative effects of dust on active nests.

25 **Methylmercury Exposure:** Covered activities have the potential to exacerbate bioaccumulation of  
26 mercury in avian species, including tricolored blackbird. Marsh (tidal and nontidal) and floodplain  
27 restoration also have the potential to increase exposure to methylmercury. Mercury is transformed  
28 into the more bioavailable form of methylmercury in aquatic systems, especially areas subjected to  
29 regular wetting and drying such as tidal marshes and flood plains (Alpers et al. 2008). Thus, BDCP  
30 restoration activities that create newly inundated areas could increase bioavailability of mercury  
31 (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration).

32 The potential mobilization or creation of methylmercury within the study area varies with site-  
33 specific conditions and would need to be assessed at the project level. *CM12 Methylmercury*  
34 *Management* contains provisions for project-specific Mercury Management Plans. Breeding  
35 tricolored blackbirds are not thought to be highly susceptible to methylmercury exposure because  
36 tidal wetlands are not expected to be a major foraging area for the species. Furthermore, the Suisun  
37 Marsh Plan (Bureau of Reclamation et al. 2010) anticipates that tidal wetlands restored under the  
38 plan would generate less methylmercury than the existing managed wetlands, potentially reducing  
39 the overall risk. However, species sensitivity to methylmercury differs widely and there is a large  
40 amount of uncertainty with respect to species-specific effects and increased methylmercury  
41 associated with natural community and floodplain restoration could indirectly affect tricolored  
42 blackbird, via uptake in lower trophic levels (as described in the BDCP, Appendix 5.D, *Contaminants*).  
43 Site-specific restoration plans that address the creation and mobilization of mercury, as well as  
44 monitoring and adaptive management as described in CM12 would be available to address the

1 uncertainty of methylmercury levels in restored tidal marsh and potential impacts on tricolored  
2 blackbird.

3 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in  
4 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,  
5 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,  
6 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz  
7 2009). The effect of selenium toxicity differs widely between species and also between age and sex  
8 classes within a species. In addition, the effect of selenium on a species can be confounded by  
9 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith  
10 2009).

11 The primary source of selenium bioaccumulation in birds is through their diet (Ackerman and  
12 Eagles-Smith 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the  
13 trophic level at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At  
14 Kesterson Reservoir in the San Joaquin Valley, selenium concentrations in invertebrates have been  
15 found to be two to six times the levels in rooted plants. Furthermore, bivalves sampled in the San  
16 Francisco Bay contained much higher selenium levels than crustaceans such as copepods (Stewart et  
17 al. 2004). Studies conducted at the Grasslands in Merced County recorded higher selenium levels in  
18 black-necked stilts which feed on aquatic invertebrates than in mallards and pintails, which are  
19 primarily herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which  
20 forage on bivalves) have much higher levels of selenium levels than shorebirds that prey on aquatic  
21 invertebrates (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high  
22 levels of selenium have a higher risk of selenium toxicity.

23 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations  
24 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to  
25 exacerbate bioaccumulation of selenium in avian species, including tricolored blackbird. Marsh  
26 (tidal and nontidal) and floodplain restoration have the potential to mobilize selenium, and  
27 therefore increase avian exposure from ingestion of prey items with elevated selenium levels. Thus,  
28 BDCP restoration activities that create newly inundated areas could increase bioavailability of  
29 selenium (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Changes in  
30 selenium concentrations were analyzed in Chapter 8, *Water Quality*, and it was determined that,  
31 relative to Existing Conditions and the No Action Alternative, CM1 would not result in substantial,  
32 long-term increases in selenium concentrations in water in the Delta under any alternative.  
33 However, it is difficult to determine whether the effects of potential increases in selenium  
34 bioavailability associated with restoration-related conservation measures (CM4 and CM5) would  
35 lead to adverse effects on tricolored blackbird.

36 Because of the uncertainty that exists at this programmatic level of review, there could be a  
37 substantial effect on tricolored blackbird from increases in selenium associated with restoration  
38 activities. This effect would be addressed through the implementation of *AMM27 Selenium*  
39 *Management* (BDCP Appendix 3.C, *Avoidance and Minimization Measures*) which would provide  
40 specific tidal habitat restoration design elements to reduce the potential for bioaccumulation of  
41 selenium and its bioavailability in tidal habitats. Furthermore, the effectiveness of selenium  
42 management to reduce selenium concentrations and/or bioaccumulation would be evaluated  
43 separately for each restoration effort as part of design and implementation. This avoidance and  
44 minimization measure would be implemented as part of the tidal habitat restoration design  
45 schedule.

1 **NEPA Effects:** The effects of noise, potential spills of hazardous material, increased dust and  
2 sedimentation, and operations and maintenance of the water conveyance facilities would not be  
3 adverse with the implementation of AMM1-AMM7 and AMM21 *Tricolored Blackbird*. Tidal habitat  
4 restoration could result in increased exposure of California least tern to selenium. This effect would  
5 be addressed through the implementation of AMM27 *Selenium Management*, which would provide  
6 specific tidal habitat restoration design elements to reduce the potential for bioaccumulation of  
7 selenium and its bioavailability in tidal habitats. The implementation of tidal natural communities  
8 restoration or floodplain restoration could result in increased exposure of tricolored blackbird to  
9 methylmercury. It is unlikely that breeding tricolored blackbird would be highly susceptible to  
10 methylmercury exposure because tidal wetlands are not expected to be a major foraging area for the  
11 species. However, it is unknown what concentrations of methylmercury are harmful to this species  
12 and the potential for increased exposure varies substantially within the study area. Site-specific  
13 restoration plans that address the creation and mobilization of mercury, as well as monitoring and  
14 adaptive management as described in CM12 *Methylmercury Management*, would better inform the  
15 potential effects of methylmercury on tricolored blackbird. The site-specific planning phase of  
16 marsh restoration would be the appropriate place to assess the potential for risk of methylmercury  
17 exposure for tricolored blackbird, once site specific sampling and other information could be  
18 developed.

19 **CEQA Conclusion:** Impacts of noise, the potential for hazardous spills, increased dust and  
20 sedimentation, and operations and maintenance of the water conveyance facilities would be less  
21 than significant with the implementation of AMM21 *Tricolored Blackbird* and AMM1-AMM7. Tidal  
22 habitat restoration could result in increased exposure of California least tern to selenium. This  
23 impact would be addressed through the implementation of AMM27 *Selenium Management*, which  
24 would provide specific tidal habitat restoration design elements to reduce the potential for  
25 bioaccumulation of selenium and its bioavailability in tidal habitats. The implementation of tidal  
26 natural communities restoration or floodplain restoration could result in increased exposure of  
27 tricolored blackbird to methylmercury. It is unlikely that breeding tricolored blackbird would be  
28 highly susceptible to methylmercury exposure because tidal wetlands are not expected to be a major  
29 foraging area for the species. However, it is unknown what concentrations of methylmercury are  
30 harmful to this species. Site-specific restoration plans that address the creation and mobilization of  
31 mercury, as well as monitoring and adaptive management as described in CM12 *Methylmercury*  
32 *Management*, would better inform the potential impacts of methylmercury on tricolored blackbird.  
33 With these measures in place, indirect effects from Alternative 4 would have a less-than-significant  
34 impact on tricolored blackbird.

35 **Impact BIO-90: Periodic Effects of Inundation of Tricolored Blackbird Habitat as a Result of**  
36 **Implementation of Conservation Components**

37 Flooding of the Yolo Bypass (CM2) would inundate 2,447-4,312 acres of breeding habitat and 263-  
38 1,252 acres of nonbreeding habitat (Table 12-4-37). Based on hypothetical floodplain restoration,  
39 construction of setback levees for CM5 *Seasonally Inundated Floodplain Restoration* could result in  
40 periodic inundation of approximately 2,509 acres of breeding habitat (30 acres of nesting, 2,124  
41 acres of cultivated lands, 355 acres of noncultivated lands suitable for foraging) and 2,694 acres of  
42 nonbreeding habitat (29 acres of roosting, 2,506 acres of cultivated lands, 158 acres of noncultivated  
43 lands suitable for foraging; see Table 12-4-37) resulting in the temporary loss of these habitats.  
44 Tricolored blackbirds are highly nomadic during the winter and would be expected to move to  
45 adjacent suitable foraging habitat when the bypass is inundated, as they do under the current

1 flooding regime. However, this inundation could reduce the availability of nesting habitat during  
2 years when flooding extends into the nesting season (past March). The periodic inundation of the  
3 Yolo Bypass (CM2) and of other floodplains (CM5) is expected to restore a more natural flood  
4 regime in support of wetland and riparian vegetation types that support nesting habitat. There  
5 would be no expected adverse effect on tricolored blackbird.

6 **NEPA Effects:** Implementation of CM2 and CM5 would result in periodic inundation of nesting and  
7 foraging habitat for tricolored blackbird. Periodic inundation would not result in an adverse effect  
8 on tricolored blackbird because inundation is expected to take place outside of the breeding season.  
9 Although foraging habitat would be temporarily unavailable, tricolored blackbirds are highly  
10 nomadic in winter and wintering birds would be expected to move to adjacent foraging habitat.

11 **CEQA Conclusion:** Implementation of CM2 and CM5 would result in periodic inundation of nesting  
12 and foraging habitat for tricolored blackbird. Periodic inundation would have a less-than-significant  
13 impact on tricolored blackbird because inundation is expected to take place outside of the breeding  
14 season. Although foraging habitat would be temporarily unavailable, tricolored blackbirds are highly  
15 nomadic in winter and wintering birds would be expected to move to adjacent foraging habitat.

## 16 **Western Burrowing Owl**

17 This section describes the effects of Alternative 4, including water conveyance facilities construction  
18 and implementation of other conservation components, on western burrowing owl. Western  
19 burrowing owl modeled habitat consisted of high- and low-value habitat for nesting and foraging.  
20 High-value habitat consists of plant alliances within the grassland and vernal pool natural  
21 communities and pasture. Low-value habitat includes plant alliances and crop types from managed  
22 wetland, alkali seasonal wetland, and cultivated lands. Value was determined through reported  
23 species use patterns from the literature.

24 Construction and restoration associated with Alternative 4 conservation measures would result in  
25 both temporary and permanent losses of western burrowing owl modeled habitat as indicated in  
26 Table 12-4-39. Full implementation of Alternative 4 would also include the following conservation  
27 actions over the term of the BDCP to benefit the western burrowing owl (BDCP Chapter 3, Section  
28 3.3, *Biological Goals and Objectives*).

- 29 • Protect at least 1,000 acres of cultivated lands in CZs 1 and 11 that support high-value  
30 burrowing owl habitat and are within 0.5 mile of high-value grassland habitat or occupied low-  
31 value habitat (Objective WBO1.1, associated with CM3).
- 32 • Protect at least 8,000 acres of grassland with at least 2,000 acres protected in CZ 1, at least 1,000  
33 acres protected in CZ 8, at least 2,000 acres protected in CZ 11, and the remainder distributed  
34 among CZs 1, 2, 4, 5, 7, 8, and 11 (Objective GNC1.1, associated with CM3).
- 35 • Restore at least 2,000 acres of grasslands (Objective GNC1.2, associated with CM8).
- 36 • Protect at least 150 acres of alkali seasonal wetland and at least 600 acres of existing vernal pool  
37 complex in CZs 1, 8, and/or 11 (Objectives ASWNC1.1 and VPNC1.1, associated with CM3).
- 38 • Restore or create alkali seasonal wetlands and vernal pool complex in CZs 1, 8, and/or 11 to  
39 achieve no net loss of wetted acres (Objectives ASWNC1.2 and VPNC1.2, associated with CM9)
- 40 • Increase burrow availability and prey abundance and accessibility (Objectives ASWNC2.3,  
41 ASWNC2.4, VPNC2.4, VPNC2.5, GNC2.3, and GNC2.4, associated with CM11)

- Protect at least 48,600 acres of cultivated lands that provide suitable habitat for covered and other native wildlife species and maintain and protect the small patches of important wildlife habitats associated with cultivated lands (Objectives CLNC1.1 and CLNC1.3, associated with CM3)

As explained below, with the restoration or protection of these amounts of habitat, in addition to management activities that would enhance habitat for the species and implementation of AMM1-AMM7, and AMM23 *Western Burrowing Owl*, impacts on western burrowing owl would not be adverse for NEPA purposes and would be less than significant for CEQA purposes.

**Table 12-4-39. Changes in Western Burrowing Owl Modeled Habitat Associated with Alternative 4 (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT	NT	LLT	CM2	CM5
CM1	High-value	881	881	351	351	NA	NA
	Low-value	3,013	3,013	689	689	NA	NA
<b>Total Impacts CM1</b>		<b>3,894</b>	<b>3,894</b>	<b>1,040</b>	<b>1,040</b>		
CM2-CM18	High-value	4,487	11,570	245	328	1,390-3,303	779
	Low-value	3,527	28,506	144	971	1,522-2,927	6,162
<b>Total Impacts CM2-CM18</b>		<b>8,014</b>	<b>40,076</b>	<b>389</b>	<b>1,299</b>	<b>2,912-6,230</b>	<b>6,941</b>
<b>Total High-value</b>		<b>5,368</b>	<b>12,451</b>	<b>596</b>	<b>679</b>	1,390-3,303	779
<b>Total Low-value</b>		<b>6,540</b>	<b>31,519</b>	<b>833</b>	<b>1,660</b>	1,522-2,927	6,162
<b>TOTAL IMPACTS</b>		<b>11,908</b>	<b>43,970</b>	<b>1,429</b>	<b>2,339</b>	<b>2,912-6,230</b>	<b>6,941</b>

<sup>a</sup> See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

### Impact BIO-91: Loss or Conversion of Habitat for and Direct Mortality of Western Burrowing Owl

Alternative 4 conservation measures would result in the combined permanent and temporary loss of up to 46,309 acres of modeled habitat for western burrowing owl (of which 13,130 acres is of high-value and 33,179 acres is of low value, Table 12-4-39). Conservation measures that would result in these losses are conveyance facilities and transmission line construction, and establishment and use of borrow and spoil areas (CM1), CM2 *Yolo Bypass Fisheries Enhancement*, CM4 *Tidal Natural Communities Restoration*, CM5 *Seasonally Inundated Floodplain Restoration*, CM7 *Riparian Natural Community Restoration*, CM8 *Grassland Natural Community Restoration*, CM10 *Nontidal Marsh Restoration*, CM11 *Natural Communities Enhancement and Management* and CM18 *Conservation*

1 *Hatcheries*. The majority of habitat loss (29,668 acres) would result from CM4. Habitat enhancement  
2 and management activities (CM11), which include ground disturbance or removal of nonnative  
3 vegetation, could result in local adverse habitat effects. In addition, maintenance activities  
4 associated with the long-term operation of the water conveyance facilities and other BDCP physical  
5 facilities could degrade or eliminate western burrowing owl habitat. Each of these individual  
6 activities is described below. A summary statement of the combined impacts and NEPA effects, and a  
7 CEQA conclusion follow the individual conservation measure discussions.

- 8 • *CM1 Water Facilities and Operation*: Construction of Alternative 4 conveyance facilities would  
9 result in the combined permanent and temporary loss of up to 4,934 acres of modeled  
10 high-value western burrowing owl habitat (881 acres of permanent loss, 351 acres of temporary  
11 loss) from CZs 3–6 and CZ 8. In addition, 3,702 acres of low-value burrowing owl habitat would  
12 be removed (3,013 acres of permanent loss, 689 acres of temporary loss). The majority of high-  
13 value grassland that would be removed would be in CZ 8, from the construction of the new  
14 forebay in CZ 8. There is a high concentration of CNDDDB and DHCCP survey records for western  
15 burrowing owls in CZ 8 to the west and the south of the Clifton Court Forebay. The loss of high-  
16 value habitat from facility construction and the establishment of the forebay RTM storage area  
17 could remove occupied habitat, displace nesting and wintering owls, and fragment occupied  
18 burrowing owl habitat.

19 The RTM storage area overlaps with six occurrences of western burrowing owl and there are  
20 also several occurrences west of the new forebay control structure that could be indirectly  
21 affected by construction activities. The amount of storage area needed for reusable tunnel  
22 material is flexible (dependent on storage pile height and other factors) and the footprint used  
23 in the effects analysis is based on a worst case scenario. However, the actual area to be affected  
24 by reusable tunnel material storage would likely be less than the estimated acreage. The  
25 implementation of *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
26 *Material* and *AMM23 Western Burrowing Owl* would require that to the extent practicable, the  
27 reusable tunnel material storage area footprint avoided locations where active burrows are  
28 present. Preconstruction surveys would be conducted prior to any construction activities under  
29 *AMM23 Western Burrowing Owl* during the nonbreeding and the breeding season. If avoidance  
30 was not possible, passive relocation would be considered in consultation with CDFW. If owls  
31 were to be excluded from existing burrows, artificial burrows would be used if it were possible  
32 for them to be installed within 100 meters from the existing burrows on protected lands. A  
33 substantial portion of the high-value grassland protection and enhancement under *CM8*  
34 *Grassland Natural Community Restoration* would be expected to occur to the west and to the  
35 south of these occurrences in CZ 8, which would provide high-value protected lands in close  
36 proximity to the disturbed habitat. Refer to the Terrestrial Biology Map Book for a detailed view  
37 of Alternative 4 construction locations. Impacts from CM1 would occur within the first 10 years  
38 of Alternative 4 implementation.

- 39 • *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo bypass fisheries enhancement  
40 would result in the combined permanent and temporary loss of up to 1,127 acres of high-value  
41 western burrowing owl habitat (882 acres of permanent loss, 245 acres of temporary loss) in  
42 the Yolo Bypass in CZ 2. In addition, 242 acres of low-value habitat would be removed (98 acres  
43 of permanent loss, 144 acres of temporary loss). The loss is expected to occur during the first 10  
44 years of Alternative 4 implementation.
- 45 • *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and  
46 inundation would permanently remove an estimated 29,668 acres of modeled western

1 burrowing owl habitat in CZs 1, 2, 4, 5, 6, 7, 8, 10, and 11. The majority of removed or converted  
2 acres (19,739 acres) is composed of low-value habitat. However, 9,929 acres of high-value  
3 habitat would also be lost from tidal restoration actions. Tidal restoration would directly impact  
4 and fragment remaining high-value grassland habitat just north of Rio Vista in and around  
5 French and Prospect Islands, and in an area south of Rio Vista around Threemile Slough. Tidal  
6 natural community restoration efforts would impact one extant record of burrowing owl just  
7 northeast of Oakley along Dutch Slough and one possibly extirpated record in Suisun Marsh.

- 8 • *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore  
9 seasonally inundated floodplain would permanently and temporarily remove approximately  
10 2,504 acres of modeled western burrowing owl in CZs 2, 4, and 7. This total is comprised of  
11 2,279 acres of low-value habitat. Also, 225 acres of high-value grassland habitat would be  
12 removed (142 permanent, 83 temporary) consisting of small patches of habitat along the San  
13 Joaquin, Old, and Middle Rivers in CZ 7.
- 14 • *CM6 Channel Margin Enhancement*: Sites for channel margin enhancement would be located  
15 along levees where western burrowing owl could be present. The species is known to use often  
16 the grassland edges along canals and levees in agricultural areas. The implementation of *AMM23*  
17 *Western Burrowing Owl* would reduce the potential for channel margin enhancement activities  
18 to disturb owls or affect active nests.
- 19 • *CM7 Riparian Natural Community Restoration*: Riparian restoration would permanently remove  
20 approximately 11 acres of high-value burrowing owl habitat as part of tidal restoration. In  
21 addition, 960 acres of low-value habitat would be removed as a part of tidal restoration and  
22 3,991 acres would be removed as part of seasonal floodplain restoration through CM7.
- 23 • *CM8 Grassland Natural Community Restoration*: Grassland restoration would primarily be  
24 implemented on agricultural lands and would result in the permanent loss of 1,676 acres (362  
25 acres of high-value and 1,314 acres of low-value) of western burrowing owl habitat. The  
26 conversion of 1,676 acres of low-value habitat to high-value grassland, would temporarily  
27 remove available habitat but would ultimately have a beneficial effect on the western burrowing  
28 owl.
- 29 • *CM10 Nontidal Marsh Restoration*: Implementation would result in the permanent removal of  
30 159 acres of high-value and 952 acres of low-value western burrowing owl habitat.
- 31 • *CM11 Natural Communities Enhancement and Management*: A variety of habitat management  
32 actions that are designed to enhance wildlife values in restored or protected habitats could  
33 result in localized ground disturbances that could temporarily remove small amounts of  
34 western burrowing owl habitat. The burrowing owl's fossorial habits make the species more  
35 sensitive to the effects of ground disturbance than other raptors. Ground-disturbing activities,  
36 such as removal of nonnative vegetation and road and other infrastructure maintenance  
37 activities, would be expected to have minor adverse effects on available western burrowing owl  
38 habitat and would be expected to result in overall improvements to and maintenance of habitat  
39 values over the term of the BDCP. CM11 would also include the construction of recreational-  
40 related facilities including trails, interpretive signs, and picnic tables (BDCP Chapter 4, *Covered*  
41 *Activities and Associated Federal Actions*). The construction of trailhead facilities, signs, staging  
42 areas, picnic areas, bathrooms, etc. would be placed on existing, disturbed areas when and  
43 where possible. However, approximately 50 acres of grassland habitat would be lost from the  
44 construction of trails and facilities.

1 Habitat management- and enhancement-related activities and equipment operation could  
2 destroy nests burrows, and noise and visual disturbances could lead to their abandonment,  
3 resulting in mortality of eggs and nestlings. The potential for these activities to result in nest  
4 failure and mortality or other adverse effects on western burrowing owl would be avoided or  
5 minimized with the incorporation of *AMM23 Western Burrowing Owl* into the BDCP which would  
6 require surveys to determine presence or absence and the establishment of no-disturbance  
7 buffers around active sites.

- 8 ● *CM18 Conservation Hatcheries*: Implementation of CM18 would remove up to 35 acres of high-  
9 value western burrowing owl habitat for the development of a delta and longfin smelt  
10 conservation hatchery in CZ 1.
- 11 ● Operations and Maintenance: Postconstruction operation and maintenance of the above-ground  
12 water conveyance facilities and restoration infrastructure could result in ongoing but periodic  
13 disturbances that could affect western burrowing owl use of the surrounding habitat.  
14 Maintenance activities would include vegetation management, levee and structure repair, and  
15 re-grading of roads and permanent work areas. These effects, however, would be reduced by  
16 AMMs and conservation actions as described below.
- 17 ● Injury and Direct Mortality: Construction would not be expected to result in direct mortality of  
18 western burrowing owl. However, if nest burrows were occupied in the vicinity of construction  
19 activities, equipment operation could destroy nests and noise and visual disturbances could lead  
20 to abandonment. *AMM23 Western Burrowing Owl* would ensure that preconstruction surveys  
21 detected any occupied burrows and no-disturbance buffers would be implemented.

22 The following paragraphs summarize the combined effects discussed above and describe other  
23 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also  
24 included.

### 25 ***Near-Term Timeframe***

26 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
27 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
28 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
29 effects of construction would not be adverse under NEPA. Alternative 4 would remove 5,964 acres  
30 (5,368 acres permanent, 596 acres temporary) of high-value habitat for western burrowing owl in  
31 the study area in the near-term. These effects would result from the construction of the water  
32 conveyance facilities (CM1, 1,232 acres), and implementing other conservation measures (*CM2 Yolo*  
33 *Bypass Fisheries Enhancement*, *CM4 Tidal Natural Communities Restoration*, *CM7 Riparian Natural*  
34 *Community Restoration*, *CM8 Grassland Natural Community Restoration*, *CM9 Vernal Pool and Alkali*  
35 *Seasonal Wetland Complex Restoration*, *CM11 Natural Communities Enhancement and Management*  
36 and *CM18 Conservation Hatcheries*—4,732 acres). In addition, 7,373 acres of low-value habitat  
37 would be removed or converted in the near-term (CM1, 3,702 acres; *CM2 Yolo Bypass Fisheries*  
38 *Enhancement*, *CM4 Tidal Natural Communities Restoration*, *CM7 Riparian Natural Community*  
39 *Restoration*, *CM8 Grassland Natural Community Restoration*, *CM9 Vernal Pool and Alkali Seasonal*  
40 *Wetland Complex Restoration*, *CM11 Natural Communities Enhancement and Management* and *CM18*  
41 *Conservation Hatcheries*—3,671 acres).

42 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected would  
43 be 2:1 protection of high-value habitat, and 1:1 protection of low-value habitat. A proportion of the  
44 loss of low-value habitat would result from conversion and enhancement to high-value habitats.

1 Using these typical ratios would indicate that 2,464 acres should be protected to compensate for the  
2 loss of high-value habitat from CM1 and that 3,702 acres should be protected to compensate for the  
3 loss of low-value habitat from CM1. The near-term effects of other conservation actions would  
4 require 9,464 acres of protection to compensate for the loss of high-value habitat and 3,671 acres of  
5 protection to compensate for the loss of low-value habitat using the same typical NEPA and CEQA  
6 ratios (2:1 protection for the loss of high-value habitat, 1:1 protection for the loss of low-value  
7 habitat).

8 The BDCP has committed to near-term goals of protecting 2,000 acres and restoring 1,140 acres of  
9 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of  
10 alkali seasonal wetland complex, and protecting 15,400 acres of non-rice cultivated lands (Table 3-4  
11 in Chapter 3, *Description of Alternatives*). These conservation actions are associated with CM3, CM8,  
12 and CM9 and would occur in the same timeframe as the construction and early restoration losses.

13 The protection of high-value grasslands is essential in order to sustain existing western burrowing  
14 owl populations in the study area. Grassland restoration and protection would occur in CZs 1, 2, 4, 5,  
15 7, 8, and 11 (Objectives GNC1.1 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be  
16 associated with vernal pool and alkali seasonal wetland complexes (Objectives ASWNC1.1 and  
17 VPNC1.1) and would result in a contiguous matrix of grassland, alkali seasonal wetland, and vernal  
18 pool natural communities which would provide habitat for western burrowing owl and reduce the  
19 effects of current levels of habitat fragmentation. This protection would not only expand the amount  
20 of protected high-value habitat in the study area, but also support existing western burrowing owl  
21 populations that occur to the west of CZ 8 and in the areas surrounding CZs 1 and 11, which would  
22 especially benefit declining populations in the vicinity of Suisun Marsh and San Pablo Bay. Certain  
23 types of cultivated lands such as irrigated pasture, alfalfa and other hay crops, and some row crops  
24 can provide foraging habitat for western burrowing owl. Under appropriate management regimes,  
25 cultivated lands can support breeding and wintering burrowing owls. Under *CM11 Natural*  
26 *Communities Enhancement and Management*, small mammal and insect prey populations would be  
27 increased on protected lands, enhancing the foraging value of these natural communities (Objectives  
28 ASWNC2.4, VPNC2.5, and GNC2.4). In addition, burrow availability would be increased on protected  
29 natural communities by encouraging ground squirrel occupancy and expansion through the creation  
30 of berms, mounds, edges, and through the prohibition of ground squirrel control programs (i.e.,  
31 poisoning, Objectives ASWNC2.3, VPNC2.4, GNC2.3). These Plan objectives represent performance  
32 standards for considering the effectiveness of conservation actions.

33 The combined acres of restoration and protection of 3,660 acres of grassland, vernal pool complex,  
34 and alkali seasonal wetland contained in the near-term Plan goals and the additional detail in the  
35 biological objectives satisfy the typical mitigation that would be applied to the project-level effects of  
36 CM1 and other near-term effects on western burrowing owl high-value habitat with the  
37 consideration that some portion of the 15,400 acres of cultivated lands protected in the near-term  
38 timeframe would be managed in suitable crop types to compensate for the loss of high-value  
39 burrowing owl habitat at a ratio of 2:1. Mitigation Measure BIO-91, *Compensate For the Near-Term*  
40 *Loss of High-Value Burrowing Owl Habitat*, would be available to address the adverse effect of high-  
41 value habitat loss in the near-term.

42 The compensation for the loss of low-value burrowing owl habitat from the other near-term impacts  
43 would be 241 acres less than the typical ratio of 1:1 protection. However, 833 acres of all near-term  
44 impacts on low-value habitat would be temporary and would be restored within 1 year of the  
45 completion of construction. In addition, a proportion of the loss of low-value habitat would be a

1 result of the conversion to high-value habitat and the near-term conservation acres would be  
2 sufficient to compensate for the permanent impacts on low-value habitat for the species. The  
3 management and enhancement of cultivated lands and protected grasslands including prey  
4 enhancement, increasing burrow availability, and reducing existing fragmentation of high-value  
5 habitat, would further compensate for any potential effect from the near-term loss of low-value  
6 foraging habitat on western-burrowing owl.

7 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
8 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
9 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
10 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
11 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
12 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
13 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

#### 14 **Late Long-Term Timeframe**

15 Based on the habitat model, the study area supports approximately 152,014 acres of high-value and  
16 254,352 acres of low-value habitat for western burrowing owl. Alternative 4 as a whole would result  
17 in the permanent loss of and temporary effects on 13,130 acres of high-value habitat and 33,179  
18 acres of low-value western burrowing owl habitat over the term of the Plan. The locations of these  
19 losses are described above in the analyses of individual conservation measures.

20 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*  
21 *Restoration*, *CM8 Grassland Natural Community Restoration*, and *CM9 Vernal Pool and Alkali Seasonal*  
22 *Wetland Complex Restoration* to protect 8,000 acres and restore 2,000 acres of grassland natural  
23 community, protect 600 acres of vernal pool complex, protect 150 acres of alkali seasonal wetland  
24 complex and protect 48,625 acres of cultivated lands that provide suitable habitat for native wildlife  
25 species (Table 3-4 in Chapter 3). Grassland restoration and protection would occur in CZs 1, 2, 4, 5,  
26 7, 8, and 11 (Objectives GNC1.1 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be  
27 associated with vernal pool and alkali seasonal wetland complexes (Objectives ASWNC1.1 and  
28 VPNC1.1) and would result in a contiguous matrix of grassland, alkali seasonal wetland, and vernal  
29 pool natural communities which would provide habitat for western burrowing owl and reduce the  
30 effects of current levels of habitat fragmentation. This protection would not only expand the amount  
31 of protected high-value habitat in the study area, but also support existing western burrowing owl  
32 populations that occur to the west of CZ 8 and in the areas surrounding CZs 1 and 11, which would  
33 especially benefit declining populations in the vicinity of Suisun Marsh and San Pablo Bay. Certain  
34 types of cultivated lands such as irrigated pasture, alfalfa and other hay crops, and some row crops  
35 can provide foraging habitat for western burrowing owl. Under appropriate management regimes,  
36 cultivated lands can support breeding and wintering burrowing owls. To ensure that cultivated  
37 lands conservation benefits western burrowing owl, the Plan's biological goals and objectives  
38 further specify that, of the cultivated lands protected in the late long-term, at least 1,000 acres  
39 would be protected in CZs 1 and 11 that support high-value burrowing owl habitat and are within  
40 0.5 miles of high-value grassland habitat or occupied low-value habitat (Objective WBO1.1). Under  
41 *CM11 Natural Communities Enhancement and Management*, small mammal and insect prey  
42 populations would be increased on protected lands, enhancing the foraging value of these natural  
43 communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4). In addition, burrow availability would  
44 be increased on protected natural communities by encouraging ground squirrel occupancy and

1 expansion through the creation of berms, mounds, edges, and through the prohibition of ground  
2 squirrel control programs (i.e., poisoning, Objectives ASWNC2.3, VPNC2.4, GNC2.3).

3 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*  
4 *Plant Species*) estimates that the restoration and protection actions discussed above could result in  
5 the protection of an estimated 33,766 acres of western burrowing owl habitat (8,589 acres high-  
6 value and 25,177 acres low-value habitat) and restoration of 1,645 acres of western burrowing owl  
7 habitat (1,642 acres high-value and 3 acres low-value habitat).

8 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
9 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
10 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
11 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
12 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
13 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
14 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

15 **NEPA Effects:** The loss of western burrowing owl habitat and potential for mortality of this special-  
16 status species under Alternative 4 would represent an adverse effect in the absence of other  
17 conservation actions. However, with habitat protection and restoration associated with CM3, CM8,  
18 and CM11, guided by biological goals and objectives and by AMM1–AMM7, *AMM23 Western*  
19 *Burrowing Owl*, and with Mitigation Measure BIO-91, *Compensate for Near-Term Loss of High-Value*  
20 *Western Burrowing Owl Habitat*, which would be available to guide the near-term protection and  
21 management of cultivated lands, the effects of habitat loss and potential mortality on western  
22 burrowing owl under Alternative 4 would not be adverse.

### 23 **CEQA Conclusion:**

#### 24 **Near-Term Timeframe**

25 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
26 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
27 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
28 effects of construction would be less than significant under CEQA. Alternative 4 would remove 5,964  
29 acres (5,368 acres permanent, 596 acres temporary) of high-value habitat for western burrowing  
30 owl in the study area in the near-term. These effects would result from the construction of the water  
31 conveyance facilities (CM1, 1,232 acres), and implementing other conservation measures (*CM2 Yolo*  
32 *Bypass Fisheries Enhancement*, *CM4 Tidal Natural Communities Restoration*, *CM7 Riparian Natural*  
33 *Community Restoration*, *CM8 Grassland Natural Community Restoration*, *CM9 Vernal Pool and Alkali*  
34 *Seasonal Wetland Complex Restoration*, *CM11 Natural Communities Enhancement and Management*  
35 and *CM18 Conservation Hatcheries*—4,732 acres). In addition, 7,373 acres of low-value habitat  
36 would be removed or converted in the near-term (CM1, 3,702 acres; *CM2 Yolo Bypass Fisheries*  
37 *Enhancement*, *CM4 Tidal Natural Communities Restoration*, *CM7 Riparian Natural Community*  
38 *Restoration*, *CM8 Grassland Natural Community Restoration*, *CM9 Vernal Pool and Alkali Seasonal*  
39 *Wetland Complex Restoration*, *CM11 Natural Communities Enhancement and Management* and *CM18*  
40 *Conservation Hatcheries*—3,671 acres).

41 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected would  
42 be 2:1 protection of high-value habitat, and 1:1 protection of low-value habitat. A proportion of the  
43 loss of low-value habitat would result from conversion and enhancement to high-value habitats.

1 Using these typical ratios would indicate that 2,464 acres should be protected to compensate for the  
2 loss of high-value habitat from CM1 and that 3,702 acres should be protected to compensate for the  
3 loss of low-value habitat from CM1. The near-term effects of other conservation actions would  
4 require 9,464 acres of protection to compensate for the loss of high-value habitat and 3,671 acres of  
5 protection to compensate for the loss of low-value habitat using the same typical NEPA and CEQA  
6 ratios (2:1 protection for the loss of high-value habitat, 1:1 protection for the loss of low-value  
7 habitat).

8 The BDCP has committed to near-term goals of protecting 2,000 acres and restoring 1,140 acres of  
9 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of  
10 alkali seasonal wetland complex, and protecting 15,400 acres of non-rice cultivated lands (Table 3-4  
11 in Chapter 3, *Description of Alternatives*). These conservation actions are associated with CM3, CM8,  
12 and CM9 and would occur in the same timeframe as the construction and early restoration losses.

13 The protection of high-value grasslands is essential in order to sustain existing western burrowing  
14 owl populations in the study area. Grassland restoration and protection would occur in CZs 1, 2, 4, 5,  
15 7, 8, and 11 (Objectives GNC1.1 and GNC1.2). Grassland protection in CZs 1, 8, and 11 would be  
16 associated with vernal pool and alkali seasonal wetland complexes (Objectives ASWNC1.1 and  
17 VPNC1.1) and would result in a contiguous matrix of grassland, alkali seasonal wetland, and vernal  
18 pool natural communities which would provide habitat for western burrowing owl and reduce the  
19 effects of current levels of habitat fragmentation. This protection would not only expand the amount  
20 of protected high-value habitat in the study area, but also support existing western burrowing owl  
21 populations that occur to the west of CZ 8 and in the areas surrounding CZs 1 and 11, which would  
22 especially benefit declining populations in the vicinity of Suisun Marsh and San Pablo Bay. Certain  
23 types of cultivated lands such as irrigated pasture, alfalfa and other hay crops, and some row crops  
24 can provide foraging habitat for western burrowing owl. Under appropriate management regimes,  
25 cultivated lands can support breeding and wintering burrowing owls. Under *CM11 Natural*  
26 *Communities Enhancement and Management*, small mammal and insect prey populations would be  
27 increased on protected lands, enhancing the foraging value of these natural communities (Objectives  
28 ASWNC2.4, VPNC2.5, and GNC2.4). In addition, burrow availability would be increased on protected  
29 natural communities by encouraging ground squirrel occupancy and expansion through the creation  
30 of berms, mounds, edges, and through the prohibition of ground squirrel control programs (i.e.,  
31 poisoning, Objectives ASWNC2.3, VPNC2.4, GNC2.3).

32 These Plan objectives represent performance standards for considering the effectiveness of  
33 conservation actions.

34 The combined acres of restoration and protection of 3,660 acres of grassland, vernal pool complex,  
35 and alkali seasonal wetland contained in the near-term Plan goals and the additional detail in the  
36 biological objectives satisfy the typical mitigation that would be applied to the project-level effects of  
37 CM1 and other near-term effects on western burrowing owl high-value habitat with the  
38 consideration that some portion of the 15,400 acres of cultivated lands protected in the near-term  
39 timeframe would be managed in suitable crop types to compensate for the loss of high-value  
40 burrowing owl habitat at a ratio of 2:1. Mitigation Measure BIO-91, *Compensate For the Near-Term*  
41 *Loss of High-Value Burrowing Owl Habitat*, would address the impact of high-value habitat loss in the  
42 near-term.

43 The compensation for the loss of low-value burrowing owl habitat from the other near-term impacts  
44 would be 241 acres less than the typical ratio of 1:1 protection. However, 833 acres of all near-term

1 impacts on low-value habitat would be temporary and would be restored within 1 year of the  
2 completion of construction. In addition, a proportion of the loss of low-value habitat would be a  
3 result of the conversion to high-value habitat and the near-term conservation acres would be  
4 sufficient to compensate for the permanent impacts on low-value habitat for the species. The  
5 management and enhancement of cultivated lands and protected grasslands including prey  
6 enhancement, increasing burrow availability, and reducing existing fragmentation of high-value  
7 habitat, would further compensate for any potential effect from the near-term loss of low-value  
8 foraging habitat on western-burrowing owl.

9 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
10 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
11 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
12 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
13 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
14 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
15 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

### 16 **Late Long-Term Timeframe**

17 Based on the habitat model, the study area supports approximately 152,014 acres of high-value and  
18 254,352 acres of low-value habitat for western burrowing owl. Alternative 4 as a whole would result  
19 in the permanent loss of and temporary effects on 13,130 acres of high-value habitat and 33,179  
20 acres of low-value western burrowing owl habitat over the term of the Plan. The locations of these  
21 losses are described above in the analyses of individual conservation measures.

22 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*  
23 *Restoration*, *CM8 Grassland Natural Community Restoration*, and *CM9 Vernal Pool and Alkali Seasonal*  
24 *Wetland Complex Restoration* to protect 8,000 acres and restore 2,000 acres of grassland natural  
25 community, protect 600 acres of vernal pool complex, protect 150 acres of alkali seasonal wetland  
26 complex and protect 48,625 acres of cultivated lands that provide suitable habitat for native wildlife  
27 species (Table 3-4 in Chapter 3). Grassland restoration and protection would occur in CZs 1, 2, 4, 5,  
28 7, 8, and 11 (Objectives GNC1.1 and GNC1.2). Grassland protection in CZs 1, 8, and 11 would be  
29 associated with vernal pool and alkali seasonal wetland complexes (Objectives ASWNC1.1 and  
30 VPNC1.1) and would result in a contiguous matrix of grassland, alkali seasonal wetland, and vernal  
31 pool natural communities which would provide habitat for western burrowing owl and reduce the  
32 effects of current levels of habitat fragmentation. This protection would not only expand the amount  
33 of protected high-value habitat in the study area, but also support existing western burrowing owl  
34 populations that occur to the west of CZ 8 and in the areas surrounding CZs 1 and 11, which would  
35 especially benefit declining populations in the vicinity of Suisun Marsh and San Pablo Bay. Certain  
36 types of cultivated lands such as irrigated pasture, alfalfa and other hay crops, and some row crops  
37 can provide foraging habitat for western burrowing owl. Under appropriate management regimes,  
38 cultivated lands can support breeding and wintering burrowing owls. To ensure that cultivated  
39 lands conservation benefits western burrowing owl, the Plan's biological goals and objectives  
40 further specify that, of the cultivated lands protected in the late long-term, at least 1,000 acres  
41 would be protected in CZs 1 and 11 that support high-value burrowing owl habitat and are within  
42 0.5 miles of high-value grassland habitat or occupied low-value habitat (Objective WBO1.1). Under  
43 *CM11 Natural Communities Enhancement and Management*, small mammal and insect prey  
44 populations would be increased on protected lands, enhancing the foraging value of these natural  
45 communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4). In addition, burrow availability would

1 be increased on protected natural communities by encouraging ground squirrel occupancy and  
2 expansion through the creation of berms, mounds, edges, and through the prohibition of ground  
3 squirrel control programs (i.e., poisoning, Objectives ASWNC2.3, VPNC2.4, GNC2.3).

4 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*  
5 *Plant Species*) estimates that the restoration and protection actions discussed above could result in  
6 the protection of an estimated 33,766 acres of western burrowing owl habitat (8,589 acres high-  
7 value and 25,177 acres low-value habitat) and restoration of 1,645 acres of western burrowing owl  
8 habitat (1,642 acres high-value and 3 acres low-value habitat).

9 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*  
10 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*  
11 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
12 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
13 *Material, and AMM7 Barge Operations Plan. All of these AMMs include elements that would avoid or*  
14 *minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are*  
15 *described in detail in BDCP Appendix 3.C, Avoidance and Minimization Measures.*

16 Considering Alternative 4's protection and restoration provisions, which would provide acreages of  
17 new high-value or enhanced habitat in amounts suitable to compensate for habitats lost to  
18 construction and restoration activities, and with implementation of AMM1-AMM7, *AMM23 Western*  
19 *Burrowing Owl*, and Mitigation Measure BIO-91, *Compensate for Near-Term Loss of High-Value*  
20 *Western Burrowing Owl Habitat*, which would be available to guide the near-term protection and  
21 management of cultivated lands, the loss of habitat or direct mortality through implementation of  
22 Alternative 4 would not result in a substantial adverse effect through habitat modifications and  
23 would not substantially reduce the number or restrict the range of the species. Therefore, the loss of  
24 habitat or potential mortality under this alternative would have a less-than-significant impact on  
25 western burrowing owl.

#### 26 **Mitigation Measure BIO-91: Compensate for Near-Term Loss of High-Value Western** 27 **Burrowing Owl Habitat**

28 Because the BDCP lacks acreage commitment for crop types that would be protected and  
29 managed within the 15,400 acres of cultivated lands protected in the near-term time period,  
30 DWR will compensate for the loss of high-value burrowing owl habitat with high-value natural  
31 communities or cultivated crop types a ratio of 2:1 in the near-term time period.

#### 32 **Impact BIO-92: Effects on Western Burrowing Owl Associated with Electrical Transmission** 33 **Facilities**

34 New transmission lines would increase the risk for bird-power line strikes and/or electrocution,  
35 which could result in injury or mortality of western burrowing owl. The species is large-bodied but  
36 with relatively long and rounded wings, making it moderately maneuverable. While burrowing owls  
37 may nest in loose colonies, they do not flock or congregate in roosts or foraging groups. Collectively,  
38 the species' keen eyesight and largely ground-based hunting behavior make it a relatively low-risk  
39 species for powerline collision. While the species is not widespread in the study area, it may become  
40 more widely distributed as grassland enhancement improves habitat for the species. Even so, the  
41 risk of effects on the population are low, given its physical and behavioral characteristics (BDCP  
42 Attachment 5.J-2, *Memorandum: Analysis of Potential Bird Collisions at Proposed BDCP Transmission*  
43 *Lines*). and new transmission lines would not be expected to have an adverse effect on the species.

1 **NEPA Effects:** The construction and presence of new transmission lines would not result in an  
2 adverse effect on western burrowing owl because the risk of bird strike is considered to be minimal  
3 based on the owl's physical and behavioral characteristics.

4 **CEQA Conclusion:** The construction and presence of new transmission lines would have a less-than-  
5 significant impact on western burrowing owl because the risk of bird strike is considered to be  
6 minimal based on the owl's physical and behavioral characteristics.

#### 7 **Impact BIO-93: Indirect Effects of Plan Implementation on Western Burrowing Owl**

8 Noise and visual disturbances associated with construction-related activities could result in  
9 temporary disturbances that affect western burrowing owl use of up to 13,922 acres of modeled  
10 burrowing owl habitat (6,113 acres of high-value habitat) within 500 feet of covered activities will  
11 temporarily be made less suitable as a result of construction noise and visual disturbances adjacent  
12 to proposed construction areas. Indirect effects associated with construction include noise, dust, and  
13 visual disturbance caused by grading, filling, contouring, and other ground-disturbing operations.  
14 Any disturbance within 250 feet of a burrow occupied by burrowing owl during the breeding season  
15 (February 1–August 31) and within 160 feet during the nonbreeding season (September 1–January  
16 31) could potential displace winter owls or cause abandonment of active nests. These potential  
17 effects would be minimized with incorporation of *AMM23 Western Burrowing Owl* into the BDCP,  
18 which would require preconstruction surveys and establish no-disturbance buffers around active  
19 burrows. Construction noise above background noise levels (greater than 50 dBA) could extend 500  
20 to 5,250 feet from the edge of construction activities (BDCP Appendix 5.J, Attachment 5J.D, *Indirect*  
21 *Effects of the Construction of the BDCP Conveyance Facility on Sandhill Crane*, Table 4), although there  
22 are no available data to determine the extent to which these noise levels could affect western  
23 burrowing owl.

24 The use of mechanical equipment during water conveyance facilities construction could cause the  
25 accidental release of petroleum or other contaminants that could affect western burrowing owl in  
26 the surrounding habitat. The inadvertent discharge of sediment or excessive dust adjacent to  
27 western burrowing owl habitat could also affect the species. AMM1–AMM7 in addition to *AMM23*  
28 *Western Burrowing Owl* would minimize the likelihood of such spills and ensure that measures were  
29 in place to prevent runoff from the construction area and any adverse effects of dust on active nests.

30 **NEPA Effects:** Indirect effects on western burrowing owl as a result of Alternative 4 implementation  
31 could have adverse effects on this species through the modification of habitat and potential for  
32 direct mortality. Construction of the new forebay in CZ 8 would have the potential to disrupt nesting  
33 owls or active burrows in the high-value grassland habitat surrounding Clifton Court Forebay and  
34 adjacent to work area. With the implementation of AMM1–AMM7, and *AMM23 Western Burrowing*  
35 *Owl*, the indirect effects from Alternative 4 implementation would not be adverse under NEPA.

36 **CEQA Conclusion:** Indirect effects on western burrowing owl as a result of Alternative 4  
37 implementation could have significant impacts on these species through the modification of habitat  
38 and potential for direct mortality. Construction of the new forebay in CZ 8 would have the potential  
39 to disrupt nesting owls or active burrows in the high-value grassland habitat surrounding Clifton  
40 Court Forebay and adjacent to work areas. With the implementation of AMM1–AMM7 and *AMM23*  
41 *Western Burrowing Owl*, the indirect effects resulting from Alternative 4 implementation would have  
42 a less-than-significant impact on western burrowing owl.

1 **Impact BIO-94: Periodic Effects of Inundation on Western Burrowing Owl Habitat as a Result**  
2 **of Implementation of Conservation Components**

3 Flooding of the Yolo Bypass from Fremont Weir operations (*CM2 Yolo Bypass Fisheries*  
4 *Enhancement*) would increase the frequency and duration of inundation on approximately 1,390–  
5 3,303 acres of high-value habitat and 1,522–2,927 acres of low-value habitat (Table 12-4-39).

6 Based on hypothetical footprints, implementation of *CM5 Seasonally Inundated Floodplain*  
7 *Restoration* could result in the periodic inundation of up to approximately 6,941 acres of modeled  
8 habitat (6,162 acres, of which would be low-value foraging habitat; Table 12-4-39).

9 Burrowing owls cannot use inundated areas for foraging or nesting, and increased inundation  
10 frequency and duration of cultivated lands and grassland habitats may affect prey populations that  
11 have insufficient time to recover following inundation events. Depending on timing, seasonal  
12 inundation of western burrowing owl habitat could result in displacement from nesting burrows or  
13 drowning of individuals. The potential for this effect is considered low because suitable burrow sites  
14 would most likely be located along setback levees, which are expected to be subject to inundation  
15 less frequently than floodplain surfaces that would be less likely to support suitable nesting  
16 burrows.

17 **NEPA Effects:** The periodically inundated habitat would not be expected to have an adverse effect on  
18 the population. The potential for direct mortality of western burrowing owl caused by inundation  
19 would be low because the locations of burrows would likely be above elevations consistently subject  
20 to inundation; therefore, the potential impact would not be adverse.

21 **CEQA Conclusion:** The potential for direct mortality of western burrowing owl caused by inundation  
22 would be low because the locations of burrows would likely be above elevations consistently subject  
23 to inundation. Therefore, periodic inundation would be expected to have a less-than-significant  
24 impact on the population.

25 **Western Yellow-Billed Cuckoo**

26 This section describes the effects of Alternative 4, including water conveyance facilities construction  
27 and implementation of other conservation components, on western yellow-billed cuckoo. The  
28 habitat model for Western yellow-billed cuckoo includes potential breeding habitat, which includes  
29 plant alliances from the valley/foothill riparian modeled habitat that contain a dense forest canopy  
30 for foraging with understory willow for nesting, and a minimum patch size of 50 acres, and  
31 migratory habitat, which includes the same plant alliances as breeding habitat without the minimum  
32 50 acres patch size requirement.

33 The western yellow-billed cuckoo is uncommon in the study area at present, and the likelihood that  
34 it would be found using the modeled habitat is low relative to more abundant riparian species.  
35 Nesting of the species in the study area has not been confirmed for approximately 100 years.  
36 Western yellow-billed cuckoo was detected in the study area during 2009 DHCCP surveys, but  
37 nesting was not confirmed and the bird is suspected to have been a migrant (Appendix 12C, *2009 to*  
38 *2011 Bay Delta Conservation Plan EIR/EIS Environmental Data Report*). Construction and restoration  
39 associated with Alternative 4 conservation measures would result in both temporary and  
40 permanent losses of Western yellow-billed cuckoo modeled habitat as indicated in Table 12-4-40.  
41 Full implementation Alternative 4 would also include the following conservation actions over the  
42 term of the BDCP to benefit the western yellow-billed cuckoo (BDCP Chapter 3, Section 3.3,  
43 *Biological Goals and Objectives*).

- 1 • Restore or create at least 5,000 acres of valley/foothill riparian natural community, with at least  
2 3,000 acres occurring on restored seasonally inundated floodplain (Objective VFRNC1.1,  
3 associated with CM7).
- 4 • Protect at least 750 acres of existing valley/foothill riparian natural community in CZ 7 by year  
5 10 (Objective VFRNC1.2, associated with CM3).
- 6 • Maintain at least 500 acres of mature riparian forest in CZ 4 or CZ 7 (Objective VFRNC2.3,  
7 associated with CM3 and CM7).
- 8 • Maintain the at least 500 acres of mature riparian forest (VFRNC2.3) intermixed with a portion  
9 of the early- to mid-successional riparian vegetation (VFRNC2.2) in large blocks with a  
10 minimum patch size of 50 acres and minimum width of 330 feet (Objective VFRNC2.4,  
11 associated with CM3 and CM7).

12 As explained below, with the restoration or protection of these amounts of habitat, in addition to  
13 management activities that would enhance these natural communities for the species and  
14 implementation of AMM1-AMM7 and AMM22 *Suisun Song Sparrow, Yellow-Breasted Chat, Least*  
15 *Bell's Vireo, Western Yellow-Billed Cuckoo*, impacts on Western yellow-billed cuckoo would not be  
16 adverse for NEPA purposes and would be less than significant for CEQA purposes.

17 **Table 12-4-40. Changes in Western Yellow-Billed Cuckoo Modeled Habitat Associated with**  
18 **Alternative 4 (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT	NT	LLT	CM2	CM5
CM1	Breeding	9	9	1	1	NA	NA
	Migratory	14	14	18	18	NA	NA
<b>Total Impacts CM1</b>		<b>23</b>	<b>23</b>	<b>19</b>	<b>19</b>		
CM2-CM18	Breeding	29	142	5	10	11-20	17
	Migratory	278	383	83	94	37-64	125
<b>Total Impacts CM2-CM18</b>		<b>307</b>	<b>525</b>	<b>88</b>	<b>104</b>	<b>48-84</b>	<b>142</b>
<b>Total Breeding</b>		<b>38</b>	<b>151</b>	<b>6</b>	<b>11</b>		
<b>Total Migratory</b>		<b>292</b>	<b>397</b>	<b>101</b>	<b>123</b>		
<b>TOTAL IMPACTS</b>		<b>330</b>	<b>548</b>	<b>107</b>	<b>123</b>	<b>48-84</b>	<b>142</b>

<sup>a</sup> See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

1 **Impact BIO-95: Loss or Conversion of Habitat for and Direct Mortality of Western Yellow-**  
2 **Billed Cuckoo**

3 Alternative 4 conservation measures would result in the combined permanent and temporary loss  
4 of up to 671 acres of modeled habitat for western yellow-billed cuckoo (162 acres of breeding  
5 habitat, 520 acres of migratory habitat, Table 12-4-40). Conservation measures that would result in  
6 these losses are conveyance facilities and transmission line construction, and establishment and use  
7 of borrow and spoil areas (CM1), Fremont Weir/Yolo Bypass improvements (CM2), tidal habitat  
8 restoration (CM4), and floodplain restoration (CM5). Habitat enhancement and management  
9 activities (CM11) which include ground disturbance or removal of nonnative vegetation, could result  
10 in local adverse habitat effects. In addition, maintenance activities associated with the long-term  
11 operation of the water conveyance facilities and other BDCP physical facilities could degrade or  
12 eliminate western yellow-billed cuckoo modeled habitat. Each of these individual activities is  
13 described below. A summary statement of the combined impacts and NEPA effects and a CEQA  
14 conclusion follow the individual conservation measure discussions.

- 15 • *CM1 Water Facilities and Operation:* Construction of Alternative 4 conveyance facilities would  
16 result in the combined permanent and temporary loss of up to 10 acres of breeding habitat (9  
17 acres of permanent loss, 1 acres of temporary loss) for yellow-billed cuckoo. In addition, 32  
18 acres of migratory habitat would be removed (14 acres of permanent loss, 18 acres of  
19 temporary loss, see Table 12-4-40). Activities that would impact modeled habitat consist of  
20 tunnel, forebay, and intake construction, temporary access roads, and construction of  
21 transmission lines. Impacts from CM1 would occur in the central delta in CZs 3- 6, and 8. There  
22 are no extant occurrences of yellow-billed cuckoo nests in the study area. However, habitat loss  
23 would have the potential to displace individuals, if present, and remove the functions and value  
24 of modeled habitat for nesting, protection, or foraging. *AMM22 Suisun Song Sparrow, Yellow-*  
25 *Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo* (BDCP Appendix 3.C, *Avoidance*  
26 *and Minimization Measures*) would minimize the effects of construction on nesting cuckoos if  
27 present in the area. Refer to the Terrestrial Biology Map Book for a detailed view of Alternative  
28 4 construction locations. Impacts from CM1 would occur within the first 10 years of Alternative  
29 4 implementation.
- 30 • *CM2 Yolo Bypass Fisheries Enhancement:* Construction of the Yolo bypass fisheries enhancement  
31 would result in the loss of approximately 31 acres of breeding habitat (26 acres of permanent  
32 loss and 5 acres of temporary loss) and 140 acres of migratory habitat (57 acres of permanent  
33 loss and 83 acres of temporary loss) for yellow-billed cuckoo in the Yolo Bypass in CZ 2. The loss  
34 is expected to occur during the first 10 years of Alternative 4 implementation. There are no  
35 extant occurrences of yellow-billed cuckoo nesting in the study area.
- 36 • *CM4 Tidal Natural Communities Restoration:* Tidal habitat restoration site preparation and  
37 inundation would permanently remove an estimated 110 acres of modeled yellow-billed cuckoo  
38 breeding habitat and 310 acres of modeled migratory habitat in CZ 1, 2, 6, and 11. There are no  
39 extant nesting records of yellow-billed cuckoo in the study area. However, a yellow-billed  
40 cuckoo detection was recorded during DHCCP surveys in 2009 (Appendix 12C, *2009 to 2011 Bay*  
41 *Delta Conservation Plan EIR/EIS Environmental Data Report*) in CZ 5 between Twin Cities Road  
42 and Walnut Grove. These detections do not overlap with the hypothetical restoration areas for  
43 CM4.
- 44 • *CM5 Seasonally Inundated Floodplain Restoration:* Construction of setback levees to restore  
45 seasonally inundated floodplain would permanently and temporarily remove approximately 11

1 acres of modeled yellow-billed cuckoo breeding habitat (6 acres of permanent loss and 5 acres  
2 of temporary loss) and 27 acres of migratory habitat (16 acres of permanent loss and 11 acres of  
3 temporary loss) in CZ 7. Based on the riparian habitat restoration assumptions, approximately  
4 3,000 acres of valley/foothill riparian habitat would be restored as a component of seasonally  
5 inundated floodplain restoration actions. The actual number of acres that would be restored  
6 may differ from these estimates, depending on how closely the outcome of seasonally inundated  
7 floodplain restoration approximates the assumed outcome. Once this restored riparian  
8 vegetation has developed habitat functions, a portion of it would be suitable to support western  
9 yellow-billed cuckoo habitat once the riparian vegetation has developed habitat functions for  
10 the cuckoo.

- 11 ● *CM11 Natural Communities Enhancement and Management*: Habitat protection and management  
12 activities that could be implemented in protected western yellow-billed cuckoo habitats would  
13 maintain and improve the functions of the habitat over the term of the BDCP. With conditions  
14 favorable for its future establishment in the study area, western yellow-billed cuckoo would be  
15 expected to benefit from the increase in protected habitat. However, habitat management- and  
16 enhancement-related activities could disturb western yellow-billed cuckoo nests if they were  
17 present near work sites. CM11 actions designed to enhance wildlife values in restored riparian  
18 habitats may result in localized ground disturbances that could temporarily remove small  
19 amounts of western yellow-billed cuckoo habitat. Ground-disturbing activities, such as removal  
20 of nonnative vegetation and road and other infrastructure maintenance activities, would be  
21 expected to have minor adverse effects on available western yellow-billed cuckoo habitat and  
22 would be expected to result in overall improvements and maintenance of western yellow-billed  
23 cuckoo habitat values over the term of the BDCP.
- 24 ● Permanent and temporary habitat losses from the above CMs, would primarily consist of small,  
25 fragmented riparian stands in CZ 2–CZ 8 that do not provide high-value habitat for the species.  
26 Temporarily affected areas would be restored as riparian habitat within 1 year following  
27 completion of construction activities. Although the effects are considered temporary, the  
28 restored riparian habitat would require 5 years to several decades, for ecological succession to  
29 occur and for restored riparian habitat to functionally replace habitat that has been affected. The  
30 majority of the riparian vegetation to be temporarily removed is early- to mid-successional;  
31 therefore, the replaced riparian vegetation would be expected to have structural components  
32 comparable to the temporarily removed vegetation within the first 5 to 10 years after the initial  
33 restoration activities are complete.
- 34 ● *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground  
35 water conveyance facilities and restoration infrastructure could result in ongoing but periodic  
36 disturbances that could affect western yellow-billed cuckoo use of the surrounding habitat.  
37 Maintenance activities would include vegetation management, levee and structure repair, and  
38 re-grading of roads and permanent work areas. These effects, however, would be reduced by  
39 AMMs and conservation actions as described below.
- 40 ● *Injury and Direct Mortality*: Western yellow-billed cuckoo nesting has not been confirmed in the  
41 Delta for approximately 100 years. However, an unconfirmed breeding detection in 2009 in  
42 DHCCP surveys (Appendix 12C, *2009 to 2011 Bay Delta Conservation Plan EIR/EIS Environmental*  
43 *Data Report*) and the present of suitable habitat indicates that the species is potentially breeding  
44 in the study area, or may nest there in the future. Construction-related activities would not be  
45 expected to result in direct mortality of adult or fledged western yellow-billed cuckoo if they  
46 were present in the study area, because they would be expected to avoid contact with

1 construction and other equipment. If western yellow-billed cuckoo were to nest in the  
2 construction area, construction-related activities, including equipment operation, noise and  
3 visual disturbances could destroy nests or lead to their abandonment, resulting in mortality of  
4 eggs and nestlings. These effects would be avoided and minimized with the incorporation of  
5 *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed*  
6 *Cuckoo* into the BDCP.

7 The following paragraphs summarize the combined effects discussed above and describe other  
8 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also  
9 included.

### 10 ***Near-Term Timeframe***

11 Because the water conveyance facilities construction is being evaluated at the project level, the near-  
12 term BDCP conservation strategy has been evaluated to determine whether it would provide  
13 sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that the  
14 effects of construction would not be adverse under NEPA. Alternative 4 would remove 437 acres of  
15 modeled habitat for yellow-billed cuckoo in the study area in the near-term. These effects would  
16 result from the construction of the water conveyance facilities (CM1, 42 acres of modeled breeding  
17 and migratory habitat), and implementing other conservation measures (*CM2 Yolo Bypass Fisheries*  
18 *Enhancement, CM4 Tidal Natural Communities Restoration, and CM5 Seasonally Inundated Floodplain*  
19 *Restoration*—395 acres of modeled nesting and migratory habitat). These habitat losses would  
20 primarily consist of small, fragmented riparian stands in CZ 2-CZ 8 that do not provide high-value  
21 habitat for the species.

22 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by  
23 CM1 and that are identified in the biological goals and objectives for yellow-billed cuckoo in Chapter  
24 3 of the BDCP would be 1:1 for restoration/creation and 1:1 protection of valley/foothill riparian  
25 habitat. Using these ratios would indicate that 42 acres of valley/foothill riparian habitat should be  
26 restored/created and 42 acres should be protected to compensate for the CM1 losses of yellow-  
27 billed cuckoo habitat. The near-term effects of other conservation actions would remove 395 acres  
28 of modeled habitat, and therefore require 395 acres of restoration and 395 acres of protection of  
29 valley/foothill riparian using the same typical NEPA and CEQA ratios (1:1 for restoration and 1:1 for  
30 protection).

31 The BDCP has committed to near-term goals of protecting 750 acres and restoring 800 acres of the  
32 valley/foothill riparian natural community in the Plan Area (Table 3-4 in Chapter 3, *Description of*  
33 *Alternatives*). These conservation actions are associated with CM3 and CM7 and would occur in the  
34 same timeframe as the construction and early restoration losses, thereby avoiding adverse effects of  
35 habitat loss on yellow-billed cuckoo. The majority of the riparian restoration acres would occur in  
36 CZ 7 as part of a reserve system with extensive wide bands or large patches of valley/foothill  
37 riparian natural community (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation*  
38 *Strategy*). Goals and objectives in the Plan for riparian restoration also include the restoration,  
39 maintenance and enhancement of structural heterogeneity with adequate vertical and horizontal  
40 overlap among vegetation components and over adjacent riverine channels, freshwater emergent  
41 wetlands, and grasslands (Objective VFRNC2.1). These natural community biological goals and  
42 objectives would inform the near-term protection and restoration efforts and represent  
43 performance standards for considering the effectiveness of conservation actions for the species.

1 The acres of protection contained in the near-term Plan goals satisfy the typical mitigation ratios  
2 that would be applied to the project-level effects of CM1 and other near-term impacts. However, the  
3 restored riparian habitat would require several years (early-mid successional) and several decades  
4 (mature riparian forest), for ecological succession to occur and for restored riparian habitat to  
5 functionally replace habitat that has been affected. Because the western yellow-billed cuckoo is not  
6 known to be an established breeder in the study area, the time lag in riparian restoration from BDCP  
7 actions would not be expected to have an adverse population-level effect on the species. Overall,  
8 BDCP riparian habitat restoration actions would be expected to benefit western yellow-billed  
9 cuckoo by increasing opportunities for a breeding population to become reestablished in the study  
10 area.

11 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*  
12 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*  
13 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
14 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
15 *Material, AMM7 Barge Operations Plan, and AMM22 Suisun Song Sparrow, Yellow-Breasted Chat,*  
16 *Least Bell's Vireo, Western Yellow-Billed Cuckoo.* All of these AMMs include elements that would  
17 avoid or minimize the risk of affecting individuals and species habitats adjacent to work areas and  
18 storage sites. The AMMs are described in detail in BDCP Appendix 3.C, *Avoidance and Minimization*  
19 *Measures.*

#### 20 **Late Long-Term Timeframe**

21 The habitat model indicates that the study area supports approximately 12,395 acres of modeled  
22 breeding and migratory habitat for yellow-billed cuckoo. Alternative 4 as a whole would result in  
23 the permanent loss of and temporary effects on 671 acres of modeled habitat (5% of the modeled  
24 habitat in the study area). These losses would occur from the construction of the water conveyance  
25 facilities (CM1) and from *CM2 Yolo Bypass Fisheries Enhancement, CM4 Tidal Natural Communities*  
26 *Restoration, and CM5 Seasonally Inundated Floodplain Restoration.* The locations of these losses  
27 would be in fragmented riparian habitat throughout the study area.

28 The Plan includes conservation commitments through *CM7 Riparian Natural Community Restoration*  
29 and *CM3 Natural Communities Protection and Restoration* to restore or create at least 5,000 acres  
30 and protect at least 750 acres of valley/foothill riparian woodland. Of the 5,000 acres of restored  
31 riparian natural communities, a minimum of 3,000 acres of valley/foothill riparian would be  
32 restored within the seasonally inundated floodplain, and 1,000 acres would be managed as dense  
33 early to mid-successional riparian forest (Objectives VFRNC1.1 and VFRNC1.2). In addition, at least  
34 500 acres of mature riparian forest would be maintained in CZ 4 or CZ 7 (Objective VFRNC2.3). This  
35 mature, riparian forest would be mixed with a portion of the early- to mid-successional riparian  
36 vegetation in large blocks with a minimum patch size of 50 acres and a minimum width of 330 feet  
37 (Objective VFRNC2.2 and VFRNC2.4), which would provide suitable nesting habitat for the cuckoo.  
38 The protection of 750 acres of existing valley/foothill riparian forest in CZ 7 would not provide in its  
39 entirety the vegetative structure needed to support these species, because patch sizes may not be  
40 large enough to support yellow-billed cuckoo breeding habitat. However, a portion of the protected  
41 habitat would provide suitable habitat for the species. Restoration actions through CM7 and CM11  
42 would expand the patches of existing riparian forest in order to support the species should they  
43 become established breeders in the study area.

1 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*  
2 *Plant Species*) estimates that the restoration and protection actions discussed above could result in  
3 the restoration of 3,397 acres and the protection of 517 acres of habitat for the yellow-billed cuckoo.

4 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
5 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
6 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
7 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
8 *Material*, *AMM7 Barge Operations Plan*, and *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat,*  
9 *Least Bell's Vireo, Western Yellow-Billed Cuckoo*. All of these AMMs include elements that would  
10 avoid or minimize the risk of affecting individuals and species habitats adjacent to work areas and  
11 storage sites. The AMMs are described in detail in BDCP Appendix 3.C, *Avoidance and Minimization*  
12 *Measures*.

13 **NEPA Effects:** The loss of western yellow-billed cuckoo habitat associated with Alternative 4 would  
14 represent an adverse effect in the absence of other conservation actions. However, the species is not  
15 an established breeder in the study area and current presence is limited to migrants. In addition, the  
16 habitat that would be lost consists of small, fragmented riparian stands that do not provide high-  
17 value habitat for the species. With habitat protection and restoration associated with CM3, CM7, and  
18 CM11, guided by biological goals and objectives and by AMM1–AMM7 and *AMM22 Suisun Song*  
19 *Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo*, which would be in  
20 place throughout the construction period, the effects of habitat loss and potential mortality on  
21 western yellow-billed cuckoo under Alternative 4 would not be adverse.

## 22 **CEQA Conclusion:**

### 23 **Near-Term Timeframe**

24 Because the water conveyance facilities construction is being evaluated at the project level, the near-  
25 term BDCP conservation strategy has been evaluated to determine whether it would provide  
26 sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that the  
27 effects of construction would be less than significant under CEQA. Alternative 4 would remove 437  
28 acres of modeled habitat for yellow-billed cuckoo in the study area in the near-term. These effects  
29 would result from the construction of the water conveyance facilities (CM1, 42 acres of modeled  
30 breeding and migratory habitat), and implementing other conservation measures (*CM2 Yolo Bypass*  
31 *Fisheries Enhancement*, *CM4 Tidal Natural Communities Restoration*, and *CM5 Seasonally Inundated*  
32 *Floodplain Restoration*—395 acres of modeled nesting and migratory habitat). These habitat losses  
33 would primarily consist of small, fragmented riparian stands in CZ 2–CZ 8 that do not provide high-  
34 value habitat for the species.

35 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by  
36 CM1 and that are identified in the biological goals and objectives for yellow-billed cuckoo in Chapter  
37 3 of the BDCP would be 1:1 for restoration/creation and 1:1 protection of valley/foothill riparian  
38 habitat. Using these ratios would indicate that 42 acres of valley/foothill riparian habitat should be  
39 restored/created and 42 acres should be protected to mitigate the CM1 losses of yellow-billed  
40 cuckoo habitat. The near-term effects of other conservation actions would remove 395 acres of  
41 modeled habitat, and therefore require 395 acres of restoration and 395 acres of protection of  
42 valley/foothill riparian using the same typical NEPA and CEQA ratios (1:1 for restoration and 1:1 for  
43 protection).

1 The BDCP has committed to near-term goals of protecting 750 acres and restoring 800 acres of the  
2 valley/foothill riparian natural community in the study area (Table 3-4 in Chapter 3, *Description of*  
3 *Alternatives*). These conservation actions are associated with CM3 and CM7 and would occur in the  
4 same timeframe as the construction and early restoration losses, thereby avoiding adverse effects of  
5 habitat loss on yellow-billed cuckoo. The majority of the riparian restoration acres would occur in  
6 CZ 7 as part of a reserve system with extensive wide bands or large patches of valley/foothill  
7 riparian natural community (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation*  
8 *Strategy*). Goals and objectives in the Plan for riparian restoration also include the restoration,  
9 maintenance and enhancement of structural heterogeneity with adequate vertical and horizontal  
10 overlap among vegetation components and over adjacent riverine channels, freshwater emergent  
11 wetlands, and grasslands (Objective VFRNC2.1). These natural community biological goals and  
12 objectives would inform the near-term protection and restoration efforts and represent  
13 performance standards for considering the effectiveness of conservation actions for the species.

14 The acres of protection contained in the near-term Plan goals satisfy the typical mitigation ratios  
15 that would be applied to the project-level effects of CM1 and other near-term impacts. However, the  
16 restored riparian habitat would require several years (early-mid successional) and several decades  
17 (mature riparian forest), for ecological succession to occur and for restored riparian habitat to  
18 functionally replace habitat that has been affected. Because the western yellow-billed cuckoo is not  
19 known to be an established breeder in the study area, the time lag in riparian restoration from BDCP  
20 actions would not be expected to have an adverse population-level effect on the species. Overall,  
21 BDCP riparian habitat restoration actions would be expected to benefit western yellow-billed  
22 cuckoo by increasing opportunities for a breeding population to become reestablished in the study  
23 area.

24 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
25 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
26 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
27 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
28 *Material*, *AMM7 Barge Operations Plan*, and *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat,*  
29 *Least Bell's Vireo, Western Yellow-Billed Cuckoo*. All of these AMMs include elements that would  
30 avoid or minimize the risk of affecting individuals and species habitats adjacent to work areas and  
31 storage sites. The AMMs are described in detail in BDCP Appendix 3.C, *Avoidance and Minimization*  
32 *Measures*.

### 33 **Late Long-Term Timeframe**

34 The habitat model indicates that the study area supports approximately 12,395 acres of modeled  
35 breeding and migratory habitat for yellow-billed cuckoo. Alternative 4 as a whole would result in  
36 the permanent loss of and temporary effects on 671 acres of modeled habitat (5% of the modeled  
37 habitat in the study area). These losses would occur from the construction of the water conveyance  
38 facilities (CM1) and from *CM2 Yolo Bypass Fisheries Enhancement*, *CM4 Tidal Natural Communities*  
39 *Restoration*, and *CM5 Seasonally Inundated Floodplain Restoration*. The locations of these losses  
40 would be in fragmented riparian habitat throughout the study area.

41 The Plan includes conservation commitments through *CM7 Riparian Natural Community Restoration*  
42 and *CM3 Natural Communities Protection and Restoration* to restore or create at least 5,000 acres  
43 and protect at least 750 acres of valley/foothill riparian woodland. Of the 5,000 acres of restored  
44 riparian natural communities, a minimum of 3,000 acres of valley/foothill riparian would be

1 restored within the seasonally inundated floodplain, and 1,000 acres would be managed as dense  
2 early to mid-successional riparian forest (Objectives VFRNC1.1 and VFRNC1.2). In addition, at least  
3 500 acres of mature riparian forest would be maintained in CZ 4 or CZ 7 (Objective VFRNC2.3). This  
4 mature, riparian forest would be mixed with a portion of the early- to mid-successional riparian  
5 vegetation in large blocks with a minimum patch size of 50 acres and a minimum width of 330 feet  
6 (Objective VFRNC2.2 and VFRNC2.4), which would provide suitable nesting habitat for the cuckoo.  
7 The protection of 750 acres of existing valley/foothill riparian forest in CZ 7 would not provide in its  
8 entirety the vegetative structure needed to support these species, because patch sizes may not be  
9 large enough to support yellow-billed cuckoo breeding habitat. However, a portion of the protected  
10 habitat would provide suitable habitat for the species. Restoration actions through CM7 and CM11  
11 would expand the patches of existing riparian forest in order to support the species should they  
12 become established breeders in the study area.

13 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*  
14 *Plant Species*) estimates that the restoration and protection actions discussed above could result in  
15 the restoration of 3,397 acres and the protection of 517 acres of habitat for the yellow-billed cuckoo.

16 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*  
17 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*  
18 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
19 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
20 *Material, AMM7 Barge Operations Plan, and AMM22 Suisun Song Sparrow, Yellow-Breasted Chat,*  
21 *Least Bell's Vireo, Western Yellow-Billed Cuckoo.* All of these AMMs include elements that would  
22 avoid or minimize the risk of affecting individuals and species habitats adjacent to work areas and  
23 storage sites. The AMMs are described in detail in BDCP Appendix 3.C, *Avoidance and Minimization*  
24 *Measures.*

25 Considering Alternative 4's protection and restoration provisions, which would provide acreages of  
26 new or enhanced habitat in amounts greater than necessary to compensate for the time lag of  
27 restoring habitats lost to construction and restoration activities, and with implementation of  
28 AMM1-AMM7 and AMM22 *Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western*  
29 *Yellow-Billed Cuckoo,* the loss of habitat or direct mortality through implementation of Alternative 4  
30 would not result in a substantial adverse effect through habitat modifications and would not  
31 substantially reduce the number or restrict the range of the species. Therefore, the loss of habitat or  
32 potential mortality under this alternative would have a less-than-significant impact on western  
33 yellow-billed cuckoo.

#### 34 **Impact BIO-96: Fragmentation of Western Yellow-Billed Cuckoo Habitat as a Result of** 35 **Constructing the Water Conveyance Facilities**

36 Grading, filling, contouring, and other initial ground-disturbing operations for water conveyance  
37 facilities construction may temporarily fragment modeled western yellow-billed cuckoo habitat.  
38 This could temporarily reduce the extent and functions supported by the affected habitat. Because  
39 western yellow-billed cuckoo is not currently present in the study area, and because the  
40 implementation of *CM5 Seasonally Inundated Floodplain Restoration* would protect and create  
41 contiguous high-value riparian habitat, any such habitat fragmentation is expected to have no or  
42 minimal effect on the species.

43 **NEPA Effects:** Fragmentation of habitat would not have an adverse effect on western yellow-billed  
44 cuckoo. The habitat functions in the study area for the species would be greatly improved through

1 the implementation of CM5, which would restore and protect large contiguous patches of riparian  
2 habitat.

3 **CEQA Conclusion:** Fragmentation of habitat would have a less-than-significant impact on western  
4 yellow-billed cuckoo. The habitat functions in the study area for the species would be greatly  
5 improved through the implementation of CM5, which would restore and protect large contiguous  
6 patches of riparian habitat.

### 7 **Impact BIO-97: Effects on Western Yellow-Billed Cuckoo Associated with Electrical** 8 **Transmission Facilities**

9 New transmission lines would increase the risk for bird-power line strikes, which could result in  
10 injury or mortality of western yellow-billed cuckoo. Because the western yellow-billed cuckoo uses  
11 riparian forests to meet all of its breeding and wintering life requisites, the species remains  
12 primarily within the canopy of riparian forests and rarely ventures into open spaces except during  
13 migration, limiting its opportunity to encounter the proposed transmission lines. As a summer  
14 resident, the species occurs in the study area during periods of relatively high visibility and clear  
15 weather conditions, thus further reducing collision risk from daily use patterns or seasonal  
16 migration flights. Finally, western yellow-billed cuckoo wing shape is characterized by low wing  
17 loading and a moderate aspect ratio, making the species moderately maneuverable and presumably  
18 able to avoid collisions, especially during high-visibility conditions (BDCP Attachment 5.J-2,  
19 *Memorandum: Analysis of Potential Bird Collisions at Proposed BDCP Transmission Lines*).  
20 Transmission line poles and towers also provide perching substrate for raptors, which could result  
21 in increased predation pressure on western yellow-billed cuckoo if they were to use habitat adjacent  
22 to lines.

23 **NEPA Effects:** The risk of bird-strike is considered to be minimal based on the species' rarity in the  
24 study area, its proclivity to remain in the riparian canopy, its presence in the study area during  
25 periods of relative high visibility, and its overall ability to successfully negotiate around overhead  
26 wires that it may encounter. Transmission line poles and towers also provide perching substrate for  
27 raptors, which could result in increased predation pressure on western yellow-billed cuckoo. This  
28 would not be expected to have an adverse effect on the western yellow-billed cuckoo population.

29 **CEQA Conclusion:** The construction and presence of new transmission lines would have a less-than-  
30 significant impact on western yellow-billed cuckoo because the risk of bird-strike is considered to  
31 be minimal based on the species' rarity in the study area, its proclivity to remain in the riparian  
32 canopy, its presence during periods of relative high visibility, and its overall ability to successfully  
33 negotiate around overhead wires that it may encounter. Transmission line poles and towers also  
34 provide perching substrate for raptors, which could result in increased predation pressure on  
35 western yellow-billed cuckoo. This would be expected to have a less-than-significant impact on the  
36 western yellow-billed cuckoo population.

### 37 **Impact BIO-98: Indirect Effects of Plan Implementation on Western Yellow-Billed Cuckoo**

38 **Construction- and operation-related effects:** Noise and visual disturbances associated with  
39 construction-related activities could result in temporary disturbances that affect western yellow-  
40 billed cuckoo use of modeled habitat adjacent to proposed construction areas. Construction noise  
41 above background noise levels (greater than 50 dBA) could extend 500 to 5,250 feet from the edge  
42 of construction activities (BDCP Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of*  
43 *the BDCP Conveyance Facility on Sandhill Crane*, Table 4), although there are no available data to

1 determine the extent to which these noise levels could affect western yellow-billed cuckoo. Indirect  
2 effects associated with construction include noise, dust, and visual disturbance caused by grading,  
3 filling, contouring, and other ground-disturbing operations outside the project footprint but within  
4 1,300 feet from the construction edge. If western yellow-billed cuckoo were to nest in or adjacent to  
5 work areas, construction and subsequent maintenance-related noise and visual disturbances could  
6 mask calls, disrupt foraging and nesting behaviors, and reduce the functions of suitable nesting  
7 habitat for these species. These potential effects would be minimized with incorporation of *AMM22*  
8 *Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo* into the  
9 BDCP. The use of mechanical equipment during water conveyance facilities construction could cause  
10 the accidental release of petroleum or other contaminants that could affect western yellow-billed  
11 cuckoo in the surrounding habitat. The inadvertent discharge of sediment or excessive dust adjacent  
12 to western yellow-billed cuckoo habitat could also affect the species. *AMM1-AMM7*, including *AMM2*  
13 *Construction Best Management Practices and Monitoring*, in addition to *AMM22 Suisun Song Sparrow,*  
14 *Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo* would minimize the likelihood  
15 of such spills from occurring and ensure that measures were in place to prevent runoff from the  
16 construction area and any adverse effects of dust on active nests.

17 **NEPA Effects:** Indirect effects on western yellow-billed cuckoo as a result of Alternative 4  
18 implementation could have adverse effects on the species through the modification of habitat and  
19 potential for direct mortality. However, due to the species' minimal presence in the study area, and  
20 with the incorporation of *AMM1-AMM7* and *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat,*  
21 *Least Bell's Vireo, Western Yellow-Billed Cuckoo* into the BDCP, indirect effects would not have an  
22 adverse effect on western yellow-billed cuckoo.

23 **CEQA Conclusion:** Indirect effects on western yellow-billed cuckoo as a result of Alternative 4  
24 implementation could have a significant impact on the species from modification of habitat. With the  
25 incorporation of *AMM1-AMM7* and *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's*  
26 *Vireo, Western Yellow-Billed Cuckoo* into the BDCP, indirect effects as a result of Alternative 4  
27 implementation would have a less-than-significant impact on western yellow-billed cuckoo.

### 28 **Impact BIO-99: Periodic Effects of Inundation of Western Yellow-Billed Cuckoo Habitat as a** 29 **Result of Implementation of Conservation Components**

30 Flooding of the Yolo Bypass from Fremont Weir operations (CM2) would increase the frequency and  
31 duration of inundation of approximately 11-20 acres of modeled western yellow-billed cuckoo  
32 breeding habitat and 37-64 acres of modeled migratory habitat. No adverse effects of increased  
33 inundation frequency on western yellow-billed cuckoo or its habitat are expected because the  
34 cuckoo breeding period is outside the period the weir would be operated. In addition, riparian  
35 vegetation supporting habitat has persisted under the existing Yolo Bypass flooding regime, and  
36 changes to frequency and inundation would be within the tolerance of these vegetation types.

37 Based on hypothetical floodplain restoration, CM5 implementation could result in periodic  
38 inundation of up to 142 acres of modeled western yellow-billed cuckoo habitat (17 acres of breeding  
39 habitat, 125 acres of migratory habitat). Inundation of restored floodplains is not expected to affect  
40 western yellow-billed cuckoo or its habitat adversely because the cuckoo breeding period is outside  
41 the period the floodplains would likely be inundated, and periodic inundation of floodplains is  
42 expected to restore a more natural flood regime in support of riparian vegetation types that provide  
43 nesting and migratory habitat for western yellow-billed cuckoo. The overall effect of seasonal  
44 inundation in existing riparian natural communities is likely to be beneficial for western yellow-

1 billed cuckoo, because, historically, flooding was the main natural disturbance regulating ecological  
2 processes in riparian areas, and flooding promotes the germination and establishment of many  
3 native riparian plants.

4 **NEPA Effects:** Periodic effects of inundation would not have an adverse on yellow-billed cuckoo if  
5 they were to establish as breeders in the study area, because flooding is expected to occur outside of  
6 the breeding season.

7 **CEQA Conclusion:** Periodic effects of inundation would have a less-than-significant impact on  
8 yellow-billed cuckoos if they were to establish as breeders in the study area, because flooding is  
9 expected to occur outside of the breeding season.

## 10 **White-Tailed Kite**

11 This section describes the effects of Alternative 4, including water conveyance facilities construction  
12 and implementation of other conservation components, on white-tailed kite. The habitat model used  
13 to assess impacts on white-tailed kite includes nesting habitat and foraging habitat. Most white-  
14 tailed kites in the Sacramento Valley are found in oak and cottonwood riparian forests, valley oak  
15 woodlands, or other groups of trees and are usually associated with compatible foraging habitat for  
16 the species in patches greater than 1,500 square meters (Erichsen et al. 1996). Modeled foraging  
17 habitat for white-tailed kite consists of pasture and hay crops, compatible row and grain crops and  
18 natural vegetation such as seasonal wetlands and annual grasslands (Erichsen et al. 1995).

19 Construction and restoration associated with Alternative 4 conservation measures would result in  
20 both temporary and permanent losses of white-tailed kite modeled habitat as indicated in Table 12-  
21 4-41. The majority of the losses would take place over an extended period of time as tidal marsh is  
22 restored in the study area. Although restoration for the loss of nesting and foraging habitat would be  
23 initiated in the same timeframe as the losses, it could take one or more decades (for nesting habitat)  
24 for restored habitats to replace the functions of habitat lost. This time lag between impacts and  
25 restoration of habitat function would be minimized by specific requirements of *AMM18 Swainson's*  
26 *Hawk and White-Tailed Kite*, including the planting of mature trees in the near-term time period. Full  
27 implementation of Alternative 4 would also include the following biological objectives over the term  
28 of the BDCP to benefit the white-tailed kite (BDCP Chapter 3, Section 3.3, *Biological Goals and*  
29 *Objectives*).

- 30 ● Restore or create at least 5,000 acres of valley/foothill riparian natural community, with at least  
31 3,000 acres occurring on restored seasonally inundated floodplain (Objective VFRNC1.1,  
32 associated with CM7).
- 33 ● Protect at least 750 acres of existing valley/foothill riparian natural community in CZ 7 by year  
34 10 (Objective VFRNC1.2, associated with CM3).
- 35 ● Protect at least 8,000 acres of grassland with at least 2,000 acres protected in CZ 1, at least 1,000  
36 acres protected in CZ 8, at least 2,000 acres protected in CZ 11, and the remainder distributed  
37 among CZs 1, 2, 4, 5, 7, 8, and 11 (Objective GNC1.1, associated with CM3).
- 38 ● Restore at least 2,000 acres of grasslands (Objective GNC1.2, associated with CM8).
- 39 ● Protect at least 150 acres of alkali seasonal wetland and at least 600 acres of existing vernal pool  
40 complex in CZs 1, 8, and/or 11 (Objectives ASWNC1.1 and VPNC1.1, associated with CM3).
- 41 ● Protect and enhance at least 8,100 acres of managed wetland, at least 1,500 acres of which are  
42 in the Grizzly Island Marsh Complex (Objective MWNC1.1, associated with CM3).

- 1 • Increase prey availability and accessibility for grassland-foraging species (Objectives ASWNC2.4,  
2 VPNC2.5, and GNC2.4, associated with CM11).
- 3 • Protect at least 48,625 acres of cultivated lands that provide suitable habitat for covered and  
4 other native wildlife species (Objective CLNC1.1, associated with CM3).
- 5 • Plant and maintain native trees along roadsides and field borders within protected cultivated  
6 lands at a rate of one tree per 10 acres (Objective SH2.1, associated with CM11).
- 7 • Maintain and protect the small patches of important wildlife habitats associated with cultivated  
8 lands within the reserve system including isolated valley oak trees, trees and shrubs along field  
9 borders and roadsides, remnant groves, riparian corridors, water conveyance channels,  
10 grasslands, ponds, and wetlands (Objective CLNC1.3, associated with CM3).
- 11 • Establish 20- to 30- foot-wide hedgerows along fields and roadsides to promote prey  
12 populations throughout protected cultivated lands (Objective SH2.2, associated with CM11)

13 As explained below, with the restoration or protection of these amounts of habitat, in addition to  
14 management activities that would enhance these natural communities for the species and  
15 implementation of AMM1–AMM7, and AMM18 *Swainson’s Hawk and White-Tailed Kite*, impacts on  
16 white-tailed kite would not be adverse for NEPA purposes and would be less than significant for  
17 CEQA purposes.

18 **Table 12-4-41. Changes in White-Tailed Kite Modeled Habitat Associated with Alternative 4 (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT	NT	LLT	CM2	CM5
CM1	Nesting	26	26	23	23	NA	NA
	Foraging	4,339	4,339	1,295	1,295	NA	NA
<b>Total Impacts CM1</b>		<b>4,365</b>	<b>4,365</b>	<b>1,318</b>	<b>1,318</b>		
CM2–CM18	Nesting	312	507	88	121	48–82	230
	Foraging	8,723	52,675	516	1,484	3,030–6,651	7,402
<b>Total Impacts CM2–CM18</b>		<b>9,035</b>	<b>53,132</b>	<b>604</b>	<b>1,605</b>	<b>3,078–6,733</b>	<b>7,632</b>
<b>Total Nesting</b>		<b>338</b>	<b>533</b>	<b>111</b>	<b>144</b>		
<b>Total Foraging</b>		<b>13,062</b>	<b>57,014</b>	<b>1,811</b>	<b>2,779</b>		
<b>TOTAL IMPACTS</b>		<b>13,400</b>	<b>57,547</b>	<b>1,922</b>	<b>2,923</b>	<b>3,078–6,733</b>	<b>7,632</b>

<sup>a</sup> See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

## 1 **Impact BIO-100: Loss or Conversion of Habitat for and Direct Mortality of White-Tailed Kite**

2 Alternative 4 conservation measures would result in the combined permanent and temporary loss  
3 of up to 60,470 acres of modeled habitat (677 acres of nesting habitat and 59,793 acres of foraging  
4 habitat) for white-tailed kite (Table 12-4-41). Conservation measures that would result in these  
5 losses are conveyance facilities and transmission line construction, and establishment and use of  
6 borrow and spoil areas (CM1), Yolo Bypass fisheries improvements (CM2), tidal habitat restoration  
7 (CM4), floodplain restoration (CM5), riparian restoration, (CM7), grassland restoration (CM8),  
8 vernal pool and wetland restoration (CM9), nontidal marsh restoration (CM10), and construction of  
9 conservation hatcheries (CM18). Habitat enhancement and management activities (CM11), which  
10 include ground disturbance or removal of nonnative vegetation, could result in local habitat effects.  
11 In addition, maintenance activities associated with the long-term operation of the water conveyance  
12 facilities and other BDCP physical facilities could affect white-tailed kite modeled habitat. Each of  
13 these individual activities is described below. A summary statement of the combined impacts and  
14 NEPA effects, and a CEQA conclusion follow the individual conservation measure discussions.

- 15 • *CM1 Water Facilities and Operation:* Construction of Alternative 4 water conveyance facilities  
16 would result in the combined permanent and temporary loss of up to 49 acres of white-tailed  
17 kite nesting habitat (26 acres of permanent loss and 23 acres of temporary loss). In addition,  
18 5,634 acres of foraging habitat would be removed (4,339 acres of permanent loss, 1,295 acres of  
19 temporary loss). Activities that would impact modeled white-tailed kite habitat consist of  
20 tunnel, forebay, and intake construction, temporary access roads, and construction of  
21 transmission lines. Most of the permanent loss of nesting habitat would occur where Intakes 1–3  
22 impact the Sacramento River’s east bank between Freeport and Courtland. The riparian areas  
23 here are very small patches, some dominated by valley oak and others by nonnative trees.  
24 Temporary losses of nesting habitat would occur where pipelines cross Snodgrass Slough and  
25 other small waterways east of the Sacramento River, and where temporary work areas  
26 surround intake sites. The riparian habitat in these areas is also composed of very small patches  
27 or stringers bordering waterways, which are composed of valley oak and scrub vegetation.  
28 There are no occurrences of nesting white-tailed kite that overlap with the construction  
29 footprint of CM1. The implementation of *AMM18 Swainson’s Hawk and White-Tailed Kite* (BDCP  
30 Appendix 3.C, *Avoidance and Minimization Measures*) would minimize the effects of construction  
31 on kites if they were to nest in the area. Impacts on foraging habitat would occur throughout the  
32 central Delta in CZs 3- 6, and CZ 8. Refer to the Terrestrial Biology Map Book for a detailed view  
33 of Alternative 4 construction locations. Impacts from CM1 would occur within the first 10 years  
34 of Alternative 4 implementation.
- 35 • *CM2 Yolo Bypass Fisheries Enhancement:* Construction of the Yolo bypass fisheries enhancement  
36 would result in the combined permanent and temporary loss of up to 170 acres of nesting  
37 habitat (82 acres of permanent loss, 88 acres of temporary loss) in the Yolo Bypass in CZ 2. In  
38 addition, 1,525 acres of foraging habitat would be removed (1,008 acres of permanent loss, 516  
39 acres of temporary loss). Activities through CM2 could involve excavation and grading in  
40 valley/foothill riparian areas to improve passage of fish through the bypasses. Most of the  
41 riparian losses would occur at the north end of Yolo Bypass where major fish passage  
42 improvements are planned. Excavation to improve water movement in the Toe Drain and in the  
43 Sacramento Weir would also remove white-tailed kite habitat. The loss is expected to occur  
44 during the first 10 years of Alternative 4 implementation.
- 45 • *CM4 Tidal Natural Communities Restoration:* Tidal habitat restoration site preparation and  
46 inundation would permanently remove an estimated 383 acres of white-tailed kite nesting

1 habitat and 41,625 acres of foraging habitat. The majority of the acres lost would consist of  
2 cultivated lands in CZs 1, 2, 4, 5, 6, and/or 7. Grassland losses would likely occur in the vicinity  
3 of Cache Slough, on Decker Island in the West Delta ROA, on the upslope fringes of Suisun Marsh,  
4 and along narrow bands adjacent to waterways in the South Delta ROA. Tidal restoration would  
5 directly impact and fragment grassland just north of Rio Vista in and around French and  
6 Prospect Islands, and in an area south of Rio Vista around Threemile Slough. Losses of alkali  
7 seasonal wetland complex habitat would likely occur in the south end of the Yolo Bypass and on  
8 the northern fringes of Suisun Marsh. The conversion of cultivated lands to tidal wetlands over  
9 fairly broad areas within the tidal restoration footprints could result in the removal or  
10 abandonment of nesting territories that occur within or adjacent to the restoration areas. Trees  
11 would not be actively removed but tree mortality would be expected over time as areas became  
12 tidally inundated. Depending on the extent and value of remaining habitat, this could reduce the  
13 local nesting population.

- 14 ● *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore  
15 seasonally inundated floodplain and riparian restoration actions would remove approximately  
16 75 acres of white-tailed kite nesting habitat (42 acres of permanent loss, 33 acres of temporary  
17 loss) and 2,675 acres of foraging habitat (1,706 acres of permanent loss, 968 acres of temporary  
18 loss). These losses would be expected after the first 10 years of Alternative 4 implementation  
19 along the San Joaquin River and other major waterways in CZ 7.
- 20 ● *CM7 Riparian Natural Community Restoration*: Riparian restoration would permanently remove  
21 approximately 971 acres of white-tailed kite foraging habitat as part of tidal restoration and  
22 3,991 acres as part of seasonal floodplain restoration through CM7.
- 23 ● *CM8 Grassland Natural Community Restoration*: Restoration of grassland is expected to be  
24 implemented on agricultural lands and would result in the conversion of 1,849 acres of white-  
25 tailed kite agricultural foraging habitat to grassland foraging habitat in CZs 1, 2, 4, 5, 7, 8, and 11.  
26 If agricultural lands supporting higher value foraging habitat than the restored grassland were  
27 removed, there would be a loss of white-tailed kite foraging habitat value.
- 28 ● *CM10 Nontidal Marsh Restoration*: Restoration and creation of nontidal freshwater marsh would  
29 result in the permanent conversion of 1,440 acres of cultivated lands to nontidal marsh in CZ 2  
30 and CZ 4. This would not result in a loss of foraging habitat as both natural communities are  
31 foraging habitat for white-tailed kite. Small patches of riparian vegetation that support White-  
32 tailed kite nesting habitat may develop along the margins of restored nontidal marsh restoration  
33 would also provide foraging habitat for the species.
- 34 ● *CM11 Natural Communities Enhancement and Management*: Habitat management- and  
35 enhancement-related activities could disturb white-tailed kite nests if they were present near  
36 work sites. A variety of habitat management actions that are designed to enhance wildlife values  
37 in BDCP-protected habitats may result in localized ground disturbances that could temporarily  
38 remove small amounts of white-tailed kite habitat and reduce the functions of habitat until  
39 restoration is complete. Ground-disturbing activities, such as removal of nonnative vegetation  
40 and road and other infrastructure maintenance, are expected to have minor effects on available  
41 white-tailed kite habitat and are expected to result in overall improvements to and maintenance  
42 of habitat values over the term of the BDCP. These effects cannot be quantified, but are expected  
43 to be minimal and would be avoided and minimized by the AMMs listed below. CM11 would also  
44 include the construction of recreational-related facilities including trails, interpretive signs, and  
45 picnic tables (BDCP Chapter 4, *Covered Activities and Associated Federal Actions*). The

1 construction of trailhead facilities, signs, staging areas, picnic areas, bathrooms, etc. would be  
2 placed on existing, disturbed areas when and where possible. However, approximately 50 acres  
3 of white-tailed kite grassland foraging habitat would be lost from the construction of trails and  
4 facilities.

- 5 • *CM18 Conservation Hatcheries*: Implementation of CM18 would remove up to 35 acres of high-  
6 white-tailed kite foraging habitat for the development of a delta and longfin smelt conservation  
7 hatchery in CZ 1. The loss is expected to occur during the first 10 years of Plan implementation.

8 Permanent and temporary white-tailed kite nesting habitat losses from the above conservation  
9 measures, would primarily consist of small, fragmented riparian stands. Temporarily affected  
10 nesting habitat would be restored as riparian habitat within 1 year following completion of  
11 construction activities. The restored riparian habitat would require 1 to several decades to  
12 functionally replace habitat that has been affected and for trees to attain sufficient size and  
13 structure suitable for nesting by white-tailed kite. *AMM18 Swainson's Hawk and White-Tailed*  
14 *Kite* contains actions described below to reduce the effect of temporal loss of nesting habitat,  
15 including the transplanting of mature trees and planting of trees near high-value foraging  
16 habitat. The functions of agricultural and grassland communities that provide foraging habitat  
17 for white-tailed kite are expected to be restored relatively quickly.

- 18 • *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground  
19 water conveyance facilities and restoration infrastructure could result in ongoing but periodic  
20 disturbances that could affect white-tailed kite use of the surrounding habitat. Maintenance  
21 activities would include vegetation management, levee and structure repair, and re-grading of  
22 roads and permanent work areas. These effects, however, would be reduced by AMM1–AMM7  
23 and *AMM18 Swainson's Hawk and White-Tailed Kite* in addition to conservation actions as  
24 described below.

- 25 • *Injury and Direct Mortality*: Construction-related activities would not be expected to result in  
26 direct mortality of adult or fledged white-tailed kite if they were present in the study area,  
27 because they would be expected to avoid contact with construction and other equipment.  
28 However, if white-tailed kite were to nest in the construction area, construction-related  
29 activities, including equipment operation, noise and visual disturbances could affect nests or  
30 lead to their abandonment, potentially resulting in mortality of eggs and nestlings. These effects  
31 would be avoided and minimized with the incorporation of *AMM18 Swainson's Hawk and White-*  
32 *Tailed Kite* into the BDCP.

33 The following paragraphs summarize the combined effects discussed above and describe other  
34 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also  
35 included.

### 36 ***Near-Term Timeframe***

37 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
38 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
39 provide sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that  
40 the effect of construction would not be adverse under NEPA. Alternative 4 would remove 449 acres  
41 (338 acres of permanent loss, 111 acres of temporary loss) of white-tailed kite nesting habitat in the  
42 study area in the near-term. These effects would result from the construction of the water  
43 conveyance facilities (CM1, 49 acres), and implementing other conservation measures (*CM2 Yolo*  
44 *Bypass Fisheries Enhancement*, *CM4 Tidal Natural Communities Restoration*, and *CM5 Seasonally*

1 *Inundated Floodplain Restoration*—400 acres). In addition, 14,873 acres of white-tailed kite foraging  
2 habitat would be removed or converted in the near-term (CM1, 5,634 acres; *CM2 Yolo Bypass*  
3 *Fisheries Enhancement*, *CM4 Tidal Natural Communities Restoration*, *CM5 Seasonally Inundated*  
4 *Floodplain Restoration*, *CM7 Riparian Natural Community Restoration*, *CM8 Grassland Natural*  
5 *Community Restoration*, *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*, *CM11*  
6 *Natural Communities Enhancement and Management* and *CM18 Conservation Hatcheries*—9,239  
7 acres).

8 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by  
9 CM1 and that are identified in the biological goals and objectives for white-tailed kite in Chapter 3 of  
10 the BDCP would be 1:1 for restoration/creation and 1:1 protection of valley/foothill riparian habitat  
11 for nesting habitat, and 1:1 protection for foraging habitat. Using these ratios would indicate that 49  
12 acres of nesting habitat should be restored/ created and 49 acres should be protected to mitigate  
13 the CM1 losses of white-tailed kite nesting habitat. In addition, 5,634 acres should be protected to  
14 compensate for the CM1 losses of white-tailed kite foraging habitat. The near-term effects of other  
15 conservation actions would remove 400 acres of modeled nesting habitat, and therefore require 400  
16 acres of restoration and 400 acres of protection of nesting habitat. Similarly, the near-term effects of  
17 other conservation actions would result in the loss or conversion of 9,239 acres of modeled foraging  
18 habitat, and therefore require 9,239 acres of protection of foraging habitat using the same typical  
19 NEPA and CEQA ratios (1:1 for restoration and 1:1 for protection of nesting habitat; 1:1 for  
20 restoration and 1:1 for protection of foraging habitat).

21 The BDCP has committed to near-term goals of protecting 750 acres and restoring 800 acres of  
22 valley/foothill riparian natural community, protecting 2,000 acres and restoring 1,140 acres of  
23 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of  
24 alkali seasonal wetland complex, protecting 4,800 acres of managed wetland natural community,  
25 protecting 15,400 acres of non-rice cultivated lands, protecting 900 acres of rice or rice equivalent  
26 habitat, and restoring 19,150 acres of tidal wetlands (Table 3-4 in Chapter 3, *Description of*  
27 *Alternatives*). These conservation actions are associated with CM3, CM4, CM7, and CM8 and would  
28 occur in the same timeframe as the construction and early restoration losses.

29 The majority of riparian protection and restoration acres would occur in CZ 7 as part of a reserve  
30 system with extensive wide bands or large patches of valley/foothill riparian natural community  
31 (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*). Riparian  
32 restoration would expand the patches of existing riparian forest in order to support nesting habitat  
33 for the species. White-tailed kite is excluded from narrow bands of riparian vegetation by  
34 Swainson's hawks and therefore requires wide patches of nesting habitat where its range overlaps  
35 with Swainson's hawk. The distribution and abundance of potential white-tailed kite nest trees  
36 would be increased by planting and maintaining native trees along roadsides and field borders  
37 within protected cultivated lands at a rate of one tree per 10 acres (Objective SWHA2.1). In addition,  
38 small but essential nesting habitat associated with cultivated lands would also be maintained and  
39 protected such as isolated trees, tree rows along field borders or roads, or small clusters of trees in  
40 farmyards or at rural residences (Objective CLNC1.3).

41 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1  
42 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali  
43 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous  
44 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would  
45 provide foraging habitat for white-tailed kite and reduce the effects of current levels of habitat

1 fragmentation. Small mammal populations would also be increased on protected lands, enhancing  
2 the foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4).  
3 Foraging opportunities would also be improved by enhancing prey populations through the  
4 establishment of 20- to 30-foot-wide hedgerows along field borders and roadsides within protected  
5 cultivated lands (Objective SWHA2.2). Remnant patches of grassland or other uncultivated areas  
6 would also be protected and maintained as part of the cultivated lands reserve system which would  
7 provide additional foraging habitat and a source of rodent prey that could recolonize cultivated  
8 fields (Objective CLNC1.3). The protection of managed wetlands (including upland grassland  
9 components) that dry during the spring would also serve as foraging habitat for white-tailed kite as  
10 prey species recolonize the fields (Objective MWNC1.1). In addition, the restoration of 19,150 acres  
11 of tidal natural communities, including transitional uplands would provide high-value foraging  
12 habitat for the white-tailed kite. At least 15,400 acres of cultivated lands that provide habitat for  
13 covered and other native wildlife species would be protected in the near-term time period  
14 (Objective CLNC1.1). These biological goals and objectives would inform the near-term protection  
15 and restoration efforts and represent performance standards for considering the effectiveness of  
16 restoration actions. The acres of restoration and protection contained in the near-term Plan goals  
17 and the additional detail in the biological objectives satisfy the typical mitigation that would be  
18 applied to the project-level effects of CM1 on white-tailed kite foraging habitat, as well as mitigate  
19 the near-term effects of the other conservation measures.

20 The 750 acres of protection and 800 acres of restoration contained in the near-term Plan goals  
21 satisfy the typical mitigation ratios that would be applied to the project-level effects of CM1 and  
22 other near-term impacts on white-tailed kite nesting habitat. The 800 acres of restored riparian  
23 habitat would be initiated in the near-term to offset the loss of modeled nesting habitat, but would  
24 require one to several decades to functionally replace habitat that has been affected and for trees to  
25 attain sufficient size and structure suitable for nesting by white-tailed kites. This time lag between  
26 the removal and restoration of nesting habitat could have a substantial impact on white-tailed kite  
27 in the near-term time period. Nesting habitat is limited throughout much of the study area,  
28 consisting mainly of intermittent riparian, isolated trees, small groves, tree rows along field borders,  
29 roadside trees, and ornamental trees near rural residences. The removal of nest trees or nesting  
30 habitat would further reduce this limited resource and could reduce or restrict the number of active  
31 white-tailed kite nests within the study area until restored riparian habitat is sufficiently developed.

32 *AMM18 Swainson's Hawk and White-Tailed Kite* would implement a program to plant large mature  
33 trees, including transplanting trees scheduled for removal. These would be supplemented with  
34 additional saplings and would be expected to reduce the temporal effects of loss of nesting habitat.  
35 The plantings would occur prior to or concurrent with (in the case of transplanting) the loss of trees.  
36 In addition, at least five trees (5-gallon container size) would be planted within the BDCP reserve  
37 system for every tree 20 feet or taller anticipated to be removed by construction during the near-  
38 term period. A variety of native tree species would be planted to provide trees with differing growth  
39 rates, maturation, and life span. Trees would be planted within the BDCP reserve system in areas  
40 that support high value foraging habitat in clumps of at least three trees each at appropriate sites  
41 within or adjacent to conserved cultivated lands, or they could be incorporated as a component of  
42 the riparian restoration (CM5, CM7) where they are in close proximity to suitable foraging habitat.  
43 Replacement trees that were incorporated into the riparian restoration would not be clustered in a  
44 single region of the study area, but would be distributed throughout the lands protected as foraging  
45 habitat for white-tailed kite. With this program in place, Alternative 4 would not have a substantial

1 adverse effect on white-tailed kite in the near-term timeframe, either through direct mortality or  
2 through habitat modifications.

3 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
4 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
5 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
6 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
7 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
8 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
9 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

### 10 **Late Long-Term Timeframe**

11 The study area supports approximately 14,069 acres of modeled nesting habitat and 507,922 acres  
12 of modeled foraging habitat for white-tailed kite. Alternative 4 as a whole would result in the  
13 permanent loss of and temporary effects on 677 acres of potential nesting habitat (5% of the  
14 potential nesting habitat in the study area) and the loss or conversion of 59,793 acres of foraging  
15 habitat (12% of the foraging habitat in the study area). The locations of these losses are described  
16 above in the analyses of individual conservation measures.

17 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*  
18 *Restoration*, *CM4 Tidal Natural Communities Restoration*, *CM5 Seasonally Inundated Floodplain*  
19 *Restoration*, *CM7 Riparian Natural Community Restoration*, and *CM8 Grassland Natural Community*  
20 *Restoration* to restore or create at least 5,000 acres and protect at least 750 acres of valley/foothill  
21 riparian natural community, protect 8,000 acres and restore 2,000 acres of grassland natural  
22 community, protect 600 acres of vernal pool complex, protect 150 acres of alkali seasonal wetland  
23 complex, protect 8,100 acres of managed wetland, protect 48,625 acres of cultivated lands that  
24 provide suitable habitat for native wildlife species, and restore at least 65,000 acres of tidal  
25 wetlands (Table 3-4 in Chapter 3, *Description of Alternatives*).

26 The majority of riparian protection and restoration acres would occur in CZ 7 as part of a reserve  
27 system with extensive wide bands or large patches of valley/foothill riparian natural community  
28 (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*). Riparian  
29 restoration would expand the patches of existing riparian forest in order to support nesting habitat  
30 for the species. White-tailed kite is excluded from narrow bands of riparian vegetation by  
31 Swainson's hawks and therefore requires wide patches of nesting habitat where its range overlaps  
32 with Swainson's hawk. The distribution and abundance of potential white-tailed kite nest trees  
33 would be increased by planting and maintaining native trees along roadsides and field borders  
34 within protected cultivated lands at a rate of one tree per 10 acres (Objective SWHA2.1). In addition,  
35 small but essential nesting habitat associated with cultivated lands would also be maintained and  
36 protected such as isolated trees, tree rows along field borders or roads, or small clusters of trees in  
37 farmyards or at rural residences (Objective CLNC1.3).

38 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1  
39 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali  
40 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous  
41 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would  
42 provide foraging habitat for white-tailed kite and reduce the effects of current levels of habitat  
43 fragmentation. Small mammal populations would also be increased on protected lands, enhancing  
44 the foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4).

1 Foraging opportunities would also be improved by enhancing prey populations through the  
2 establishment of 20- to 30-foot-wide hedgerows along field borders and roadsides within protected  
3 cultivated lands (Objective SWHA2.2). Remnant patches of grassland or other uncultivated areas  
4 would also be protected and maintained as part of the cultivated lands reserve system which would  
5 provide additional foraging habitat and a source of rodent prey that could recolonize cultivated  
6 fields (Objective CLNC1.3). The protection of managed wetlands (including upland grassland  
7 components) that dry during the spring would also serve as foraging habitat for white-tailed kite as  
8 prey species recolonize the fields (Objective MWNC1.1). In addition, the restoration of at least  
9 65,000 acres of tidal natural communities, including transitional uplands would provide high-value  
10 foraging habitat for the white-tailed kite. At least 45,405 acres of cultivated lands that provide  
11 foraging habitat for white-tailed kite would be protected by the late long-term time period  
12 (Objective CLNC1.1).

13 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*  
14 *Plant Species*) estimates that the restoration and protection actions discussed above could result in  
15 the restoration of 3,800 acres and the protection of 570 acres of nesting habitat and the restoration  
16 of 49,875 acres and the protection of 2,050 acres of foraging habitat for white-tailed kite.

17 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*  
18 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*  
19 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
20 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
21 *Material, and AMM7 Barge Operations Plan. All of these AMMs include elements that would avoid or*  
22 *minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are*  
23 *described in detail in BDCP Appendix 3.C, Avoidance and Minimization Measures.*

24 **NEPA Effects:** The loss of white-tailed kite habitat and potential direct mortality of this special-  
25 status species under Alternative 4 would represent an adverse effect in the absence of other  
26 conservation actions. However, with habitat protection and restoration associated with CM3, CM5,  
27 CM7, CM8, CM9, and CM11, guided by biological goals and objectives and by AMM1–AMM7 and  
28 *AMM18 Swainson's Hawk and White-Tailed Kite*, which would be in place throughout the  
29 construction period, the effects of habitat loss and potential mortality on white-tailed kite under  
30 Alternative 4 would not be adverse.

### 31 **CEQA Conclusion:**

#### 32 **Near-Term Timeframe**

33 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
34 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
35 provide sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that  
36 the effect of construction would be less than significant under CEQA. Alternative 4 would remove  
37 449 acres (338 acres of permanent loss, 111 acres of temporary loss) of white-tailed kite nesting  
38 habitat in the study area in the near-term. These effects would result from the construction of the  
39 water conveyance facilities (CM1, 49 acres), and implementing other conservation measures (*CM2*  
40 *Yolo Bypass Fisheries Enhancement, CM4 Tidal Natural Communities Restoration, and CM5 Seasonally*  
41 *Inundated Floodplain Restoration—400 acres). In addition, 14,873 acres of white-tailed kite foraging*  
42 *habitat would be removed or converted in the near-term (CM1, 5,634 acres; CM2 Yolo Bypass*  
43 *Fisheries Enhancement, CM4 Tidal Natural Communities Restoration, CM5 Seasonally Inundated*  
44 *Floodplain Restoration, CM7 Riparian Natural Community Restoration, CM8 Grassland Natural*

1 *Community Restoration, CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration, CM11*  
2 *Natural Communities Enhancement and Management and CM18 Conservation Hatcheries—9,239*  
3 *acres).*

4 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by  
5 CM1 and that are identified in the biological goals and objectives for white-tailed kite in Chapter 3 of  
6 the BDCP would be 1:1 for restoration/creation and 1:1 protection of valley/foothill riparian habitat  
7 for nesting habitat, and 1:1 protection for foraging habitat. Using these ratios would indicate that 49  
8 acres of nesting habitat should be restored/ created and 49 acres should be protected to mitigate  
9 the CM1 losses of white-tailed kite nesting habitat. In addition, 5,634 acres should be protected to  
10 compensate for the CM1 losses of white-tailed kite foraging habitat. The near-term effects of other  
11 conservation actions would remove 400 acres of modeled nesting habitat, and therefore require 400  
12 acres of restoration and 400 acres of protection of nesting habitat. Similarly, the near-term effects of  
13 other conservation actions would result in the loss or conversion of 9,239 acres of modeled foraging  
14 habitat, and therefore require 9,239 acres of protection of foraging habitat using the same typical  
15 NEPA and CEQA ratios (1:1 for restoration and 1:1 for protection of nesting habitat; 1:1 for  
16 restoration and 1:1 for protection of foraging habitat).

17 The BDCP has committed to near-term goals of protecting 750 acres and restoring 800 acres of  
18 valley/foothill riparian natural community, protecting 2,000 acres and restoring 1,140 acres of  
19 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of  
20 alkali seasonal wetland complex, protecting 4,800 acres of managed wetland natural community,  
21 protecting 15,400 acres of non-rice cultivated lands, protecting 900 acres of rice or rice equivalent  
22 habitat, and restoring 19,150 acres of tidal wetlands (Table 3-4 in Chapter 3, *Description of*  
23 *Alternatives*). These conservation actions are associated with CM3, CM4, CM7, and CM8 and would  
24 occur in the same timeframe as the construction and early restoration losses.

25 The majority of riparian protection and restoration acres would occur in CZ 7 as part of a reserve  
26 system with extensive wide bands or large patches of valley/foothill riparian natural community  
27 (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*). Riparian  
28 restoration would expand the patches of existing riparian forest in order to support nesting habitat  
29 for the species. White-tailed kite is excluded from narrow bands of riparian vegetation by  
30 Swainson's hawks and therefore requires wide patches of nesting habitat where its range overlaps  
31 with Swainson's hawk. The distribution and abundance of potential white-tailed kite nest trees  
32 would be increased by planting and maintaining native trees along roadsides and field borders  
33 within protected cultivated lands at a rate of one tree per 10 acres (Objective SWHA2.1). In addition,  
34 small but essential nesting habitat associated with cultivated lands would also be maintained and  
35 protected such as isolated trees, tree rows along field borders or roads, or small clusters of trees in  
36 farmyards or at rural residences (Objective CLNC1.3).

37 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1  
38 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali  
39 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous  
40 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would  
41 provide foraging habitat for white-tailed kite and reduce the effects of current levels of habitat  
42 fragmentation. Small mammal populations would also be increased on protected lands, enhancing  
43 the foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4).  
44 Foraging opportunities would also be improved by enhancing prey populations through the  
45 establishment of 20- to 30-foot-wide hedgerows along field borders and roadsides within protected

1 cultivated lands (Objective SWHA2.2). Remnant patches of grassland or other uncultivated areas  
2 would also be protected and maintained as part of the cultivated lands reserve system which would  
3 provide additional foraging habitat and a source of rodent prey that could recolonize cultivated  
4 fields (Objective CLNC1.3). The protection of managed wetlands (including upland grassland  
5 components) that dry during the spring would also serve as foraging habitat for white-tailed kite as  
6 prey species recolonize the fields (Objective MWNC1.1). In addition, the restoration of 19,150 acres  
7 of tidal natural communities, including transitional uplands would provide high-value foraging  
8 habitat for the white-tailed kite. At least 15,400 acres of cultivated lands that provide habitat for  
9 covered and other native wildlife species would be protected in the near-term time period  
10 (Objective CLNC1.1). These biological goals and objectives would inform the near-term protection  
11 and restoration efforts and represent performance standards for considering the effectiveness of  
12 restoration actions. The acres of restoration and protection contained in the near-term Plan goals  
13 and the additional detail in the biological objectives satisfy the typical mitigation that would be  
14 applied to the project-level effects of CM1 on white-tailed kite foraging habitat, as well as mitigate  
15 the near-term effects of the other conservation measures.

16 The 750 acres of protection and 800 acres of restoration contained in the near-term Plan goals  
17 satisfy the typical mitigation ratios that would be applied to the project-level effects of CM1 and  
18 other near-term impacts on white-tailed kite nesting habitat. The 800 acres of restored riparian  
19 habitat would be initiated in the near-term to offset the loss of modeled nesting habitat, but would  
20 require one to several decades to functionally replace habitat that has been affected and for trees to  
21 attain sufficient size and structure suitable for nesting by white-tailed kites. This time lag between  
22 the removal and restoration of nesting habitat could have a substantial impact on white-tailed kite  
23 in the near-term time period. Nesting habitat is limited throughout much of the study area,  
24 consisting mainly of intermittent riparian, isolated trees, small groves, tree rows along field borders,  
25 roadside trees, and ornamental trees near rural residences. The removal of nest trees or nesting  
26 habitat would further reduce this limited resource and could reduce or restrict the number of active  
27 white-tailed kite nests within the study area until restored riparian habitat is sufficiently developed.

28 *AMM18 Swainson's Hawk and White-Tailed Kite* would implement a program to plant large mature  
29 trees, including transplanting trees scheduled for removal. These would be supplemented with  
30 additional saplings and would be expected to reduce the temporal effects of loss of nesting habitat.  
31 The plantings would occur prior to or concurrent with (in the case of transplanting) the loss of trees.  
32 In addition, at least five trees (5-gallon container size) would be planted within the BDCP reserve  
33 system for every tree 20 feet or taller anticipated to be removed by construction during the near-  
34 term period. A variety of native tree species would be planted to provide trees with differing growth  
35 rates, maturation, and life span. Trees would be planted within the BDCP reserve system in areas  
36 that support high value foraging habitat in clumps of at least three trees each at appropriate sites  
37 within or adjacent to conserved cultivated lands, or they could be incorporated as a component of  
38 the riparian restoration (CM5, CM7) where they are in close proximity to suitable foraging habitat.  
39 Replacement trees that were incorporated into the riparian restoration would not be clustered in a  
40 single region of the study area, but would be distributed throughout the lands protected as foraging  
41 habitat for white-tailed kite.

42 To enhance white-tailed kite reproductive output until the replacement nest trees become suitable  
43 for nesting, 100 acres of high-quality foraging habitat (alfalfa rotation) would be protected in the  
44 near-term for each potential nest site removed (a nest site is defined as a 125-acre block in which  
45 more than 50% of nest trees are 20 feet or greater in height) as a result of construction activity  
46 during the near-term. The foraging habitat to be protected would be within 6 kilometers of the

1 removed tree within an otherwise suitable foraging landscape and on land not subject to threat of  
2 seasonal flooding, construction disturbances, or other conditions that would reduce the foraging  
3 value of the land. With this program in place, Alternative 4 would not have a substantial adverse  
4 effect on white-tailed kite in the near-term timeframe, either through direct mortality or through  
5 habitat modifications.

6 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
7 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
8 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
9 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
10 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
11 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
12 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

### 13 **Late Long-Term Timeframe**

14 The study area supports approximately 14,069 acres of modeled nesting habitat and 507,922 acres  
15 of modeled foraging habitat for white-tailed kite. Alternative 4 as a whole would result in the  
16 permanent loss of and temporary effects on 677 acres of potential nesting habitat (5% of the  
17 potential nesting habitat in the study area) and the loss or conversion of 59,793 acres of foraging  
18 habitat (12% of the foraging habitat in the study area).

19 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*  
20 *Restoration*, *CM4 Tidal Natural Communities Restoration*, *CM5 Seasonally Inundated Floodplain*  
21 *Restoration*, *CM7 Riparian Natural Community Restoration*, and *CM8 Grassland Natural Community*  
22 *Restoration* to restore or create at least 5,000 acres and protect at least 750 acres of valley/foothill  
23 riparian natural community, protect 8,000 acres and restore 2,000 acres of grassland natural  
24 community, protect 600 acres of vernal pool complex, protect 150 acres of alkali seasonal wetland  
25 complex, protect 8,100 acres of managed wetland, protect 48,625 acres of cultivated lands that  
26 provide suitable habitat for native wildlife species, and restore at least 65,000 acres of tidal  
27 wetlands (Table 3-4 in Chapter 3).

28 The majority of riparian protection and restoration acres would occur in CZ 7 as part of a reserve  
29 system with extensive wide bands or large patches of valley/foothill riparian natural community  
30 (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*). Riparian  
31 restoration would expand the patches of existing riparian forest in order to support nesting habitat  
32 for the species. White-tailed kite is excluded from narrow bands of riparian vegetation by  
33 Swainson's hawks and therefore requires wide patches of nesting habitat where its range overlaps  
34 with Swainson's hawk. The distribution and abundance of potential white-tailed kite nest trees  
35 would be increased by planting and maintaining native trees along roadsides and field borders  
36 within protected cultivated lands at a rate of one tree per 10 acres (Objective SWHA2.1). In addition,  
37 small but essential nesting habitat associated with cultivated lands would also be maintained and  
38 protected such as isolated trees, tree rows along field borders or roads, or small clusters of trees in  
39 farmyards or at rural residences (Objective CLNC1.3).

40 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1  
41 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali  
42 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous  
43 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would  
44 provide foraging habitat for white-tailed kite and reduce the effects of current levels of habitat

1 fragmentation. Small mammal populations would also be increased on protected lands, enhancing  
2 the foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4).  
3 Foraging opportunities would also be improved by enhancing prey populations through the  
4 establishment of 20- to 30-foot-wide hedgerows along field borders and roadsides within protected  
5 cultivated lands (Objective SWHA2.2). Remnant patches of grassland or other uncultivated areas  
6 would also be protected and maintained as part of the cultivated lands reserve system which would  
7 provide additional foraging habitat and a source of rodent prey that could recolonize cultivated  
8 fields (Objective CLNC1.3). The protection of managed wetlands (including upland grassland  
9 components) that dry during the spring would also serve as foraging habitat for white-tailed kite as  
10 prey species recolonize the fields (Objective MWNC1.1). In addition, the restoration of at least  
11 65,000 acres of tidal natural communities, including transitional uplands would provide high-value  
12 foraging habitat for the white-tailed kite. At least 45,405 acres of cultivated lands that provide  
13 foraging habitat for white-tailed kite would be protected by the late long-term time period  
14 (Objective CLNC1.1).

15 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*  
16 *Plant Species*) estimates that the restoration and protection actions discussed above could result in  
17 the restoration of 3,800 acres and the protection of 570 acres of nesting habitat and the restoration  
18 of 49,875 acres and the protection of 2,050 acres of foraging habitat for white-tailed kite.

19 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
20 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
21 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
22 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
23 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
24 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
25 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

26 Considering Alternative 4's protection and restoration provisions, which would provide acreages of  
27 new or enhanced habitat in amounts greater than necessary to compensate for the time lag of  
28 restoring riparian and foraging habitats lost to construction and restoration activities, and with  
29 implementation of AMM1-AMM7 and *AMM18 Swainson's Hawk and White-Tailed Kite*, the loss of  
30 habitat or direct mortality through implementation of Alternative 4 would not result in a substantial  
31 adverse effect through habitat modifications and would not substantially reduce the number or  
32 restrict the range of white-tailed kite. In particular, 95% of the loss of foraging habitat effects  
33 involve the conversion from one habitat type to another form of suitable foraging habitat. Therefore,  
34 the loss of habitat or potential mortality under this alternative would have a less-than-significant  
35 impact on white-tailed kite.

### 36 **Impact BIO-101: Effects on White-Tailed Kite Associated with Electrical Transmission** 37 **Facilities**

38 New transmission lines would increase the risk that white-tailed kites could be subject to power line  
39 strikes and/or electrocution, which could result in injury or mortality of individuals. This species  
40 would be at low risk of bird strike mortality based on its general maneuverability, its keen eyesight,  
41 and lack of flocking behavior (BDCP Attachment 5.J-2, *Memorandum: Analysis of Potential Bird*  
42 *Collisions at Proposed BDCP Transmission Lines*). *AMM20 Greater Sandhill Crane* would further  
43 reduce any potential effects.

1 **NEPA Effects:** New transmission lines would minimally increase the risk for white-tailed kite power  
2 line strikes. However, the species would be at a low risk of bird strike mortality based on its general  
3 maneuverability, its keen eyesight and lack of flocking behavior. With the implementation of *AMM20*  
4 *Greater Sandhill Crane* the potential effect of the construction of new transmission lines on white-  
5 tailed kite would not be adverse.

6 **CEQA Conclusion:** New transmission lines would increase the risk for white-tailed kite power line  
7 strikes and/or electrocution. However, the species would be at a low risk of bird strike mortality  
8 based on its general maneuverability, its keen eyesight and lack of flocking behavior. *AMM20 Greater*  
9 *Sandhill Crane*, would further reduce any potential impact of the construction of new transmission  
10 lines on white-tailed kite to a less-than-significant level.

### 11 **Impact BIO-102: Indirect Effects of Plan Implementation on White-Tailed Kite**

12 White-tailed kite nesting habitat within the vicinity of proposed construction areas could be  
13 indirectly affected by construction activities. Construction noise above background noise levels  
14 (greater than 50 dBA) could extend 500 to 5,250 feet from the edge of construction activities (BDCP  
15 Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of the BDCP Conveyance Facility on*  
16 *Sandhill Crane*, Table 4), although there are no available data to determine the extent to which these  
17 noise levels could affect white-tailed kite. Indirect effects associated with construction include noise,  
18 dust, and visual disturbance caused by grading, filling, contouring, and other ground-disturbing  
19 operations outside the project footprint but within 1,300 feet from the construction edge. If white-  
20 tailed kite were to nest in or adjacent to work areas, construction and subsequent maintenance-  
21 related noise and visual disturbances could mask calls, disrupt foraging and nesting behaviors, and  
22 reduce the functions of suitable nesting habitat for these species. *AMM18 Swainson's Hawk and*  
23 *White-Tailed Kite* would require preconstruction surveys, and if detected, 200-yard no-disturbance  
24 buffers would be established around active nests. The use of mechanical equipment during water  
25 conveyance facilities construction could cause the accidental release of petroleum or other  
26 contaminants that could affect white-tailed kite in the surrounding habitat. The inadvertent  
27 discharge of sediment or excessive dust adjacent to white-tailed kite habitat could also affect the  
28 species. *AMM1-AMM7*, including *AMM2 Construction Best Management Practices and Monitoring*,  
29 would minimize the likelihood of such spills and ensure that measures are in place to prevent runoff  
30 from the construction area and negative effects of dust on active nests.

31 **Methylmercury Exposure:** Covered activities have the potential to exacerbate bioaccumulation of  
32 mercury in avian species, including white-tailed kite. Marsh (tidal and nontidal) and floodplain  
33 restoration also have the potential to increase exposure to methylmercury. Mercury is transformed  
34 into the more bioavailable form of methylmercury in aquatic systems, especially areas subjected to  
35 regular wetting and drying such as tidal marshes and flood plains (Alpers et al. 2008). Thus, BDCP  
36 restoration activities that create newly inundated areas could increase bioavailability of mercury  
37 (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Increased methylmercury  
38 associated with natural community and floodplain restoration may indirectly affect white-tailed kite  
39 (see BDCP Appendix 5.D, *Contaminants*). However, the potential mobilization or creation of  
40 methylmercury within the study area varies with site-specific conditions and would need to be  
41 assessed at the project level. *CM12 Methylmercury Management* includes provisions for project-  
42 specific Mercury Management Plans. Site-specific restoration plans that address the creation and  
43 mobilization of mercury, as well as monitoring and adaptive management as described in *CM12*  
44 would be available to address the uncertainty of methylmercury levels in restored tidal marsh and  
45 potential impacts on white-tailed kite.

1 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in  
2 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,  
3 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,  
4 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz  
5 2009). The effect of selenium toxicity differs widely between species and also between age and sex  
6 classes within a species. In addition, the effect of selenium on a species can be confounded by  
7 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith  
8 2009).

9 The primary source of selenium bioaccumulation in birds is through their diet (Ackerman and  
10 Eagles-Smith 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the  
11 trophic level at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At  
12 Kesterson Reservoir in the San Joaquin Valley, selenium concentrations in invertebrates have been  
13 found to be two to six times the levels in rooted plants. Furthermore, bivalves sampled in the San  
14 Francisco Bay contained much higher selenium levels than crustaceans such as copepods (Stewart et  
15 al. 2004). Studies conducted at the Grasslands in Merced County recorded higher selenium levels in  
16 black-necked stilts which feed on aquatic invertebrates than in mallards and pintails, which are  
17 primarily herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which  
18 forage on bivalves) have much higher levels of selenium levels than shorebirds that prey on aquatic  
19 invertebrates (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high  
20 levels of selenium have a higher risk of selenium toxicity.

21 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations  
22 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to  
23 exacerbate bioaccumulation of selenium in avian species, including white-tailed kite. Marsh (tidal  
24 and nontidal) and floodplain restoration have the potential to mobilize selenium, and therefore  
25 increase avian exposure from ingestion of prey items with elevated selenium levels. Thus, BDCP  
26 restoration activities that create newly inundated areas could increase bioavailability of selenium  
27 (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Changes in selenium  
28 concentrations were analyzed in Chapter 8, *Water Quality*, and it was determined that, relative to  
29 Existing Conditions and the No Action Alternative, CM1 would not result in substantial, long-term  
30 increases in selenium concentrations in water in the Delta under any alternative. However, it is  
31 difficult to determine whether the effects of potential increases in selenium bioavailability  
32 associated with restoration-related conservation measures (CM4, CM5) would lead to adverse  
33 effects on white-tailed kite.

34 Because of the uncertainty that exists at this programmatic level of review, there could be a  
35 substantial effect on white-tailed kite from increases in selenium associated with restoration  
36 activities. This effect would be addressed through the implementation of *AMM27 Selenium*  
37 *Management* (BDCP Appendix 3.C, *Avoidance and Minimization Measures*) which would provide  
38 specific tidal habitat restoration design elements to reduce the potential for bioaccumulation of  
39 selenium and its bioavailability in tidal habitats. Furthermore, the effectiveness of selenium  
40 management to reduce selenium concentrations and/or bioaccumulation would be evaluated  
41 separately for each restoration effort as part of design and implementation. This avoidance and  
42 minimization measure would be implemented as part of the tidal habitat restoration design  
43 schedule.

44 **NEPA Effects:** Noise and visual disturbances from the construction of water conveyance facilities  
45 could reduce white-tailed kite use of modeled habitat adjacent to work areas. Moreover, operation

1 and maintenance of the water conveyance facilities, including the transmission facilities, could result  
2 in ongoing but periodic postconstruction disturbances that could affect white-tailed kite use of the  
3 surrounding habitat. Noise, potential spills of hazardous materials, increased dust and  
4 sedimentation, and operations and maintenance of the water conveyance facilities under Alternative  
5 4 would not have an adverse effect on white-tailed kite with the implementation of AMM1–AMM7,  
6 and *AMM18 Swainson’s Hawk and White-Tailed Kite*. Tidal habitat restoration could result in  
7 increased exposure of white-tailed kite to selenium. This effect would be addressed through the  
8 implementation of *AMM27 Selenium Management*, which would provide specific tidal habitat  
9 restoration design elements to reduce the potential for bioaccumulation of selenium and its  
10 bioavailability in tidal habitats. The indirect effects associated with noise and visual disturbances,  
11 potential spills of hazardous material, and increased exposure to selenium from Alternative 4  
12 implementation would not have an adverse effect on white-tailed kite. Tidal habitat restoration is  
13 unlikely to have an adverse effect on white-tailed kite through increased exposure to  
14 methylmercury, as kites currently forage in tidal marshes where elevated methylmercury levels  
15 exist. However, it is unknown what concentrations of methylmercury are harmful to the species and  
16 the potential for increased exposure varies substantially within the study area. Site-specific  
17 restoration plans in addition to monitoring and adaptive management, described in *CM12*  
18 *Methylmercury Management*, would address the uncertainty of methylmercury levels in restored  
19 tidal marsh. The site-specific planning phase of marsh restoration would be the appropriate place to  
20 assess the potential for risk of methylmercury exposure for white-tailed kite, once site specific  
21 sampling and other information could be developed.

22 **CEQA Conclusion:** Noise, the potential for hazardous spills, increased dust and sedimentation, and  
23 operations and maintenance of the water conveyance facilities under Alternative 4 would have a  
24 less-than-significant impact on white-tailed kite with the implementation of *AMM18 Swainson’s*  
25 *Hawk and White-Tailed Kite*, and AMMs1–7. Tidal habitat restoration could result in increased  
26 exposure of white-tailed kite to selenium. This effect would be addressed through the  
27 implementation of *AMM27 Selenium Management*, which would provide specific tidal habitat  
28 restoration design elements to reduce the potential for bioaccumulation of selenium and its  
29 bioavailability in tidal habitats. The implementation of tidal natural communities restoration or  
30 floodplain restoration could result in increased exposure of white-tailed kite to methylmercury.  
31 However, it is unknown what concentrations of methylmercury are harmful to this species. *CM12*  
32 *Methylmercury Management* includes provisions for project-specific Mercury Management Plans.  
33 Site-specific restoration plans that address the creation and mobilization of mercury, as well as  
34 monitoring and adaptive management as described in *CM12*, would better inform potential impacts  
35 and address the uncertainty of methylmercury levels in restored tidal marsh in the study area on  
36 white-tailed kite. With these measures in place, the indirect effects associated with noise and visual  
37 disturbances, potential spills of hazardous material, and increased exposure to selenium from  
38 Alternative 4 implementation would have a less-than-significant impact on white-tailed kite.

39 **Impact BIO-103: Periodic Effects of Inundation of White-Tailed Kite Habitat as a Result of**  
40 **Implementation of Conservation Components**

41 Flooding of the Yolo Bypass from Fremont Weir operations (related to *CM2 Yolo Bypass Fisheries*  
42 *Enhancement*) would increase the frequency and duration of inundation on approximately 48–82  
43 acres of modeled white-tailed kite nesting habitat and 3,030–6,651 acres of modeled white-tailed  
44 kite foraging habitat (Table 12-4-41). During inundation years, affected cultivated lands and  
45 grassland would not be available as foraging habitat until prey populations have re-inhabited

1 inundated areas. This would result in temporary periodic reduction in availability of foraging  
2 habitat. If late-season Fremont Weir operations were to preclude the planting of some crop types,  
3 there could be a further loss of foraging habitat value if the crop type that would have been planted  
4 would provide greater foraging habitat value than the fallowed fields. No known white-tailed kite  
5 nest sites would be affected, and increased periodic flooding is not expected to cause any adverse  
6 effect on nest sites that may be within the inundation area because existing trees already withstand  
7 floods in the area, the increase in inundation frequency and duration is expected to remain within  
8 the range of tolerance of riparian trees, and any nest sites would be located above floodwaters.

9 Based on hypothetical floodplain restoration, CM5 implementation could result in periodic  
10 inundation of up to approximately 230 acres of modeled white-tailed kite nesting habitat and 7,402  
11 acres of modeled white-tailed kite foraging habitat (Table 12-4-41). Inundation of foraging habitat  
12 could result in a periodic reduction of available foraging habitat due to the reduction in available  
13 prey. Following draw-down, inundated habitats are expected to recover and provide suitable  
14 foraging conditions until the following inundation period. Thus, this is considered a periodic impact  
15 that is unlikely to affect white-tailed kite distribution and abundance, or foraging use of the study  
16 area.

17 Periodic inundation of floodplains (through CM2 and CM5) would be expected to restore a more  
18 natural flood regime in support of riparian vegetation types that support white-tailed kite nesting  
19 habitat. No adverse effects of inundation on white-tailed kite riparian habitat are expected because  
20 valley/foothill riparian vegetation is expected to benefit from seasonal inundation.

21 **NEPA Effects:** Although foraging habitat would be periodically unavailable to white-tailed kite  
22 because of CM2 and CM5 implementation, inundated habitats are expected to recover following  
23 draw-down. Any effects are considered short-term and would not result in an adverse effect.

24 **CEQA Conclusion:** Although foraging habitat would be periodically unavailable to white-tailed kite  
25 because of CM2 and CM5 implementation, inundated habitats are expected to recover following  
26 draw-down. Any effects are considered short-term and would be expected to have a less-than-  
27 significant impact on white-tailed kite.

## 28 **Yellow-Breasted Chat**

29 This section describes the effects of Alternative 4, including water conveyance facilities construction  
30 and implementation of other conservation components, on yellow-breasted chat. Yellow-breasted  
31 chat modeled habitat includes suitable nesting and migratory habitat as those plant alliances from  
32 the valley/foothill riparian modeled habitat that contain a shrub component and an overstory  
33 component. Primary nesting and migratory habitat is qualitatively distinguished from secondary  
34 habitat in Delta areas as those plant associations that support a greater percentage of a suitable  
35 shrub cover, particularly blackberry, and California wild rose, and have an open to moderately dense  
36 overstory canopy, using data from Hickson and Keeler-Wolf (2007). No distinction is made between  
37 primary and secondary habitat for Suisun Marsh/Yolo Basin habitats because supporting  
38 information is lacking.

39 Construction and restoration associated with Alternative 4 conservation measures would result in  
40 both temporary and permanent losses of yellow-breasted chat modeled habitat as indicated in Table  
41 12-4-42. Full implementation of Alternative 4 would also include the following conservation actions  
42 over the term of the BDCP to benefit the yellow-breasted chat (BDCP Chapter 3, Section 3.3,  
43 *Biological Goals and Objectives*).

- 1       • Restore or create at least 5,000 acres of valley/foothill riparian natural community, with at least  
2       3,000 acres occurring on restored seasonally inundated floodplain (Objective VFRNC1.1,  
3       associated with CM7).
- 4       • Protect at least 750 acres of existing valley/foothill riparian natural community in CZ 7 by year  
5       10 (Objective VFRNC1.2, associated with CM3).
- 6       • Restore, maintain and enhance structural heterogeneity with adequate vertical and horizontal  
7       overlap among vegetation components and over adjacent riverine channels, freshwater  
8       emergent wetlands, and grasslands (Objective VFRNC2.1, associated with CM7).
- 9       • Maintain at least 1,000 acres of early- to mid-successional vegetation with a well-developed  
10       understory of dense shrubs on restored seasonally inundated floodplain (Objective VFRNC2.2,  
11       associated with CM7).

12       As explained below, with the restoration or protection of these amounts of habitat, in addition to  
13       management activities that would enhance these natural communities for the species and  
14       implementation of AMM1–AMM7 and AMM22 *Suisun Song Sparrow*, *Yellow-Breasted Chat*, *Least*  
15       *Bell's Vireo*, *Western Yellow-Billed Cuckoo*, impacts on yellow-breasted chat would not be adverse for  
16       NEPA purposes and would be less than significant for CEQA purposes.

1  
2

**Table 12-4-42. Changes in Yellow-Breasted Chat Modeled Habitat Associated with Alternative 4 (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Nesting and Migratory Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	Primary	17	17	6	6	NA	NA
	Secondary	11	11	17	17	NA	NA
	Suisun Marsh/ Upper Yolo Bypass	0	0	0	0	NA	NA
<b>Total Impacts CM1</b>		<b>28</b>	<b>28</b>	<b>23</b>	<b>23</b>		
CM2-CM18	Primary	96	214	58	73	19-38	92
	Secondary	209	357	0	6	6-18	56
	Suisun Marsh/ Upper Yolo Bypass	76	85	29	29	23-32	0
<b>Total Impacts CM2-CM18</b>		<b>381</b>	<b>656</b>	<b>87</b>	<b>102</b>	<b>48-88</b>	<b>148</b>
<b>Total Primary</b>		<b>113</b>	<b>231</b>	<b>64</b>	<b>79</b>	19-38	92
<b>Total Secondary</b>		<b>220</b>	<b>368</b>	<b>17</b>	<b>23</b>	6-18	56
<b>Total Suisun Marsh/Upper Yolo Bypass</b>		<b>76</b>	<b>85</b>	<b>29</b>	<b>29</b>	23-32	0
<b>TOTAL IMPACTS</b>		<b>409</b>	<b>684</b>	<b>110</b>	<b>131</b>	<b>48-88</b>	<b>148</b>

<sup>a</sup> See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-104: Loss or Conversion of Habitat for and Direct Mortality of Yellow-Breasted**  
5 **Chat**

6 Alternative 4 conservation measures would result in the combined permanent and temporary loss  
7 of up to 815 acres of modeled nesting and migratory habitat for yellow-breasted chat (684 acres of  
8 permanent loss, 131 acres of temporary loss, Table 12-4-42). Conservation measures that would  
9 result in these losses are conveyance facilities and transmission line construction, and establishment  
10 and use of borrow and spoil areas (CM1), Fremont Weir/Yolo Bypass improvements (CM2), tidal  
11 habitat restoration (CM4), and floodplain restoration (CM5). Habitat enhancement and management  
12 activities (CM11) which include ground disturbance or removal of nonnative vegetation, could result  
13 in local adverse habitat effects. In addition, maintenance activities associated with the long-term  
14 operation of the water conveyance facilities and other BDCP physical facilities could degrade or  
15 eliminate yellow-breasted chat habitat. Each of these individual activities is described below. A

1 summary statement of the combined impacts and NEPA effects, and a CEQA conclusion follow the  
2 individual conservation measure discussions.

3 • *CM1 Water Facilities and Operation*: Construction of Alternative 4 conveyance facilities would  
4 result in the combined permanent and temporary loss of up to 23 acres of primary habitat (17  
5 acres of permanent loss, 6 acres of temporary loss). In addition, 28 acres of secondary habitat  
6 would be removed (11 acres of permanent loss, 17 acres of temporary loss, Table 12-4-42).  
7 Activities that would impact modeled habitat consist of tunnel, forebay, and intake construction,  
8 temporary access roads, and construction of transmission lines. Impacts from CM1 would occur  
9 in the central delta in CZs 3- 6, and 8. This loss would have the potential to displace individuals,  
10 if present, and remove the functions and value of modeled habitat for nesting, protection, or  
11 foraging. There are no occurrences of yellow-breasted chat that overlap with the CM1  
12 construction footprint. The implementation of *AMM22 Suisun Song Sparrow, Yellow-Breasted*  
13 *Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo* (BDCP Appendix 3.C, *Avoidance and*  
14 *Minimization Measures*) would minimize the effects of construction on nesting yellow-breasted  
15 chats if they were to occur in the area. Refer to the Terrestrial Biology Map Book for a detailed  
16 view of Alternative 4 construction locations. Impacts from CM1 would occur within the first 10  
17 years of Alternative 4 implementation.

18 • *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo bypass fisheries enhancement  
19 would permanently remove approximately 83 acres and temporarily remove 88 acres of yellow-  
20 breasted chat habitat in the Yolo Bypass in CZ 2. The loss is expected to occur during the first 10  
21 years of Alternative 4 implementation.

22 • *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and  
23 inundation would permanently remove an estimated 545 acres of modeled yellow-breasted chat  
24 habitat in CZ 1, 2, 6, and 11. This total is composed of an estimated 182 acres of primary nesting  
25 and migratory habitat, 349 acres of secondary nesting and migratory habitat, and 14 acres of  
26 nesting and migratory habitat in the Suisun Marsh and upper Yolo Bypass areas.

27 • *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore  
28 seasonally inundated floodplain would permanently and temporarily remove approximately 49  
29 acres of modeled yellow-breasted chat habitat in CZ 7. This total is comprised of 28 acres of  
30 primary nesting and migratory habitat and 21 acres of secondary nesting and migratory habitat.  
31 Based on the riparian habitat restoration assumptions, approximately 3,000 acres of  
32 valley/foothill riparian habitat would be restored as a component of seasonally inundated  
33 floodplain restoration actions. The actual number of acres that would be restored may differ  
34 from these estimates, depending on how closely the outcome of seasonally inundated floodplain  
35 restoration approximates the assumed outcome. Once this restored riparian vegetation has  
36 developed habitat functions, a portion of it would be suitable to support yellow-breasted chat  
37 habitat.

38 • *CM11 Natural Communities Enhancement and Management*: Habitat protection and management  
39 activities that could be implemented in protected yellow-breasted chat habitats would be  
40 expected to maintain and improve the functions of the habitat over the term of the BDCP.  
41 Yellow-breasted chat would be expected to benefit from the increase in protected habitat, which  
42 would maintain conditions favorable for the chat's use of the study area.

43 Habitat management- and enhancement-related activities could disturb yellow-breasted chat  
44 nests if they are present near work sites. Equipment operation could destroy nests, and noise  
45 and visual disturbances could lead to their abandonment, resulting in mortality of eggs and

1 nestlings. *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-*  
2 *Billed Cuckoo* would ensure that these activities do not result in direct mortality of yellow-  
3 breasted chat or other adverse effects.

4 Occupied habitat would be monitored to determine if there is a need to implement controls on  
5 brood parasites (brown-headed cowbird) or nest predators. If implemented, these actions  
6 would be expected to benefit the yellow-breasted chat by removing a potential stressor that  
7 could, if not addressed, adversely affect the stability of newly established populations.

8 A variety of habitat management actions included in *CM11 Natural Communities Enhancement*  
9 *and Management* that are designed to enhance wildlife values in restored riparian habitats may  
10 result in localized ground disturbances that could temporarily remove small amounts of yellow-  
11 breasted chat habitat. Ground-disturbing activities, such as removal of nonnative vegetation and  
12 road and other infrastructure maintenance activities, are expected to have minor adverse effects  
13 on available yellow-breasted chat habitat and are expected to result in overall improvements to  
14 and maintenance of yellow-breasted chat habitat values over the term of the BDCP.

- 15 ● Operations and Maintenance: Postconstruction operation and maintenance of the above-ground  
16 water conveyance facilities and restoration infrastructure could result in ongoing but periodic  
17 disturbances that could affect least Bell's vireo and yellow warbler use of the surrounding  
18 habitat. Maintenance activities would include vegetation management, levee and structure  
19 repair, and re-grading of roads and permanent work areas. These effects, however, would be  
20 reduced by AMMs and conservation actions as described below.
- 21 ● Injury and Direct Mortality: Construction is not expected to result in direct mortality of yellow-  
22 breasted chat because adults and fledged young are expected to occur only in very small  
23 numbers and, if present, would avoid contact with construction and other equipment. If yellow-  
24 breasted chat were to nest in the vicinity of construction activities, equipment operation could  
25 destroy nests and noise and visual disturbances could lead to nest abandonment. *AMM22 Suisun*  
26 *Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo* would avoid  
27 and minimize this effect.
- 28 ● Permanent and temporary habitat losses from the above CMs, would primarily consist of small,  
29 fragmented riparian stands in CZ 2–CZ 8 that do not provide high-value habitat for the species.  
30 Temporarily affected areas would be restored as riparian habitat within 1 year following  
31 completion of construction activities. Although the effects are considered temporary, the  
32 restored riparian habitat would require 5 years to several decades, for ecological succession to  
33 occur and for restored riparian habitat to functionally replace habitat that has been affected. The  
34 majority of the riparian vegetation to be temporarily removed is early- to mid-successional;  
35 therefore, the replaced riparian vegetation would be expected to have structural components  
36 comparable to the temporarily removed vegetation within the first 5 to 10 years after the initial  
37 restoration activities are complete.

38 The following paragraphs summarize the combined effects discussed above and describe other  
39 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also  
40 included.

#### 41 ***Near-Term Timeframe***

42 Because the water conveyance facilities construction is being evaluated at the project level, the near-  
43 term BDCP conservation strategy has been evaluated to determine whether it would provide

1 sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that the  
2 effects of construction would not be adverse under NEPA. Alternative 4 would remove 519 acres of  
3 modeled habitat for yellow-breasted chat in the study area in the near-term. These effects would  
4 result from the construction of the water conveyance facilities (CM1, 51 acres of modeled nesting  
5 and migratory habitat), and implementing other conservation measures (*CM2 Yolo Bypass Fisheries*  
6 *Enhancement*, *CM4 Tidal Natural Communities Restoration*, and *CM5 Seasonally Inundated Floodplain*  
7 *Restoration*—468 acres of modeled nesting and migratory habitat). These habitat losses would  
8 primarily consist of small, fragmented riparian stands in CZ 2-CZ 8 that do not provide high-value  
9 habitat for the species.

10 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by  
11 CM1 and that are identified in the biological goals and objectives for yellow-breasted chat in Chapter  
12 3 of the BDCP would be 1:1 for restoration/creation and 1:1 protection of valley/foothill riparian  
13 habitat. Using these ratios would indicate that 51 acres of valley/foothill riparian habitat should be  
14 restored/created and 51 acres should be protected to compensate for the CM1 losses of yellow-  
15 breasted chat habitat. The near-term effects of other conservation actions would remove 468 acres  
16 of modeled habitat, and therefore require 468 acres of restoration and 468 acres of protection of  
17 valley/foothill riparian using the same typical NEPA and CEQA ratios (1:1 for restoration and 1:1 for  
18 protection).

19 The BDCP has committed to near-term goals of protecting 750 acres and restoring 800 acres of the  
20 valley/foothill riparian natural community in the study area (Table 3-4 in Chapter 3, *Description of*  
21 *Alternatives*). These conservation actions are associated with CM3 and CM7 and would occur in the  
22 same timeframe as the construction and early restoration losses, thereby avoiding adverse effects of  
23 habitat loss on yellow-breasted chat. The majority of the riparian restoration acres would occur in  
24 CZ 7 as part of a reserve system with extensive wide bands or large patches of valley/foothill  
25 riparian natural community (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation*  
26 *Strategy*). Goals and objectives in the Plan for riparian restoration also include the restoration,  
27 maintenance and enhancement of structural heterogeneity with adequate vertical and horizontal  
28 overlap among vegetation components and over adjacent riverine channels, freshwater emergent  
29 wetlands, and grasslands (Objective VFRNC2.1). The yellow-breasted chat has specific structural  
30 habitat requirements, so only the early- to mid-successional portions of the restored and protected  
31 riparian natural would be expected to provide suitable habitat characteristics for the species. These  
32 natural community biological goals and objectives would inform the near-term protection and  
33 restoration efforts and represent performance standards for considering the effectiveness of  
34 conservation actions for the species.

35 The acres of protection contained in the near-term Plan goals and the additional detail in the  
36 biological objectives for yellow-breasted chat satisfy the typical mitigation ratios that would be  
37 applied to the project-level effects of CM1, as well as mitigate the near-term effects of the other  
38 conservation measures. The restored riparian habitat could require 5 years to several decades, for  
39 ecological succession to occur and for restored riparian habitat to functionally replace habitat that  
40 has been affected. However, because the modeled habitat impacted largely consists of small patches  
41 of blackberry, willow, and riparian scrub, BDCP actions would not be expected to have an adverse  
42 population-level effect on the species in the near-term time period.

43 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
44 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
45 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*

1 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
2 *Material, AMM7 Barge Operations Plan, and AMM22 Suisun Song Sparrow, Yellow-Breasted Chat,*  
3 *Least Bell's Vireo, Western Yellow-Billed Cuckoo.* All of these AMMs include elements that would  
4 avoid or minimize the risk of affecting individuals and species habitats adjacent to work areas and  
5 storage sites. The AMMs are described in detail in BDCP Appendix 3.C, *Avoidance and Minimization*  
6 *Measures.*

### 7 **Late Long-Term Timeframe**

8 The habitat model indicates that the study area supports approximately 14,547 acres of modeled  
9 nesting and migratory habitat for yellow-breasted chat. Alternative 4 as a whole would result in the  
10 permanent loss of and temporary effects on 815 acres of modeled habitat (6% of the modeled  
11 habitat in the study area). These losses would occur from the construction of the water conveyance  
12 facilities (CM1) and from *CM2 Yolo Bypass Fisheries Enhancement, CM4 Tidal Natural Communities*  
13 *Restoration, and CM5 Seasonally Inundated Floodplain Restoration.* The locations of these losses  
14 would be in fragmented riparian habitat throughout the study area.

15 The Plan includes conservation commitments through *CM7 Riparian Natural Community Restoration*  
16 and *CM3 Natural Communities Protection and Restoration* to restore or create at least 5,000 acres  
17 and protect at least 750 acres of valley/foothill riparian woodland. Of the 5,000 acres of restored  
18 riparian natural communities, a minimum of 3,000 acres of valley/foothill riparian would be  
19 restored within the seasonally inundated floodplain, and 1,000 acres would be managed as dense  
20 early to mid-successional riparian forest (Objectives VFRNC1.1 and VFRNC1.2). The yellow-breasted  
21 chat has specific structural habitat requirements, so only the early- to mid-successional portions of  
22 the restored and protected riparian natural would be expected to provide suitable habitat  
23 characteristics for the species. Fluvial disturbance in restored riparian floodplains would help to  
24 maintain early- to mid-successional vegetation. The resulting riparian systems would be subject to  
25 natural erosion and deposition, which would provide conditions conducive to the establishment of  
26 dense willow stands that are preferred by yellow-breasted chat for nesting. In addition, if  
27 monitoring determined that cowbird parasitism was having an effect on the yellow-breasted  
28 population in the study area, a cowbird control program would be implemented through *CM11*  
29 *Natural Communities Enhancement and Management.* Goals and objectives in the Plan for riparian  
30 restoration also include the maintenance and enhancement of structural heterogeneity (Objective  
31 VFRNC2.1) which would provide suitable habitat for yellow-breasted chat.

32 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*  
33 *Plant Species*) estimates that the restoration and protection actions discussed above could result in  
34 the restoration of 2,683 acres and the protection of 594 acres of habitat for the yellow-breasted  
35 chat.

36 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*  
37 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*  
38 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
39 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
40 *Material, AMM7 Barge Operations Plan, and AMM22 Suisun Song Sparrow, Yellow-Breasted Chat,*  
41 *Least Bell's Vireo, Western Yellow-Billed Cuckoo.* All of these AMMs include elements that would  
42 avoid or minimize the risk of affecting individuals and species habitats adjacent to work areas and  
43 storage sites. The AMMs are described in detail in BDCP Appendix 3.C, *Avoidance and Minimization*  
44 *Measures.*

1 **NEPA Effects:** The loss of yellow-breasted chat habitat and potential direct mortality of this special-  
2 status species would represent an adverse effect in the absence of other conservation actions. The  
3 restored riparian habitat would require 5 years to several decades, for ecological succession to  
4 occur and for restored riparian habitat to functionally replace habitat that has been affected.  
5 However, the habitat that would be lost consists of small, fragmented riparian stands that would not  
6 provide high-value habitat for the species. And because the nesting and migratory habitat that  
7 would be lost is small relative to the species' range throughout California and North America,  
8 Alternative 4 actions would not be expected to have an adverse population-level effect on the  
9 species. With habitat protection and restoration associated with CM3, CM7, and CM11, guided by  
10 biological goals and objectives and by *AMM1 Worker Awareness Training, AMM2 Construction Best*  
11 *Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention Plan, AMM4 Erosion*  
12 *and Sediment Control Plan, AMM5 Spill Prevention, Containment, and Countermeasure Plan, AMM6*  
13 *Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged Material, AMM7 Barge*  
14 *Operations Plan, and AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western*  
15 *Yellow-Billed Cuckoo*, which would be in place throughout the construction period, the effects of  
16 habitat loss and potential mortality on yellow-breasted chat under Alternative 4 would not be  
17 adverse.

18 **CEQA Conclusion:**

19 **Near-Term Timeframe**

20 Because the water conveyance facilities construction is being evaluated at the project level, the near-  
21 term BDCP conservation strategy has been evaluated to determine whether it would provide  
22 sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that the  
23 impact of construction would be less than significant under CEQA. Alternative 4 would remove 519  
24 acres of modeled habitat for yellow-breasted chat in the study area in the near-term. These effects  
25 would result from the construction of the water conveyance facilities (CM1, 51 acres of modeled  
26 nesting and migratory habitat), and implementing other conservation measures (*CM2 Yolo Bypass*  
27 *Fisheries Enhancement, CM4 Tidal Natural Communities Restoration, and CM5 Seasonally Inundated*  
28 *Floodplain Restoration*—468 acres of modeled nesting and migratory habitat). These habitat losses  
29 would primarily consist of small, fragmented riparian stands in CZ 2-CZ 8 that do not provide high-  
30 value habitat for the species.

31 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by  
32 CM1 and that are identified in the biological goals and objectives for yellow-breasted chat in Chapter  
33 3 of the BDCP would be 1:1 for restoration/creation and 1:1 protection of valley/foothill riparian  
34 habitat. Using these ratios would indicate that 51 acres of valley/foothill riparian habitat should be  
35 restored/created and 51 acres should be protected to mitigate the CM1 losses of yellow-breasted  
36 chat habitat. The near-term effects of other conservation actions would remove 468 acres of  
37 modeled habitat, and therefore require 468 acres of restoration and 468 acres of protection of  
38 valley/foothill riparian using the same typical NEPA and CEQA ratios (1:1 for restoration and 1:1 for  
39 protection).

40 The BDCP has committed to near-term goals of protecting 750 acres and restoring 800 acres of the  
41 valley/foothill riparian natural community in the study area (Table 3-4 in Chapter 3, *Description of*  
42 *Alternatives*). These conservation actions are associated with CM3 and CM7 and would occur in the  
43 same timeframe as the construction and early restoration losses, thereby avoiding adverse effects of  
44 habitat loss on yellow-breasted chat. The majority of the riparian restoration acres would occur in

1 CZ 7 as part of a reserve system with extensive wide bands or large patches of valley/foothill  
2 riparian natural community (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation*  
3 *Strategy*). Goals and objectives in the Plan for riparian restoration also include the restoration,  
4 maintenance and enhancement of structural heterogeneity with adequate vertical and horizontal  
5 overlap among vegetation components and over adjacent riverine channels, freshwater emergent  
6 wetlands, and grasslands (Objective VFRNC2.1). The yellow-breasted chat has specific structural  
7 habitat requirements, so only the early- to mid-successional portions of the restored and protected  
8 riparian natural would be expected to provide suitable habitat characteristics for the species. These  
9 natural community biological goals and objectives would inform the near-term protection and  
10 restoration efforts and represent performance standards for considering the effectiveness of  
11 conservation actions for the species.

12 The acres of protection contained in the near-term Plan goals and the additional detail in the  
13 biological objectives for yellow-breasted chat satisfy the typical mitigation ratios that would be  
14 applied to the project-level effects of CM1, as well as mitigate the near-term effects of the other  
15 conservation measures. The restored riparian habitat could require 5 years to several decades, for  
16 ecological succession to occur and for restored riparian habitat to functionally replace habitat that  
17 has been affected. However, because the modeled habitat impacted largely consists of small patches  
18 of blackberry, willow, and riparian scrub, BDCP actions would be expected to have a less-than-  
19 significant population-level impact on the species in the near-term time period.

20 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
21 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
22 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
23 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
24 *Material Attachment 5J.C, Analysis of Potential Bird Collisions at Proposed BDCP Powerlines*, *AMM7*  
25 *Barge Operations Plan*, and *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo,*  
26 *Western Yellow-Billed Cuckoo*. All of these AMMs include elements that would avoid or minimize the  
27 risk of affecting individuals and species habitats adjacent to work areas and storage sites. The AMMs  
28 are described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

### 29 **Late Long-Term Timeframe**

30 The habitat model indicates that the study area supports approximately 14,547 acres of modeled  
31 nesting and migratory habitat for yellow-breasted chat. Alternative 4 as a whole would result in the  
32 permanent loss of and temporary effects on 815 acres of modeled habitat (6% of the modeled  
33 habitat in the study area). These losses would occur from the construction of the water conveyance  
34 facilities (CM1) and from *CM2 Yolo Bypass Fisheries Enhancement*, *CM4 Tidal Natural Communities*  
35 *Restoration*, and *CM5 Seasonally Inundated Floodplain Restoration*. The locations of these losses  
36 would be in fragmented riparian habitat throughout the study area.

37 The Plan includes conservation commitments through *CM7 Riparian Natural Community Restoration*  
38 and *CM3 Natural Communities Protection and Restoration* to restore or create at least 5,000 acres  
39 and protect at least 750 acres of valley/foothill riparian woodland. Of the 5,000 acres of restored  
40 riparian natural communities, a minimum of 3,000 acres of valley/foothill riparian would be  
41 restored within the seasonally inundated floodplain, and 1,000 acres would be managed as dense  
42 early to mid-successional riparian forest (Objectives VFRNC1.1 and VFRNC1.2). The yellow-breasted  
43 chat has specific structural habitat requirements, so only the early- to mid-successional portions of  
44 the restored and protected riparian natural would be expected to provide suitable habitat

1 characteristics for the species. Fluvial disturbance in restored riparian floodplains would help to  
2 maintain early- to mid-successional vegetation. The resulting riparian systems would be subject to  
3 natural erosion and deposition, which would provide conditions conducive to the establishment of  
4 dense willow stands that are preferred by yellow-breasted chat for nesting. In addition, if  
5 monitoring determined that cowbird parasitism was having an effect on the yellow-breasted  
6 population in the study area, a cowbird control program would be implemented through *CM11*  
7 *Natural Communities Enhancement and Management*. Goals and objectives in the Plan for riparian  
8 restoration also include the maintenance and enhancement of structural heterogeneity (Objective  
9 VFRNC2.1) which would provide suitable habitat for yellow-breasted chat.

10 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*  
11 *Plant Species*) estimates that the restoration and protection actions discussed above could result in  
12 the restoration of 2,683 acres and the protection of 594 acres of habitat for the yellow-breasted  
13 chat.

14 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
15 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
16 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
17 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
18 *Material*, *AMM7 Barge Operations Plan*, and *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat,*  
19 *Least Bell's Vireo, Western Yellow-Billed Cuckoo*. All of these AMMs include elements that would  
20 avoid or minimize the risk of affecting individuals and species habitats adjacent to work areas and  
21 storage sites. The AMMs are described in detail in BDCP Appendix 3.C, *Avoidance and Minimization*  
22 *Measures*.

23 Considering Alternative 4's protection and restoration provisions, which would provide acreages of  
24 new or enhanced habitat in amounts suitable to compensate for habitats lost to construction and  
25 restoration activities, and with implementation of AMM1–AMM7 and *AMM22 Suisun Song Sparrow,*  
26 *Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo*, the loss of habitat or direct  
27 mortality through implementation of Alternative 4 would not result in a substantial adverse effect  
28 through habitat modifications and would not substantially reduce the number or restrict the range  
29 of the species. Therefore, the loss of habitat or potential mortality under this alternative would have  
30 a less-than-significant impact on yellow-breasted chat.

### 31 **Impact BIO-105: Fragmentation of Yellow-Breasted Chat Habitat as a Result of Constructing** 32 **the Water Conveyance Facilities**

33 Grading, filling, contouring, and other initial ground-disturbing activities for water conveyance  
34 facilities construction may temporarily fragment modeled yellow-breasted chat habitat. This could  
35 temporarily reduce the extent of and functions supported by the affected habitat. Because of the  
36 current infrequent occurrence and small numbers of yellow-breasted chat in the Plan Area, and  
37 because *CM5 Seasonally Inundated Floodplain Restoration* would restore and protect contiguous  
38 high-value riparian habitat in CZ 7, any such habitat fragmentation is expected to have no or  
39 minimal effect on the species.

40 **NEPA Effects:** Temporary fragmentation of habitat would not result in an adverse effect on yellow-  
41 breasted chat. The habitat functions for the species would be significantly improved through the  
42 implementation of *CM5*, which would restore and protect large contiguous patches of riparian  
43 habitat.

1 **CEQA Conclusion:** Temporary fragmentation of habitat would have a less-than-significant impact on  
2 yellow-breasted chat. The habitat functions for the species would be significantly improved through  
3 the implementation of CM5, which would restore and protect large contiguous patches of riparian  
4 habitat.

5 **Impact BIO-106: Effects on Yellow-Breasted Chat Associated with Electrical Transmission**  
6 **Facilities**

7 New transmission lines would increase the risk for bird-power line strikes, which could result in  
8 injury or mortality of western yellow-billed cuckoo. Yellow-breasted chats are migratory and  
9 usually arrive at California breeding grounds in April from their wintering grounds in Mexico and  
10 Guatemala. Departure for wintering grounds occurs from August to September. These are periods of  
11 relative high visibility when the risk of powerline collisions will be low. The species' small, relatively  
12 maneuverable body; its foraging behavior; and its presence in the Plan Area during the summer  
13 contribute to a low risk of collision with the proposed transmission lines (BDCP Attachment 5.J-2,  
14 *Memorandum: Analysis of Potential Bird Collisions at Proposed BDCP Transmission Lines*). New  
15 transmission lines would therefore not be expected to have an adverse effect on yellow-breasted  
16 chat.

17 **NEPA Effects:** The construction and presence of new transmission lines would not result in an  
18 adverse effect on yellow-breasted chat because the risk of bird strike is considered to be minimal  
19 based on the species' small, relatively maneuverable body; its foraging behavior; and its presence in  
20 the Plan Area during the summer during periods of high visibility.

21 **CEQA Conclusion:** The construction and presence of new transmission lines would have a less-than-  
22 significant impact on yellow-breasted chat because the risk of bird strike is considered to be  
23 minimal based on the species' small, relatively maneuverable body; its foraging behavior; and its  
24 presence in the Plan Area during the summer during periods of high visibility.

25 **Impact BIO-107: Indirect Effects of Plan Implementation on Yellow-Breasted Chat**

26 Noise and visual disturbances associated with construction-related activities could result in  
27 temporary disturbances that affect yellow-breasted chat use of modeled habitat adjacent to  
28 proposed construction areas. Construction noise above background noise levels (greater than 50  
29 dBA) could extend 500 to 5,250 feet from the edge of construction activities (BDCP Appendix 5.J,  
30 Attachment 5J.D, *Indirect Effects of the Construction of the BDCP Conveyance Facility on Sandhill*  
31 *Crane*, Table 4), although there are no available data to determine the extent to which these noise  
32 levels could affect yellow-breasted chat. Indirect effects associated with construction include noise,  
33 dust, and visual disturbance caused by grading, filling, contouring, and other ground-disturbing  
34 operations outside the project footprint but within 1,300 feet from the construction edge. If yellow-  
35 breasted chat were to nest in or adjacent to work areas, construction and subsequent maintenance-  
36 related noise and visual disturbances could mask calls, disrupt foraging and nesting behaviors, and  
37 reduce the functions of suitable nesting habitat for these species. These potential effects would be  
38 minimized with incorporation of *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's*  
39 *Vireo, Western Yellow-Billed Cuckoo* into the BDCP, which would ensure 250 foot no-disturbance  
40 buffers were established around active nests. The use of mechanical equipment during water  
41 conveyance facilities construction could cause the accidental release of petroleum or other  
42 contaminants that could affect yellow-breasted chat in the surrounding habitat. The inadvertent  
43 discharge of sediment or excessive dust adjacent to yellow-breasted chat habitat could also affect

1 the species. AMM1–AMM7, including *AMM2 Construction Best Management Practices and Monitoring*,  
2 in addition to *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-*  
3 *Billed Cuckoo* would minimize the likelihood of such spills from occurring and ensure that measures  
4 were in place to prevent runoff from the construction area and any adverse effects of dust on active  
5 nests. If present, yellow-breasted chat individuals could be temporarily affected by noise and visual  
6 disturbances adjacent to water conveyance construction sites, reducing the use of an estimated 59  
7 acres of modeled primary nesting and migratory habitat and 119 acres of secondary nesting and  
8 migratory habitat. *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western*  
9 *Yellow-Billed Cuckoo* would avoid and minimize this effect on the species.

10 **NEPA Effects:** The potential for noise and visual disturbance, hazardous spills, increased dust and  
11 sedimentation, and the potential impacts of operations and maintenance of the water conveyance  
12 facilities would not result in an adverse effect on yellow-breasted chat with the incorporation of  
13 AMM1–AMM7, and *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western*  
14 *Yellow-Billed Cuckoo* into the BDCP.

15 **CEQA Conclusion:** The potential for noise and visual disturbance, hazardous spills, increased dust  
16 and sedimentation, and the potential impacts of operations and maintenance of the water  
17 conveyance facilities would have a less-than-significant impact on yellow-breasted chat with the  
18 incorporation of AMM1–AMM7, and *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's*  
19 *Vireo, Western Yellow-Billed Cuckoo* into the BDCP.

#### 20 **Impact BIO-108: Periodic Effects of Inundation of Yellow-Breasted Chat Habitat as a Result of** 21 **Implementation of Conservation Components**

22 Flooding of the Yolo Bypass from Fremont Weir operations (CM2) would increase the frequency and  
23 duration of inundation of approximately 48–88 acres of modeled yellow-breasted chat nesting and  
24 migratory habitat. No adverse effects of increased inundation frequency on yellow-breasted chat or  
25 its habitat are expected because the chat breeding period is outside the period the weir would be  
26 operated. Moreover, riparian vegetation supporting habitat has persisted under the existing Yolo  
27 Bypass flooding regime, and changes to frequency and inundation would be within the tolerance of  
28 these vegetation types.

29 Based on hypothetical floodplain restoration, CM5 could result in periodic inundation of up to 148  
30 acres of modeled yellow-breasted chat habitat. Inundation of restored floodplains is not expected to  
31 affect yellow-breasted chat or its habitat because the chat breeding period is outside the period the  
32 floodplains would likely be inundated. In addition, providing for periodic inundation of floodplains  
33 is expected to restore a more natural flood regime in support of riparian vegetation types that  
34 provide nesting and migratory habitat for yellow-breasted chat. The overall effect of seasonal  
35 inundation in existing riparian natural communities is likely to be beneficial because, historically,  
36 flooding was the main natural disturbance regulating ecological processes in riparian areas, and  
37 flooding promotes the germination and establishment of many native riparian plants.

38 **NEPA Effects:** Increases in the frequency and duration of Yolo Bypass flooding and CM5 floodplain  
39 restoration would be expected to create more natural flood regimes that would support riparian  
40 habitat, which would not result in a beneficial effect on yellow breasted chat.

41 **CEQA Conclusion:** By creating more natural flood regimes that would support riparian habitat,  
42 increases in the frequency and duration of Yolo Bypass flooding and CM5 floodplain restoration  
43 would have a beneficial impact on yellow breasted chat.

1 **Cooper's Hawk and Osprey**

2 This section describes the effects of Alternative 4, including water conveyance facilities construction  
3 and implementation of other conservation components, on Cooper's hawk and osprey. Although  
4 osprey often nest on manmade structures such as telephone poles, and Cooper's hawk will nest in  
5 more developed landscapes, modeled nesting habitat for these species is restricted to valley/foothill  
6 riparian forest.

7 Construction and restoration associated with Alternative 4 conservation measures would result in  
8 both temporary and permanent losses of Cooper's hawk and osprey modeled habitat as indicated in  
9 Table 12-4-43. The majority of the losses would take place over an extended period of time as tidal  
10 marsh is restored in the study area. Although restoration for the loss of nesting habitat would be  
11 initiated in the same timeframe as the losses, it could take one or more decades for restored habitats  
12 to replace the functions of habitat lost. This time lag between impacts and restoration of habitat  
13 function would be minimized by specific requirements of *AMM18 Swainson's Hawk and White-Tailed*  
14 *Kite*, including the planting of mature trees in the near-term time period. Full implementation of  
15 Alternative 4 would include the following conservation actions over the term of the BDCP which  
16 would also benefit Cooper's hawk and osprey (BDCP Chapter 3, Section 3.3, *Biological Goals and*  
17 *Objectives*).

- 18 ● Restore or create at least 5,000 acres of valley/foothill riparian natural community, with at least  
19 3,000 acres occurring on restored seasonally inundated floodplain (Objective VFRNC1.1,  
20 associated with CM7)
- 21 ● Protect at least 750 acres of existing valley/foothill riparian natural community in CZ 7 by year  
22 10 (Objective VFRNC1.2, associated with CM3).
- 23 ● Plant and maintain native trees along roadsides and field borders within protected cultivated  
24 lands at a rate of one tree per 10 acres (Objective SH2.1, associated with CM11).
- 25 ● Maintain and protect the small patches of important wildlife habitats associated with cultivated  
26 lands within the reserve system including isolated valley oak trees, trees and shrubs along field  
27 borders and roadsides, remnant groves, riparian corridors, water conveyance channels,  
28 grasslands, ponds, and wetlands (Objective CLNC1.3, associated with CM3 and CM11).

29 As explained below, with the acres of restoration or protection included in the Plan, in addition to  
30 management activities to enhance natural communities for species and implementation of AMM1-  
31 AMM7, *AMM18 Swainson's Hawk and White-Tailed Kite*, and Mitigation Measure BIO-75, impacts on  
32 Cooper's hawk and osprey would not be adverse for NEPA purposes and would be less than  
33 significant for CEQA purposes.

1 **Table 12-4-43. Changes in Cooper’s Hawk and Osprey Modeled Habitat Associated with**  
2 **Alternative 4 (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	Nesting	26	26	23	23	NA	NA
<b>Total Impacts CM1</b>		<b>26</b>	<b>26</b>	<b>23</b>	<b>23</b>		
CM2–CM18	Nesting	312	507	88	121	48-82	230
<b>Total Impacts CM2–CM18</b>		<b>312</b>	<b>507</b>	<b>88</b>	<b>121</b>	<b>48-82</b>	<b>230</b>
<b>TOTAL IMPACTS</b>		<b>338</b>	<b>533</b>	<b>111</b>	<b>144</b>	<b>48-82</b>	<b>230</b>

<sup>a</sup> See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-109: Loss or Conversion of Habitat for and Direct Mortality of Cooper’s Hawk and**  
5 **Osprey**

6 Alternative 4 conservation measures would result in the combined permanent and temporary loss  
7 of up to 677 acres of modeled nesting habitat for Cooper’s hawk and osprey (Table 12-4-43).  
8 Conservation measures that would result in these losses are Water Facilities and Operation (CM1)  
9 (which would involve construction of conveyance facilities and transmission lines and  
10 establishment and use of borrow and spoil areas), Yolo Bypass Fisheries Enhancement (CM2), Tidal  
11 Natural Communities Restoration (CM4), and Seasonally Inundated Floodplain Restoration (CM5).  
12 Habitat enhancement and management activities (CM11), which would include ground disturbance  
13 or removal of nonnative vegetation, could result in local adverse habitat effects. In addition,  
14 maintenance activities associated with the long-term operation of the water conveyance facilities  
15 and other BDCP physical facilities could affect Cooper’s hawk and osprey modeled habitat. Each of  
16 these individual activities is described below. A summary statement of the combined impacts and  
17 NEPA and CEQA conclusions follows the individual conservation measure discussions.

- 18 • *CM1 Water Facilities and Operation*: Construction of Alternative 4 water conveyance facilities  
19 would result in the combined permanent and temporary loss of up to 49 acres of modeled  
20 Cooper’s hawk and osprey habitat (Table 12-4-43). Of the 49 acres of modeled habitat that  
21 would be removed for the construction of the conveyance facilities, 26 acres would be a  
22 permanent loss and 23 acres would be a temporary loss of habitat. This loss would have the  
23 potential to displace individuals, if present, and remove the functions and value of potentially  
24 suitable habitat. Activities that would impact modeled habitat consist of tunnel, forebay, and  
25 intake construction, temporary access roads, and construction of transmission lines. Impacts  
26 from CM1 would occur in the central delta in CZ 3, CZ 4, CZ 5, CZ 6, and CZ 8. There are no

1 occurrences of Cooper's hawk or osprey that overlap with the construction footprint for CM1.  
2 However, Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid*  
3 *Disturbance of Nesting Birds*, would be available to minimize impacts on Cooper's hawk and  
4 osprey if they were to nest in the vicinity of construction activities. Refer to the Terrestrial  
5 Biology Map Book for a detailed view of Alternative 4 construction locations. Impacts from CM1  
6 would occur within the first 10 years of Plan implementation.

- 7 ● *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo Bypass fisheries enhancement  
8 would result in the combined permanent and temporary loss of up to 170 acres of Cooper's  
9 hawk and osprey nesting habitat (82 acres of permanent loss, 88 acres of temporary loss) in the  
10 Yolo Bypass in CZ 2. Activities through CM2 could involve excavation and grading in  
11 valley/foothill riparian areas to improve passage of fish through the bypasses. Most of the  
12 riparian losses would occur at the north end of Yolo Bypass where major fish passage  
13 improvements are planned. Excavation to improve water movement in the Toe Drain and in the  
14 Sacramento Weir would also remove potential Cooper's hawk and osprey habitat. The loss is  
15 expected to occur during the first 10 years of Alternative 4 implementation.
- 16 ● *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration could permanently  
17 remove up to 383 acres of potential Cooper's hawk and osprey nesting habitat. Trees would not  
18 be actively removed but tree mortality would be expected over time as areas became tidally  
19 inundated.
- 20 ● *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore  
21 seasonally inundated floodplain and riparian restoration actions would remove approximately  
22 75 acres of Cooper's hawk and osprey nesting habitat (42 acres of permanent loss, 33 acres of  
23 temporary loss). These losses would be expected after the first 10 years of Alternative 4  
24 implementation along the San Joaquin River and other major waterways in CZ 7.
- 25 ● *CM11 Natural Communities Enhancement and Management*: Habitat management- and  
26 enhancement-related activities could disturb Cooper's hawk and osprey nests if they were  
27 present near work sites. A variety of habitat management actions included in CM11 that are  
28 designed to enhance wildlife values in BDCP-protected habitats may result in localized ground  
29 disturbances that could temporarily remove small amounts of Cooper's hawk and osprey habitat  
30 and reduce the functions of habitat until restoration is complete. Ground-disturbing activities,  
31 such as removal of nonnative vegetation and road and other infrastructure maintenance, are  
32 expected to have minor effects on available Cooper's hawk and osprey habitat and are expected  
33 to result in overall improvements to and maintenance of habitat values over the term of the  
34 BDCP. These effects cannot be quantified, but are expected to be minimal and would be avoided  
35 and minimized by the AMMs listed below.

36 Permanent and temporary habitat losses from the above conservation measures would  
37 primarily consist of fragmented riparian stands. Temporarily affected areas would be restored  
38 as riparian habitat within 1 year following completion of construction activities. Although the  
39 effects are considered temporary, the restored riparian habitat would require 1 to several  
40 decades to functionally replace habitat that has been affected and for trees to attain sufficient  
41 size and structure suitable for nesting by Cooper's hawk or osprey. *AMM18 Swainson's Hawk and*  
42 *White-Tailed Kite* contains actions described below to reduce the effect of temporal loss of  
43 nesting habitat, including the transplanting of mature trees.

- 44 ● *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground  
45 water conveyance facilities and restoration infrastructure could result in ongoing but periodic

1 disturbances that could affect Cooper's hawk or osprey use of the surrounding habitat.  
2 Maintenance activities would include vegetation management, levee and structure repair, and  
3 re-grading of roads and permanent work areas. These effects, however, would be reduced by  
4 AMM1-AMM7 and conservation actions as described below.

- 5 • Injury and Direct Mortality: Construction-related activities would not be expected to result in  
6 direct mortality of adult or fledged Cooper's hawk or osprey if they were present in the Plan  
7 Area, because they would be expected to avoid contact with construction and other equipment.  
8 If Cooper's hawk or osprey were to nest in the construction area, construction-related activities,  
9 including equipment operation, noise and visual disturbances could affect nests or lead to their  
10 abandonment, potentially resulting in mortality of eggs and nestlings. Mitigation Measure BIO-  
11 75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would  
12 be available to address these adverse effects on Cooper's hawk and osprey.

13 The following paragraphs summarize the combined effects discussed above and describe other  
14 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also  
15 included.

#### 16 **Near-Term Timeframe**

17 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
18 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
19 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
20 effect of construction would not be adverse under NEPA. Alternative 4 would remove 449 acres  
21 (338 acres of permanent loss, 111 acres of temporary loss) of Cooper's hawk and osprey nesting  
22 habitat in the study area in the near-term. These effects would result from the construction of the  
23 water conveyance facilities (CM1, 49 acres), and implementing other conservation measures (CM2  
24 *Yolo Bypass Fisheries Enhancement*, CM4 *Tidal Natural Communities Restoration*, and CM5 *Seasonally*  
25 *Inundated Floodplain Restoration*—400 acres of habitat).

26 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by  
27 CM1 would be 1:1 for restoration/creation and 1:1 protection of valley/foothill riparian habitat.  
28 Using these ratios would indicate that 49 acres of nesting habitat should be restored/created and 49  
29 acres should be protected to compensate for the CM1 losses of modeled Cooper's hawk and osprey  
30 habitat. In addition, The near-term effects of other conservation actions would remove 400 acres of  
31 modeled breeding habitat, and therefore require 400 acres of restoration and 400 acres of  
32 protection of modeled Cooper's hawk and osprey using the same typical NEPA and CEQA ratios.

33 The BDCP has committed to near-term goals of protecting 750 acres and restoring 800 acres of  
34 valley/foothill riparian natural community (Table 3-4 in Chapter 3, *Description of Alternatives*).  
35 These conservation actions are associated with CM3, and CM7 and would occur in the same  
36 timeframe as the construction and early restoration losses. The majority of riparian protection and  
37 restoration acres would occur in CZ 7 as part of a reserve system with extensive wide bands or large  
38 patches of valley/foothill riparian natural community (Objectives VFRNC1.1 and VFRNC1.2 in BDCP  
39 Chapter 3, *Conservation Strategy*). Riparian restoration would expand the patches of existing  
40 riparian forest in order to support nesting habitat for riparian species. The Plan's objectives would  
41 also benefit Cooper's hawk and osprey by protecting small but essential habitats that occur within  
42 cultivated lands, such as tree rows along field borders or roads, and small clusters of trees in  
43 farmyards or rural residences (Objective CLNC1.3). In addition, the distribution and abundance of  
44 potential nest trees would be increased by planting and maintaining native trees along roadsides

1 and field borders within protected cultivated lands at a rate of one tree per 10 acres (Objective  
2 SWHA2.1).

3 The 750 acres of protection and 800 acres of restoration contained in the near-term Plan goals  
4 satisfy the typical mitigation ratios that would be applied to the project-level effects of CM1 and  
5 other near-term impacts on Cooper's hawk and osprey nesting habitat. The 800 acres of restored  
6 riparian habitat would be initiated in the near-term to offset the loss of modeled nesting habitat, but  
7 would require one to several decades to functionally replace habitat that has been affected and for  
8 trees to attain sufficient size and structure suitable for nesting by these species. This time lag  
9 between the removal and restoration of nesting habitat could have a substantial impact on nesting  
10 raptors in the near-term time period. Nesting habitat is limited throughout much of the study area,  
11 consisting mainly of intermittent riparian, isolated trees, small groves, tree rows along field borders,  
12 roadside trees, and ornamental trees near rural residences. The removal of nest trees or nesting  
13 habitat would further reduce this limited resource and could reduce or restrict the number of active  
14 nests within the study area until restored riparian habitat is sufficiently developed.

15 *AMM18 Swainson's Hawk and White-Tailed Kite* would implement a program to plant large mature  
16 trees, including transplanting trees scheduled for removal. These would be supplemented with  
17 additional saplings and would be expected to reduce the temporal effects of loss of nesting habitat.  
18 The plantings would occur prior to or concurrent with (in the case of transplanting) the loss of trees.  
19 In addition, at least five trees (5-gallon container size) would be planted within the BDCP reserve  
20 system for every tree 20 feet or taller anticipated to be removed by construction during the near-  
21 term period. A variety of native tree species would be planted to provide trees with differing growth  
22 rates, maturation, and life span. Trees would be planted within the BDCP reserve system in clumps  
23 of at least three trees each at appropriate sites within or adjacent to conserved cultivated lands, or  
24 they could be incorporated as a component of the riparian restoration (CM5, CM7). Replacement  
25 trees that were incorporated into the riparian restoration would not be clustered in a single region  
26 of the study area, but would be distributed throughout the conserved lands.

27 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
28 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
29 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
30 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
31 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
32 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
33 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*. Cooper's hawk and  
34 osprey are not species that are covered under the BDCP. For the BDCP to avoid an adverse effect on  
35 individuals, preconstruction surveys for noncovered avian species would be required to ensure that  
36 active nests are detected and avoided. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting*  
37 *Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to address this adverse  
38 effect.

### 39 **Late Long-Term Timeframe**

40 The study area supports approximately 14,069 acres of modeled nesting habitat for Cooper's hawk  
41 and osprey. Alternative 4 as a whole would result in the permanent loss of and temporary effects on  
42 677 acres of potential nesting habitat (5% of the potential nesting habitat in the study area).

43 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*  
44 *Restoration*, *CM5 Seasonally Inundated Floodplain Restoration*, and *CM7 Riparian Natural Community*

1        *Restoration* to restore or create at least 5,000 acres and protect at least 750 acres of valley/foothill  
2        riparian natural community (Table 3-4 in Chapter 3, *Description of Alternatives*). The majority of  
3        riparian protection and restoration acres would occur in CZ 7 as part of a reserve system with  
4        extensive wide bands or large patches of valley/foothill riparian natural community (Objectives  
5        VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*). Riparian restoration would  
6        expand the patches of existing riparian forest in order to support nesting habitat for riparian  
7        species. The Plan's objectives would also benefit Cooper's hawk and osprey by protecting small but  
8        essential habitats that occur within cultivated lands, such as tree rows along field borders or roads,  
9        and small clusters of trees in farmyards or rural residences (Objective CLNC1.3). In addition, the  
10       distribution and abundance of potential nest trees would be increased by planting and maintaining  
11       native trees along roadsides and field borders within protected cultivated lands at a rate of one tree  
12       per 10 acres (Objective SWHA2.1).

13       The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
14       *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
15       *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
16       *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
17       *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
18       minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
19       described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*. Cooper's hawk and  
20       osprey are not species that are covered under the BDCP. For the BDCP to avoid an adverse effect on  
21       individuals, preconstruction surveys for noncovered avian species would be required to ensure that  
22       active nests are detected and avoided. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting*  
23       *Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to address this adverse  
24       effect.

25       **NEPA Effects:** The loss of Cooper's hawk and osprey habitat and potential direct mortality of these  
26       special-status species under Alternative 4 would represent an adverse effect in the absence of other  
27       conservation actions. With habitat protection and restoration associated with CM3, CM5, CM7,  
28       guided by biological goals and objectives and by AMM1–AMM7 and *AMM18 Swainson's Hawk and*  
29       *White-Tailed Kite*, which would be in place throughout the construction period, the effects of habitat  
30       loss on Cooper's hawk and osprey under Alternative 4 would not be adverse. Cooper's hawk and  
31       osprey are not covered species under the BDCP. For the BDCP to avoid an adverse effect on  
32       individuals, preconstruction surveys for noncovered avian species would be required to ensure that  
33       nests are detected and avoided. Mitigation Measure BIO-75 would be available to address this  
34       adverse effect.

35       **CEQA Conclusion:**

36       **Near-Term Timeframe**

37       Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
38       the near-term BDCP conservation strategy has been evaluated to determine whether it would  
39       provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
40       effect of construction would not be adverse under NEPA. Alternative 4 would remove 449 acres  
41       (338 acres of permanent loss, 111 acres of temporary loss) of Cooper's hawk and osprey nesting  
42       habitat in the study area in the near-term. These effects would result from the construction of the  
43       water conveyance facilities (CM1, 49 acres), and implementing other conservation measures (*CM2*  
44       *Yolo Bypass Fisheries Enhancement*, *CM4 Tidal Natural Communities Restoration*, and *CM5 Seasonally*  
45       *Inundated Floodplain Restoration*—400 acres of habitat).

1 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by  
2 CM1 would be 1:1 for restoration/creation and 1:1 protection of valley/foothill riparian habitat.  
3 Using these ratios would indicate that 49 acres of nesting habitat should be restored/created and 49  
4 acres should be protected to mitigate the CM1 losses of modeled Cooper's hawk and osprey habitat.  
5 In addition, The near-term effects of other conservation actions would remove 400 acres of modeled  
6 breeding habitat, and therefore require 400 acres of restoration and 400 acres of protection of  
7 modeled Cooper's hawk and osprey using the same typical NEPA and CEQA ratios. The BDCP has  
8 committed to near-term goals of protecting 750 acres and restoring 800 acres of valley/foothill  
9 riparian natural community (Table 3-4 in Chapter 3, *Description of Alternatives*). These conservation  
10 actions are associated with CM3, and CM7 and would occur in the same timeframe as the  
11 construction and early restoration losses. The majority of riparian protection and restoration acres  
12 would occur in CZ 7 as part of a reserve system with extensive wide bands or large patches of  
13 valley/foothill riparian natural community (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3,  
14 *Conservation Strategy*). Riparian restoration would expand the patches of existing riparian forest in  
15 order to support nesting habitat for riparian species. The Plan's objectives would also benefit  
16 Cooper's hawk and osprey by protecting small but essential habitats that occur within cultivated  
17 lands, such as tree rows along field borders or roads, and small clusters of trees in farmyards or  
18 rural residences (Objective CLNC1.3). In addition, the distribution and abundance of potential nest  
19 trees would be increased by planting and maintaining native trees along roadsides and field borders  
20 within protected cultivated lands at a rate of one tree per 10 acres (Objective SWHA2.1).

21 The 750 acres of protection and 800 acres of restoration contained in the near-term Plan goals  
22 satisfy the typical mitigation ratios that would be applied to the project-level effects of CM1 and  
23 other near-term impacts on Cooper's hawk and osprey nesting habitat. The 800 acres of restored  
24 riparian habitat would be initiated in the near-term to offset the loss of modeled nesting habitat, but  
25 would require one to several decades to functionally replace habitat that has been affected and for  
26 trees to attain sufficient size and structure suitable for nesting by these species. This time lag  
27 between the removal and restoration of nesting habitat could have a substantial impact on nesting  
28 raptors in the near-term time period. Nesting habitat is limited throughout much of the study area,  
29 consisting mainly of intermittent riparian, isolated trees, small groves, tree rows along field borders,  
30 roadside trees, and ornamental trees near rural residences. The removal of nest trees or nesting  
31 habitat would further reduce this limited resource and could reduce or restrict the number of active  
32 nests within the study area until restored riparian habitat is sufficiently developed.

33 *AMM18 Swainson's hawk and White-Tailed kite* would implement a program to plant large mature  
34 trees, including transplanting trees scheduled for removal. These would be supplemented with  
35 additional saplings and would be expected to reduce the temporal effects of loss of nesting habitat.  
36 The plantings would occur prior to or concurrent with (in the case of transplanting) the loss of trees.  
37 In addition, at least five trees (5-gallon container size) would be planted within the BDCP reserve  
38 system for every tree 20 feet or taller anticipated to be removed by construction during the near-  
39 term period. A variety of native tree species would be planted to provide trees with differing growth  
40 rates, maturation, and life span. Trees would be planted within the BDCP reserve system in clumps  
41 of at least three trees each at appropriate sites within or adjacent to conserved cultivated lands, or  
42 they could be incorporated as a component of the riparian restoration (CM5, CM7). Replacement  
43 trees that were incorporated into the riparian restoration would not be clustered in a single region  
44 of the study area, but would be distributed throughout the conserved lands.

45 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
46 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*

1 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
2 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
3 *Material, and AMM7 Barge Operations Plan. All of these AMMs include elements that would avoid or*  
4 *minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are*  
5 *described in detail in BDCP Appendix 3.C, Avoidance and Minimization Measures. Cooper's hawk and*  
6 *osprey are not species that are covered under the BDCP. For the BDCP to avoid an adverse effect on*  
7 *individuals, preconstruction surveys for noncovered avian species would be required to ensure that*  
8 *active nests are detected and avoided. Implementation of Mitigation Measure BIO-75 would reduce*  
9 *the potential impact on nesting Cooper's hawk and osprey to a less-than-significant level.*

#### 10 **Late Long-Term Timeframe**

11 The study area supports approximately 14,069 acres of modeled nesting habitat for Cooper's hawk  
12 and osprey. Alternative 4 as a whole would result in the permanent loss of and temporary effects on  
13 677 acres of potential nesting habitat (5% of the potential nesting habitat in the study area).

14 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*  
15 *Restoration, CM5 Seasonally Inundated Floodplain Restoration, and CM7 Riparian Natural Community*  
16 *Restoration to restore or create at least 5,000 acres and protect at least 750 acres of valley/foothill*  
17 *riparian natural community (Table 3-4 in Chapter 3, Description of Alternatives). The majority of*  
18 *riparian protection and restoration acres would occur in CZ 7 as part of a reserve system with*  
19 *extensive wide bands or large patches of valley/foothill riparian natural community (Objectives*  
20 *VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, Conservation Strategy). Riparian restoration would*  
21 *expand the patches of existing riparian forest in order to support nesting habitat for riparian*  
22 *species. The Plan's objectives would also benefit Cooper's hawk and osprey by protecting small but*  
23 *essential habitats that occur within cultivated lands, such as tree rows along field borders or roads,*  
24 *and small clusters of trees in farmyards or rural residences(Objective CLNC1.3). In addition, the*  
25 *distribution and abundance of potential nest trees would be increased by planting and maintaining*  
26 *native trees along roadsides and field borders within protected cultivated lands at a rate of one tree*  
27 *per 10 acres (Objective SWHA2.1).*

28 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*  
29 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*  
30 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
31 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
32 *Material, and AMM7 Barge Operations Plan. All of these AMMs include elements that would avoid or*  
33 *minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are*  
34 *described in detail in BDCP Appendix 3.C, Avoidance and Minimization Measures. Cooper's hawk and*  
35 *osprey are not species that are covered under the BDCP. For the BDCP to have a less-than-significant*  
36 *impact on individuals, preconstruction surveys for noncovered avian species would be required to*  
37 *ensure that active nests are detected and avoided. Implementation of Mitigation Measure BIO-75,*  
38 *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds, would reduce*  
39 *this impact to a less-than-significant level.*

40 Considering Alternative 4's protection and restoration provisions, which would provide acreages of  
41 new or enhanced habitat in amounts greater than necessary to compensate for the time lag of  
42 restoring riparian habitats lost to construction and restoration activities, and with implementation  
43 of AMM1-AMM7, *AMM18 Swainson's Hawk and White-Tailed kite*, and Mitigation Measure BIO-75,  
44 the loss of habitat or direct mortality through implementation of Alternative 4 would not result in a

1 substantial adverse effect through habitat modifications and would not substantially reduce the  
2 number or restrict the range of either species. Therefore, the loss of habitat or potential mortality  
3 under this alternative would have a less-than-significant impact on Cooper's hawk and osprey.

4 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**  
5 **Disturbance of Nesting Birds**

6 See Mitigation Measure BIO-75 under Impact BIO-75.

7 **Impact BIO-110: Effects on Cooper's Hawk and Osprey Associated with Electrical**  
8 **Transmission Facilities**

9 New transmission lines would increase the risk for bird-power line strikes, which could result in  
10 injury or mortality of Cooper's hawk and osprey. The existing network of transmission lines in the  
11 Plan Area currently poses the same small risk for Cooper's hawk and osprey, and any incremental  
12 risk associated with the new power line corridors would also be expected to be low. *AMM20 Greater*  
13 *Sandhill Crane*, which would install flight-diverters on new and selected existing transmission lines,  
14 would further reduce any potential effects.

15 **NEPA Effects:** New transmission lines would increase the risk for bird-power line strikes, which  
16 could result in injury or mortality of Cooper's hawk and osprey. With the implementation of *AMM20*  
17 *Greater Sandhill Crane*, which would install flight-diverters on new and selected existing  
18 transmission lines, there would not be an adverse effect on Cooper's hawk and osprey.

19 **CEQA Conclusion:** New transmission lines would increase the risk for bird-power line strikes, which  
20 could result in injury or mortality of Cooper's hawk and osprey. *AMM20 Greater Sandhill Crane*,  
21 which would install flight-diverters on new and selected existing transmission lines, would  
22 minimize this risk would reduce the impact of new transmission lines on Cooper's hawk and osprey  
23 to a less-than-significant level.

24 **Impact BIO-111: Indirect Effects of Plan Implementation on Cooper's Hawk and Osprey**

25 **Indirect construction- and operation-related effects:** Construction noise above background noise  
26 levels (greater than 50 dBA) could extend 500 to 5,250 feet from the edge of construction activities  
27 (BDCP Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of the BDCP Conveyance*  
28 *Facility on Sandhill Crane*, Table 4), although there are no available data to determine the extent to  
29 which these noise levels could affect Cooper's hawk or osprey. If Cooper's hawk or osprey were to  
30 nest in or adjacent to work areas, construction and subsequent maintenance-related noise and  
31 visual disturbances could mask calls, disrupt foraging and nesting behaviors, and reduce the  
32 functions of suitable nesting habitat for these species. Mitigation Measure BIO-75, *Conduct*  
33 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would avoid the  
34 potential for adverse effects of construction-related activities on survival and productivity of nesting  
35 Cooper's hawk and osprey. The use of mechanical equipment during water conveyance facilities  
36 construction could cause the accidental release of petroleum or other contaminants that could affect  
37 Cooper's hawk and osprey in the surrounding habitat. The inadvertent discharge of sediment or  
38 excessive dust adjacent to suitable habitat could also have an adverse effect on these species.  
39 *AMM1-AMM7*, including *AMM2 Construction Best Management Practices and Monitoring*, would  
40 minimize the likelihood of such spills and ensure that measures are in place to prevent runoff from  
41 the construction area and negative effects of dust on active nests.

1 **Methylmercury Exposure:** Covered activities have the potential to exacerbate bioaccumulation of  
2 mercury in avian species, including Cooper's hawk and osprey. Future operational impacts under  
3 CM1 were analyzed using a DSM-2 based model to assess potential effects on mercury concentration  
4 and bioavailability resulting from proposed flows. Subsequently, a regression model was used to  
5 estimate fish-tissue concentrations under these future operational conditions (evaluated starting  
6 operations or ESO). Results indicated that changes in total mercury levels in water and fish tissues  
7 due to ESO were insignificant (see BDCP Appendix 5.D, Tables 5D.4-3, 5D.4-4, and 5D.4-5).

8 Marsh (tidal and nontidal) and floodplain restoration have the potential to increase exposure to  
9 methylmercury. Mercury is transformed into the more bioavailable form of methylmercury in  
10 aquatic systems, especially areas subjected to regular wetting and drying such as tidal marshes and  
11 flood plains (Alpers et al. 2008). Thus, BDCP restoration activities that create newly inundated areas  
12 could increase bioavailability of mercury (see BDCP Chapter 3, *Conservation Strategy*, for details of  
13 restoration). Species sensitivity to methylmercury differs widely and there is a large amount of  
14 uncertainty with respect to species-specific effects. Increased methylmercury associated with  
15 natural community and floodplain restoration could indirectly affect cooper's hawk and osprey, via  
16 uptake in lower trophic levels (as described in the BDCP, Appendix 5.D, *Contaminants*).

17 The potential mobilization or creation of methylmercury within the Plan Area varies with site-  
18 specific conditions and would need to be assessed at the project level. *CM12 Methylmercury*  
19 *Management* contains provisions for Project-specific Mercury Management Plans. Site-specific  
20 restoration plans that address the creation and mobilization of mercury, as well as monitoring and  
21 adaptive management as described in CM12 would be available to address the uncertainty of  
22 methylmercury levels in restored tidal marsh and potential impacts on cooper's hawk and osprey.

23 **NEPA Effects:** Noise and visual disturbances from the construction of water conveyance facilities  
24 could reduce Cooper's hawk and osprey use of modeled habitat adjacent to work areas. Moreover,  
25 operation and maintenance of the water conveyance facilities, including the transmission facilities,  
26 could result in ongoing but periodic postconstruction disturbances that could adversely affect  
27 Cooper's hawk and osprey use of the surrounding habitat. Mitigation Measure BIO-75, *Conduct*  
28 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, in addition to AMM1-  
29 AMM7, would be available to address this adverse effect. The implementation of tidal natural  
30 communities restoration or floodplain restoration could result in increased exposure of Cooper's  
31 hawk or osprey to methylmercury, through the ingestion of fish or small mammals in tidally  
32 restored areas. However, it is currently unknown what concentrations of methylmercury are  
33 harmful to these species and the potential for increased exposure varies substantially within the  
34 study area. Site-specific restoration plans that address the creation and mobilization of mercury, as  
35 well as monitoring and adaptive management as described in CM12 would better inform potential  
36 impacts and address the uncertainty of methylmercury levels in restored tidal marsh in the study  
37 area on cooper's hawk and osprey. The site-specific planning phase of marsh restoration would be  
38 the appropriate place to assess the potential for risk of methylmercury exposure for Cooper's hawk  
39 and osprey, once site specific sampling and other information could be developed.

40 **CEQA Conclusion:** Noise and visual disturbances from the construction of water conveyance  
41 facilities could reduce Cooper's hawk and osprey use of modeled habitat adjacent to work areas.  
42 Moreover, operation and maintenance of the water conveyance facilities, including the transmission  
43 facilities, could result in ongoing but periodic postconstruction disturbances that could affect  
44 Cooper's hawk and osprey use of the surrounding habitat. Noise, the potential for hazardous spills,  
45 increased dust and sedimentation, and operations and maintenance of the water conveyance

1 facilities under Alternative 4 would have a less-than-significant impact on Cooper's hawk and osprey  
2 with the implementation of Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird*  
3 *Surveys and Avoid Disturbance of Nesting Birds*, and AMM1–AMM7. The implementation of tidal  
4 natural communities restoration or floodplain restoration could result in increased exposure of  
5 Cooper's hawk or osprey to methylmercury through the ingestion of fish or small mammals in  
6 restored tidal areas. However, it is currently unknown what concentrations of methylmercury are  
7 harmful to these species. Site-specific restoration plans that address the creation and mobilization of  
8 mercury, as well as monitoring and adaptive management as described in CM12, would address the  
9 uncertainty of methylmercury levels in restored tidal marsh in the study area and better inform  
10 potential impacts on Cooper's hawk and osprey.

11 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**  
12 **Disturbance of Nesting Birds**

13 See Mitigation Measure BIO-75 under Impact BIO-75.

14 **Impact BIO-112: Periodic Effects of Inundation of Cooper's Hawk and Osprey Nesting Habitat**  
15 **as a Result of Implementation of Conservation Components**

16 Flooding of the Yolo Bypass from Fremont Weir operations (CM2) would increase the frequency and  
17 duration of inundation of approximately 48-82 acres of modeled Cooper's hawk and osprey  
18 breeding habitat. However, increased periodic flooding is not expected to cause any adverse effect on  
19 breeding habitat because trees in which nest sites are situated already withstand floods, the  
20 increase in inundation frequency and duration is expected to remain within the range of tolerance of  
21 riparian trees, and nest sites are located above floodwaters.

22 Based on hypothetical floodplain restoration, CM5 implementation could result in periodic  
23 inundation of up to 230 acres of breeding habitat for Cooper's hawk and osprey. The overall effect of  
24 seasonal inundation in existing riparian natural communities is likely to be beneficial for these  
25 species, because, historically, flooding was the main natural disturbance regulating ecological  
26 processes in riparian areas, and flooding promotes the germination and establishment of many  
27 native riparian plants.

28 **NEPA Effects:** Increased periodic flooding would not be expected to cause any adverse effect on nest  
29 sites because trees in which nest sites are situated already withstand floods, the increase in  
30 inundation frequency and duration is expected to remain within the range of tolerance of riparian  
31 trees, and nest sites are located above floodwaters. Therefore, increased duration and inundation  
32 from CM2 and CM5 would not have an adverse effect on Cooper's hawk and osprey.

33 **CEQA Conclusion:** Increased periodic flooding would not be expected to cause any adverse effect on  
34 nest sites because trees in which nest sites are situated already withstand floods, the increase in  
35 inundation frequency and duration is expected to remain within the range of tolerance of riparian  
36 trees, and nest sites are located above floodwaters. Therefore, increased duration and inundation  
37 from CM2 and CM5 would have a less-than-significant impact on Cooper's hawk and osprey.

38 **Golden Eagle and Ferruginous Hawk**

39 This section describes the effects of Alternative 4, including water conveyance facilities construction  
40 and implementation of other conservation components, on golden eagle and ferruginous hawk.

1 Modeled foraging habitat for these species consists of grassland, alkali seasonal wetland, vernal pool  
2 complex, alfalfa, grain and hay, pasture, and idle cropland throughout the study area.

3 Construction and restoration associated with Alternative 4 conservation measures would result in  
4 both temporary and permanent losses of golden eagle and ferruginous hawk modeled foraging  
5 habitat as indicated in Table 12-4-44. Full implementation of Alternative 4 would include the  
6 following conservation actions over the term of the BDCP that would also benefit golden eagles or  
7 ferruginous hawk (BDCP Chapter 3, Section 3.3, *Biological Goals and Objectives*).

- 8 • Protect at least 8,000 acres of grassland with at least 2,000 acres protected in CZ 1, at least 1,000  
9 acres protected in CZ 8, at least 2,000 acres protected in CZ 11, and the remainder distributed  
10 among CZs 1, 2, 4, 5, 7, 8, and 11 (Objective GNC1.1, associated with CM3).
- 11 • Restore at least 2,000 acres of grasslands (Objective GNC1.2, associated with CM8).
- 12 • Protect at least 150 acres of alkali seasonal wetland and at least 600 acres of existing vernal pool  
13 complex in CZs 1, 8, and/or 11 (Objectives ASWNC1.1 and VPNC1.1, associated with CM3).
- 14 • Increase prey availability and accessibility for grassland-foraging species (Objectives ASWNC2.4,  
15 VPNC2.5, and GNC2.4, associated with CM11).
- 16 • Protect at least 48,625 acres of cultivated lands that provide suitable habitat for covered and  
17 other native wildlife species (Objective CLNC1.1, associated with CM3).
- 18 • Within the at least 48,625 acres of protected cultivated lands, protect at least 42,275 acres of  
19 cultivated lands as Swainson's hawk foraging habitat with at least 50% in very high-value  
20 habitat in CZs 2, 3, 4, 5, 7, 8, 9, and 11 (Objective SH1.2, associated with CM3).

21 As explained below, with the restoration or protection of these amounts of habitat, in addition to  
22 management activities to enhance natural communities for species and implementation of AMM1-  
23 AMM7, impacts on golden eagle and ferruginous hawk would not be adverse for NEPA purposes and  
24 would be less than significant for CEQA purposes.

1 **Table 12-4-44. Changes in Golden Eagle and Ferruginous Hawk Habitat Associated with**  
2 **Alternative 4 (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	Foraging	1,969	1,969	633	633	NA	NA
<b>Total Impacts CM1</b>		<b>1,969</b>	<b>1,969</b>	<b>633</b>	<b>633</b>		
CM2-CM18	Foraging	5,450	26,198	376	893	1,158-3,650	3,823
<b>Total Impacts CM2-CM18</b>		<b>5,450</b>	<b>26,198</b>	<b>376</b>	<b>893</b>	<b>1,158-3,650</b>	<b>3,823</b>
<b>TOTAL IMPACTS</b>		<b>7,419</b>	<b>28,167</b>	<b>1,009</b>	<b>1,526</b>	<b>1,158-3,650</b>	<b>3,823</b>

<sup>a</sup> See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-113: Loss or Conversion of Habitat for and Direct Mortality of Golden Eagle and**  
5 **Ferruginous Hawk**

6 Alternative 4 conservation measures would result in the combined permanent and temporary loss  
7 of up 29,693 acres of modeled foraging habitat for golden eagle and ferruginous hawk (28,167 acres  
8 of permanent loss and 1,526 of temporary loss, Table 12-4-44). Conservation measures that would  
9 result in these losses are conveyance facilities and transmission line construction, and establishment  
10 and use of borrow and spoil areas (CM1), Yolo Bypass fisheries improvements (CM2), tidal habitat  
11 restoration (CM4), floodplain restoration (CM5), riparian restoration (CM7), grassland restoration  
12 (CM8), vernal pool and wetland restoration (CM9), nontidal marsh restoration (CM10), and  
13 construction of conservation hatcheries (CM18). The majority of habitat loss (20,880 acres) would  
14 result from CM4. Habitat enhancement and management activities (CM11), which include ground  
15 disturbance or removal of nonnative vegetation, and the construction of recreational trails, signs,  
16 and facilities, could result in local adverse habitat effects. In addition, maintenance activities  
17 associated with the long-term operation of the water conveyance facilities and other BDCP physical  
18 facilities could degrade or eliminate golden eagle foraging habitat. Each of these individual activities  
19 is described below. A summary statement of the combined impacts and NEPA effects, and a CEQA  
20 conclusion follows the individual conservation measure discussions.

- 21 • *CM1 Water Facilities and Operation*: Construction of Alternative 4 conveyance facilities would  
22 result in the combined permanent and temporary loss of up to 2,602 acres of modeled golden  
23 eagle and ferruginous hawk habitat (1,969 acres of permanent loss, 633 acres of temporary  
24 loss). Impacts would occur from the construction of intakes 2, 3, and 5 and associated temporary  
25 work areas and access roads in CZ 4 between Clarksburg and Courtland. The construction of the  
26 permanent and temporary transmission line corridors through CZs 4-6 and 9 would also remove

1 suitable foraging habitat for the species. Approximately 685 acres of impact would be from the  
2 new forebay constructed south of the Clifton court Forebay in CZ 8. Some of the grassland  
3 habitat lost at the sites of new canals south of Clifton Court Forebay is composed of larger stands  
4 of ruderal and herbaceous vegetation and California annual grassland, which is also suitable  
5 foraging habitat for the species. There are no occurrences of golden eagle or ferruginous hawk  
6 that intersect with the CM1 footprint. Refer to the Terrestrial Biology Map Book for a detailed  
7 view of Alternative 4 construction locations. Impacts from CM1 would occur within the first 10  
8 years of Plan implementation.

- 9 • *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo bypass fisheries enhancement  
10 would result in the combined permanent and temporary loss of up to 1,274 acres of modeled  
11 golden eagle and ferruginous hawk foraging habitat (898 acres of permanent loss, 376 acres of  
12 temporary loss) in the Yolo Bypass in CZ 2. Impacted habitat would consist primarily of  
13 grassland and pasture. Most of the grassland losses would occur at the north end of the bypass  
14 below Fremont Weir, along the Toe Drain/Tule Canal, and along the west side channels.  
15 Realignment of Putah Creek could also involve excavation and grading in alkali seasonal wetland  
16 complex habitat as a new channel is constructed. The loss is expected to occur during the first 10  
17 years of Alternative 4 implementation.
- 18 • *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and  
19 inundation would permanently remove an estimated 20,880 acres of modeled golden eagle and  
20 ferruginous hawk habitat. The majority of the acres lost would consist of cultivated lands in CZs  
21 1, 2, 4, 5, 6, and/or 7. Grassland losses would likely occur in the vicinity of Cache Slough, on  
22 Decker Island in the West Delta ROA, on the upslope fringes of Suisun Marsh, and along narrow  
23 bands adjacent to waterways in the South Delta ROA. Tidal restoration would directly impact  
24 and fragment grassland just north of Rio Vista in and around French and Prospect Islands, and in  
25 an area south of Rio Vista around Threemile Slough. Losses of alkali seasonal wetland complex  
26 habitat would likely occur in the south end of the Yolo Bypass and on the northern fringes of  
27 Suisun Marsh.
- 28 • *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore  
29 seasonally inundated floodplain would permanently and temporarily remove approximately  
30 1,450 acres of modeled golden eagle and ferruginous hawk foraging habitat (933 permanent,  
31 517 temporary). These losses would be expected after the first 10 years of Alternative 4  
32 implementation along the San Joaquin River and other major waterways in CZ 7.
- 33 • *CM8 Grassland Natural Community Restoration and CM9 Vernal Pool and Alkali Seasonal Wetland*  
34 *Complex Restoration*: Temporary construction-related disturbance of grassland habitat would  
35 result from implementation of CM8 and CM9 in CZs 1, 2, 4, 5, 7, 8, and 11. However, all areas  
36 would be restored after the construction periods. Grassland restoration would be implemented  
37 on agricultural lands that also provide foraging habitat for golden eagle and ferruginous hawk  
38 and would result in the conversion of 837 acres of cultivated lands to grassland.
- 39 • *CM10 Nontidal Marsh Restoration*: Implementation of CM10 would result in the permanent  
40 removal of 705 acres of golden eagle and ferruginous hawk foraging habitat.
- 41 • *CM11 Natural Communities Enhancement and Management*: A variety of habitat management  
42 actions included in CM11 that are designed to enhance wildlife values in restored or protected  
43 habitats could result in localized ground disturbances that could temporarily remove small  
44 amounts of golden eagle and ferruginous hawk foraging habitat. Ground-disturbing activities,  
45 such as removal of nonnative vegetation and road and other infrastructure maintenance

1 activities, would be expected to have minor adverse effects on available habitat for these  
2 species. CM11 would also include the construction of recreational-related facilities including  
3 trails, interpretive signs, and picnic tables (BDCP Chapter 4, *Covered Activities and Associated*  
4 *Federal Actions*). The construction of trailhead facilities, signs, staging areas, picnic areas,  
5 bathrooms, etc. would be placed on existing, disturbed areas when and where possible.  
6 However, approximately 50 acres of grassland habitat would be lost from the construction of  
7 trails and facilities.

- 8 • *CM18 Conservation Hatcheries*: Implementation of CM18 would remove up to 35 acres of  
9 modeled golden eagle and ferruginous hawk foraging habitat for the development of a delta and  
10 longfin smelt conservation hatchery in CZ 1.
- 11 • *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground  
12 water conveyance facilities and restoration infrastructure could result in ongoing but periodic  
13 disturbances that could affect golden eagle and ferruginous hawk use of the surrounding habitat.  
14 Maintenance activities would include vegetation management, levee and structure repair, and  
15 re-grading of roads and permanent work areas. These effects, however, would be reduced by  
16 AMM1–AMM7 and conservation actions as described below.
- 17 • *Injury and Direct Mortality*: Construction would not be expected to result in direct mortality of  
18 golden eagle and ferruginous hawk because foraging individuals would be expected to  
19 temporarily avoid the increased noise and activity associated with construction areas.

20 The following paragraphs summarize the combined effects discussed above and describe other  
21 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also  
22 included.

### 23 ***Near-Term Timeframe***

24 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
25 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
26 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
27 effects of construction would not be adverse under NEPA. Alternative 4 would remove 8,428 acres  
28 (7,419 permanent, 1,009 temporary) of modeled golden eagle and ferruginous hawk foraging  
29 habitat in the study area in the near-term. These effects would result from the construction of the  
30 water conveyance facilities (CM1, 2,602 acres), and implementing other conservation measures  
31 (*CM2 Yolo Bypass Fisheries Enhancement*, *CM4 Tidal Natural Communities Restoration*, *CM7 Riparian*  
32 *Natural Community Restoration*, *CM8 Grassland Natural Community Restoration*, *CM9 Vernal Pool and*  
33 *Alkali Seasonal Wetland Complex Restoration*, *CM11 Natural Communities Enhancement and*  
34 *Management* and *CM18 Conservation Hatcheries*—5,826 acres).

35 The typical NEPA and CEQA project-level mitigation ratio for those natural communities affected  
36 would be 2:1 for protection of habitat. Using this ratio would indicate that 5,204 acres should be  
37 protected to compensate for the CM1 losses of 2,602 acres of golden eagle and ferruginous hawk  
38 foraging habitat. The near-term effects of other conservation actions would remove 5,826 acres of  
39 modeled habitat, and therefore require 11,652 acres of protection of golden eagle and ferruginous  
40 hawk habitat using the same typical NEPA and CEQA ratio (2:1 for protection).

41 The BDCP has committed to near-term goals of protecting 2,000 acres and restoring 1,140 acres of  
42 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of  
43 alkali seasonal wetland complex, and protecting 15,400 acres of non-rice cultivated lands (Table 3-4

1 in Chapter 3, *Description of Alternatives*). These conservation actions are associated with CM3, CM8,  
2 and CM9 and would occur in the same timeframe as the construction and early restoration losses  
3 thereby avoiding adverse effects of habitat loss on golden eagle and ferruginous hawk foraging in  
4 the study area. Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11  
5 (Objectives GNC1.1 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be associated with  
6 vernal pool and alkali seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would  
7 result in a contiguous matrix of grassland, alkali seasonal wetland, and vernal pool natural  
8 communities which would expand golden eagle and ferruginous hawk foraging habitat and reduce  
9 the effects of current levels of habitat fragmentation. Under *CM11 Natural Communities*  
10 *Enhancement and Management*, insect and mammal prey populations would be increased on  
11 protected lands, enhancing the foraging value of these natural communities (Objectives ASWNC2.4,  
12 VPNC2.5, and GNC2.4). Burrow availability would be increased on protected natural communities by  
13 encouraging ground squirrel occupancy and expansion through the creation of berms, mounds,  
14 edges, and through the prohibition of ground squirrel control programs (i.e., poisoning).

15 Cultivated lands that provide habitat for covered and other native wildlife species would provide  
16 approximately 15,400 acres of potential foraging habitat for golden eagle and ferruginous hawk  
17 (Objective CLNC1.1). Approximately 87% of cultivated lands protected by the late long-term time  
18 period would be in alfalfa and pasture crop types (very high- and high-value crop types for  
19 Swainson's hawk (Objective SH1.2) which are also suitable for golden eagle and ferruginous hawk.  
20 This biological objective provides an estimate for the high proportion of cultivated lands protected  
21 in the near-term time period which would be suitable for golden eagle and ferruginous hawk.

22 The acres of restoration and protection contained in the near-term Plan goals and the additional  
23 detail in the biological objectives satisfy the typical mitigation that would be applied to the project-  
24 level effects of CM1 on golden eagle and ferruginous hawk, as well as mitigate the near-term effects  
25 of the other conservation measures with the consideration that some portion of the 15,400 acres of  
26 cultivated lands protected in the near-term timeframe would be managed in suitable crop types to  
27 compensate for the loss of habitat at a ratio of 2:1. Mitigation Measure BIO-113, *Compensate for the*  
28 *Near-Term Loss of Golden Eagle and Ferruginous Hawk Foraging Habitat* would be available to  
29 address the adverse effect of habitat loss in the near-term.

30 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
31 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
32 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
33 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
34 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
35 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
36 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

### 37 ***Late Long-Term Timeframe***

38 Alternative 4 as a whole would result in the permanent loss of and temporary effects on 29,692  
39 acres of modeled golden eagle and ferruginous hawk foraging habitat during the term of the Plan.  
40 The locations of these losses are described above in the analyses of individual conservation  
41 measures. The Plan includes conservation commitments through *CM3 Natural Communities*  
42 *Protection and Restoration*, *CM8 Grassland Natural Community Restoration*, and *CM9 Vernal Pool and*  
43 *Alkali Seasonal Wetland Complex Restoration* to protect 8,000 acres and restore 2,000 acres of  
44 grassland natural community, protect 600 acres of vernal pool complex, protect 150 acres of alkali

1 seasonal wetland complex and protect 48,625 acres of cultivated lands that provide suitable habitat  
2 for native wildlife species (Table 3-4 in Chapter 3, *Description of Alternatives*). Grassland restoration  
3 and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1 and GNC1.2). Grassland  
4 protection in CZs 1, 8, and 11 would be associated with vernal pool and alkali seasonal wetland  
5 complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous matrix of  
6 grassland, alkali seasonal wetland, and vernal pool natural communities which would expand  
7 foraging habitat for golden eagle and ferruginous hawk and reduce the effects of current levels of  
8 habitat fragmentation. Under *CM11 Natural Communities Enhancement and Management*, insect and  
9 small mammal prey populations would be increased on protected lands, enhancing the foraging  
10 value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4). Burrow  
11 availability would be increased on protected natural communities by encouraging ground squirrel  
12 occupancy and expansion through the creation of berms, mounds, edges, and through the  
13 prohibition of ground squirrel control programs (i.e., poisoning). Cultivated lands that provide  
14 habitat for covered and other native wildlife species would provide approximately 15,400 acres of  
15 potential habitat for golden eagle and ferruginous hawk (Objective CLNC1.1). Approximately 42,275  
16 acres of cultivated lands protected would be in alfalfa and pasture crop types (very high- and high-  
17 value crop types for Swainson's hawk (Objective SH1.2) which are also suitable for golden eagle and  
18 ferruginous hawk.

19 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
20 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
21 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
22 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
23 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
24 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
25 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

26 **NEPA Effects:** The loss of golden eagle and ferruginous hawk habitat and potential mortality of these  
27 special-status species under Alternative 4 would represent an adverse effect in the absence of other  
28 conservation actions. However, with habitat protection and restoration associated with CM3, CM8,  
29 CM9, and CM11, guided by biological goals and objectives and by AMM1–AMM7, which would be in  
30 place throughout the construction period, and with implementation of Mitigation Measure BIO-113,  
31 *Compensate for the Near-Term Loss of Golden Eagle and Ferruginous Hawk Foraging Habitat*, the  
32 effects of habitat loss and potential for direct mortality on golden eagle and ferruginous hawk under  
33 Alternative 4 would not be adverse.

#### 34 **CEQA Conclusion:**

#### 35 **Near-Term Timeframe**

36 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
37 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
38 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
39 effects of construction would be less than significant under CEQA. Alternative 4 would remove 8,428  
40 acres (7,419 permanent, 1,009 temporary) of modeled golden eagle and ferruginous hawk foraging  
41 habitat in the study area in the near-term. These effects would result from the construction of the  
42 water conveyance facilities (CM1, 2,602 acres), and implementing other conservation measures  
43 (*CM2 Yolo Bypass Fisheries Enhancement*, *CM4 Tidal Natural Communities Restoration*, *CM7 Riparian*  
44 *Natural Community Restoration*, *CM8 Grassland Natural Community Restoration*, *CM9 Vernal Pool and*

1 *Alkali Seasonal Wetland Complex Restoration, CM11 Natural Communities Enhancement and*  
2 *Management and CM18 Conservation Hatcheries—5,826 acres).*

3 The typical NEPA and CEQA project-level mitigation ratio for those natural communities affected  
4 would be 2:1 for protection of habitat. Using this ratio would indicate that 5,204 acres should be  
5 protected to mitigate the CM1 losses of 2,602 acres of golden eagle and ferruginous hawk foraging  
6 habitat. The near-term effects of other conservation actions would remove 5,826 acres of modeled  
7 habitat, and therefore require 11,652 acres of protection of golden eagle and ferruginous hawk  
8 habitat using the same typical NEPA and CEQA ratio (2:1 for protection).

9 The BDCP has committed to near-term goals of protecting 2,000 acres and restoring 1,140 acres of  
10 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of  
11 alkali seasonal wetland complex, and protecting 15,400 acres of non-rice cultivated lands (Table 3-4  
12 in Chapter 3). These conservation actions are associated with CM3, CM8, and CM9 and would occur  
13 in the same timeframe as the construction and early restoration losses thereby avoiding significant  
14 impacts of habitat loss on golden eagle and ferruginous hawk foraging in the study area. Grassland  
15 restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11. (Objectives GNC1.1 and  
16 GNC1.2). Grassland protection in CZs 1, 8, and 11 would be associated with vernal pool and alkali  
17 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous  
18 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would  
19 expand golden eagle and ferruginous hawk foraging habitat and reduce the effects of current levels  
20 of habitat fragmentation. Under *CM11 Natural Communities Enhancement and Management*, insect  
21 and mammal prey populations would be increased on protected lands, enhancing the foraging value  
22 of these natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4). Burrow availability  
23 would be increased on protected natural communities by encouraging ground squirrel occupancy  
24 and expansion through the creation of berms, mounds, edges, and through the prohibition of ground  
25 squirrel control programs (i.e., poisoning). Cultivated lands that provide habitat for covered and  
26 other native wildlife species would provide approximately 15,400 acres of potential foraging habitat  
27 for golden eagle and ferruginous hawk (Objective CLNC1.1). Approximately 87% of cultivated lands  
28 protected by the late long-term time period would be in alfalfa and pasture crop types (very high-  
29 and high-value crop types for Swainson's hawk (Objective SH1.2) which are also suitable for golden  
30 eagle and ferruginous hawk. This biological objective provides an estimate for the high proportion of  
31 cultivated lands protected in the near-term time period which would be suitable for golden eagle  
32 and ferruginous hawk.

33 These Plan objectives represent performance standards for considering the effectiveness of  
34 conservation actions. The acres of restoration and protection contained in the near-term Plan goals  
35 and the additional detail in the biological objectives satisfy the typical mitigation that would be  
36 applied to the project-level effects of CM1 on golden eagle and ferruginous hawk, as well as mitigate  
37 the near-term effects of the other conservation measures with the consideration that some portion  
38 of the 15,400 acres of cultivated lands protected in the near-term timeframe would be managed in  
39 suitable crop types to compensate for the loss of habitat at a ratio of 2:1. The implementation of  
40 Mitigation Measure BIO-113, *Compensate for the Near-Term Loss of Golden Eagle and Ferruginous*  
41 *Hawk Foraging Habitat* would reduce the impact of habitat loss in the near-term to less than  
42 significant.

43 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*  
44 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*  
45 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*

1 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
2 *Material, and AMM7 Barge Operations Plan. All of these AMMs include elements that would avoid or*  
3 *minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are*  
4 *described in detail in BDCP Appendix 3.C, Avoidance and Minimization Measures.*

5 ***Late Long-Term Timeframe***

6 Alternative 4 as a whole would result in the permanent loss of and temporary effects on 29,692  
7 acres of modeled golden eagle and ferruginous hawk foraging habitat during the term of the Plan.  
8 The locations of these losses are described above in the analyses of individual conservation  
9 measures. The Plan includes conservation commitments through *CM3 Natural Communities*  
10 *Protection and Restoration, CM8 Grassland Natural Community Restoration, and CM9 Vernal Pool and*  
11 *Alkali Seasonal Wetland Complex Restoration* to protect 8,000 acres and restore 2,000 acres of  
12 grassland natural community, protect 600 acres of vernal pool complex, protect 150 acres of alkali  
13 seasonal wetland complex and protect 48,625 acres of cultivated lands that provide suitable habitat  
14 for native wildlife species (Table 3-4 in Chapter 3). Grassland restoration and protection would  
15 occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1 and GNC1.2). Grassland protection in CZs 1, 8,  
16 and 11 would be associated with vernal pool and alkali seasonal wetland complexes (Objectives  
17 ASWNC1.1 and VPNC1.1) and would result in a contiguous matrix of grassland, alkali seasonal  
18 wetland, and vernal pool natural communities which would expand foraging habitat for golden eagle  
19 and ferruginous hawk and reduce the effects of current levels of habitat fragmentation. Under *CM11*  
20 *Natural Communities Enhancement and Management*, insect and small mammal prey populations  
21 would be increased on protected lands, enhancing the foraging value of these natural communities  
22 (Objectives ASWNC2.4, VPNC2.5, and GNC2.4). Burrow availability would be increased on protected  
23 natural communities by encouraging ground squirrel occupancy and expansion through the creation  
24 of berms, mounds, edges, and through the prohibition of ground squirrel control programs (i.e.,  
25 poisoning). Cultivated lands that provide habitat for covered and other native wildlife species would  
26 provide approximately 15,400 acres of potential habitat for golden eagle and ferruginous hawk  
27 (Objective CLNC1.1). Approximately 42,275 acres of cultivated lands protected would be in alfalfa  
28 and pasture crop types. These are very high- and high-value crop types for Swainson's hawk  
29 (Objective SH1.2) which are also suitable for golden eagle and ferruginous hawk.

30 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*  
31 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*  
32 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
33 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
34 *Material, and AMM7 Barge Operations Plan. All of these AMMs include elements that would avoid or*  
35 *minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are*  
36 *described in detail in BDCP Appendix 3.C, Avoidance and Minimization Measures.*

37 Considering Alternative 4's protection and restoration provisions, which would provide acreages of  
38 new or enhanced habitat in amounts suitable to compensate for habitats lost to construction and  
39 restoration activities, and with the implementation of AMM1-AMM7, and Mitigation Measure BIO-  
40 113, *Compensate for the Near-Term Loss of Golden Eagle and Ferruginous Hawk Foraging Habitat*, the  
41 loss of habitat or direct mortality through implementation of Alternative 4 would not result in a  
42 substantial adverse effect through habitat modifications and would not substantially reduce the  
43 number or restrict the range of either species. Therefore, the loss of habitat or potential mortality  
44 under this alternative would have a less-than-significant impact on golden eagle and ferruginous  
45 hawk.

1           **Mitigation Measure BIO-113: Compensate for the Near-Term Loss of Golden Eagle and**  
2           **Ferruginous Hawk Foraging Habitat**

3           DWR will manage and protect sufficient acres of cultivated lands such as pasture, grain and hay  
4           crops, or alfalfa to provide golden eagle and ferruginous hawk foraging habitat such that the  
5           total acres of high-value habitat impacted in the near-term timeframe are mitigated at a ratio of  
6           2:1. Additional grassland protection, enhancement, and management may be substituted for the  
7           protection of high-value cultivated lands.

8           **Impact BIO-114: Effects on Golden Eagle and Ferruginous Hawk Associated with Electrical**  
9           **Transmission Facilities**

10          New transmission lines would increase the risk that golden eagles and ferruginous hawks could be  
11          subject to power line strikes, which could result in injury or mortality of these species. Golden eagle  
12          and ferruginous hawk would be at low risk of bird strike mortality based on factors assessed in the  
13          bird strike vulnerability analysis (BDCP Attachment 5.J-2, *Memorandum: Analysis of Potential Bird*  
14          *Collisions at Proposed BDCP Transmission Lines*). Factors analyzed include the height of the new  
15          transmission lines and the flight behavior of species. The existing network of transmission lines in  
16          the Plan Area currently poses the same small risk for golden eagle and ferruginous hawk, and any  
17          incremental risk associated with the new power line corridors would also be expected to be low.  
18          *AMM20 Greater Sandhill Crane*, would further reduce any potential effects.

19          **NEPA Effects:** New transmission lines would minimally increase the risk for golden eagle and  
20          ferruginous hawk power line strikes. With the implementation of *AMM20 Greater Sandhill Crane*, the  
21          potential effect of the construction of new transmission lines on golden eagle and ferruginous hawk  
22          would not be adverse.

23          **CEQA Conclusion:** New transmission lines would minimally increase the risk for golden eagle and  
24          ferruginous hawk power line strikes. *AMM20 Greater Sandhill Crane* would reduce the potential  
25          impact of the construction of new transmission lines on golden eagle and ferruginous hawk to a less-  
26          than-significant level.

27          **Impact BIO-115: Indirect Effects of Plan Implementation on Golden Eagle and Ferruginous**  
28          **Hawk**

29          Construction- and subsequent maintenance-related noise and visual disturbances could disrupt  
30          foraging, and reduce the functions of suitable foraging habitat for golden eagle and ferruginous  
31          hawk. Construction noise above background noise levels (greater than 50 dBA) could extend 500 to  
32          5,250 feet from the edge of construction activities (BDCP Appendix 5.J, Attachment 5J.D, *Indirect*  
33          *Effects of the Construction of the BDCP Conveyance Facility on Sandhill Crane*, Table 4), although there  
34          are no available data to determine the extent to which these noise levels could affect golden eagle or  
35          ferruginous hawk. Indirect effects associated with construction include noise, dust, and visual  
36          disturbance caused by grading, filling, contouring, and other ground-disturbing operations. The use  
37          of mechanical equipment during water conveyance facilities construction could cause the accidental  
38          release of petroleum or other contaminants that could affect these species or their prey in the  
39          surrounding habitat. *AMM1–AMM7*, including *AMM2 Construction Best Management Practices and*  
40          *Monitoring*, would minimize the likelihood of such spills from occurring. The inadvertent discharge  
41          of sediment or excessive dust adjacent to golden eagle and ferruginous hawk grassland habitat could  
42          also have a negative effect on the species. However, *AMM1–AMM7* would also ensure that measures

1 would be in place to prevent runoff from the construction area and the negative effects of dust on  
2 wildlife adjacent to work areas.

3 **NEPA Effects:** Indirect effects on golden eagle and ferruginous hawk as a result of Plan  
4 implementation could have adverse effects on these species through the modification of habitat.  
5 With the incorporation of AMM1–AMM7 into the BDCP, indirect effects as a result of Alternative 4  
6 implementation would not have an adverse effect on golden eagle and ferruginous hawk.

7 **CEQA Conclusion:** Indirect effects on golden eagle and ferruginous hawk as a result of Plan  
8 implementation could have a significant impact on the species from modification of habitat. With the  
9 incorporation of AMM1–AMM7 into the BDCP, indirect effects as a result of Alternative 4  
10 implementation would have a less-than-significant impact on golden eagle and ferruginous hawk.

### 11 **Impact BIO-116: Periodic Effects of Inundation on Golden Eagle and Ferruginous Hawk** 12 **Habitat as a Result of Implementation of Conservation Components**

13 Flooding of the Yolo Bypass from Fremont Weir operations (*CM2 Yolo Bypass Fisheries*  
14 *Enhancement*) would increase the frequency and duration of inundation on approximately 1,158–  
15 3,650 acres of modeled golden eagle and ferruginous hawk foraging habitat (Table 12-4-44).Based  
16 on hypothetical footprints, implementation of *CM5 Seasonally Inundated Floodplain Restoration*  
17 could result in the periodic inundation of up to approximately 3,823 acres of modeled habitat (Table  
18 12-4-44).

19 Golden eagles and ferruginous hawks would not likely use inundated areas for foraging, and  
20 increased frequency and duration of inundation of grassland habitats may affect prey populations  
21 that have insufficient time to recover following inundation events. However, periodically inundated  
22 habitat would not be expected to have an adverse effect on local or migratory golden eagles or the  
23 wintering ferruginous hawk populations in the study area.

24 **NEPA Effects:** Implementation of CM2 would increase the frequency and duration of inundation on  
25 approximately 1,158–3,650 acres of modeled golden eagle and ferruginous hawk foraging habitat. In  
26 addition, implementation of CM5 could result in the periodic inundation of up to 3,823 acres of  
27 modeled habitat. However, periodic inundation would not be expected to have an adverse effect on  
28 the wintering golden eagle or ferruginous hawk populations in the study area.

29 **CEQA Conclusion:** Implementation of CM2 would increase the frequency and duration of inundation  
30 on approximately 1,158–3,650 acres of modeled golden eagle and ferruginous hawk foraging  
31 habitat. In addition, implementation of CM5 could result in the periodic inundation of up to 3,823  
32 acres of modeled habitat. However, periodic inundation would be expected to have a less-than-  
33 significant impact on the golden eagle and ferruginous hawk populations in the study area.

### 34 **Cormorants, Herons and Egrets**

35 This section describes the effects of Alternative 4, including water conveyance facilities construction  
36 and implementation of other conservation components, on double-crested cormorant, great blue  
37 heron, great egret, snowy egret, and black-crowned night heron. Modeled breeding habitat for these  
38 species consists of valley/foothill riparian forest.

39 Construction and restoration associated with Alternative 4 conservation measures would result in  
40 both temporary and permanent losses of cormorant, heron, and egret modeled habitat as indicated  
41 in Table 12-4-45. The majority of the losses would take place over an extended period of time as

1 tidal marsh is restored in the study area. Although restoration for the loss of nesting habitat would  
2 be initiated in the same timeframe as the losses, it could take one or more decades for restored  
3 habitats to replace the functions of habitat lost. This time lag between impacts and restoration of  
4 habitat function would be minimized by specific requirements of *AMM18 Swainson's Hawk and*  
5 *White-Tailed Kite*, including the planting of mature trees in the near-term time period. Full  
6 implementation of Alternative 4 would include the following conservation actions over the term of  
7 the BDCP which would also benefit cormorants, herons, and egrets (BDCP Chapter 3, Section 3.3,  
8 *Biological Goals and Objectives*).

- 9 • Restore or create at least 5,000 acres of valley/foothill riparian natural community, with at least  
10 3,000 acres occurring on restored seasonally inundated floodplain (Objective VFRNC1.1,  
11 associated with CM7).
- 12 • Protect at least 750 acres of existing valley/foothill riparian natural community in CZ 7 by year  
13 10 (Objective VFRNC1.2, associated with CM3).
- 14 • Maintain and protect the small patches of important wildlife habitats associated with cultivated  
15 lands within the reserve system including isolated valley oak trees, trees and shrubs along field  
16 borders and roadsides, remnant groves, riparian corridors, water conveyance channels,  
17 grasslands, ponds, and wetlands (Objective CLNC1.3, associated with CM3).

18 As explained below, with the restoration or protection of these amounts of habitat, in addition to  
19 management activities to enhance natural communities for species and implementation of AMM1–  
20 AMM7, *AMM18 Swainson's Hawk and White-Tailed Kite*, and Mitigation Measure BIO-75, impacts on  
21 cormorants, herons, and egrets would not be adverse for NEPA purposes and would be less than  
22 significant for CEQA purposes.

1 **Table 12-4-45. Changes in Cormorant, Heron and Egret Modeled Habitat Associated with**  
2 **Alternative 4 (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	Nesting (Rookeries)	34	34	30	30	NA	NA
<b>Total Impacts CM1</b>		<b>34</b>	<b>34</b>	<b>30</b>	<b>30</b>		
CM2-CM18	Nesting (Rookeries)	387	684	88	123	51-92	266
<b>Total Impacts CM2-CM18</b>		<b>387</b>	<b>684</b>	<b>88</b>	<b>123</b>	<b>51-92</b>	<b>266</b>
<b>TOTAL IMPACTS</b>		<b>421</b>	<b>718</b>	<b>118</b>	<b>153</b>	<b>51-92</b>	<b>266</b>

<sup>a</sup> See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-117: Loss or Conversion of Nesting Habitat for and Direct Mortality of**  
5 **Cormorants, Herons and Egrets**

6 Alternative 4 conservation measures would result in the combined permanent and temporary loss  
7 of up to 871 acres of modeled nesting habitat (718 acres of permanent loss, 153 acres of temporary  
8 loss) for double-crested cormorant, great blue heron, great egret, snowy egret, and black-crowned  
9 night heron (Table 12-4-45). Conservation measures that would result in these losses are  
10 conveyance facilities and transmission line construction, and establishment and use of borrow and  
11 spoil areas (CM1), Fremont Weir/Yolo Bypass fisheries improvements (CM2), tidal natural  
12 communities restoration (CM4), and seasonally inundated floodplain restoration (CM5). Habitat  
13 enhancement and management activities (CM11) which include ground disturbance or removal of  
14 nonnative vegetation, could result in local adverse habitat effects. In addition, maintenance activities  
15 associated with the long-term operation of the water conveyance facilities and other BDCP physical  
16 facilities could degrade or eliminate cormorant, heron, and egret modeled habitat. Each of these  
17 individual activities is described below. A summary statement of the combined impacts, NEPA  
18 effects, and a CEQA conclusion follow the individual conservation measure discussions.

- 19 • *CM1 Water Facilities and Operation*: Construction of Alternative 4 water conveyance facilities  
20 would result in the combined permanent and temporary loss of up to 64 acres of modeled  
21 nesting habitat for cormorants, herons, and egrets. (Table 12-4-45). Of the 64 acres of modeled  
22 habitat that would be removed for the construction of the conveyance facilities, 34 acres would  
23 be a permanent loss and 30 acres would be a temporary loss of habitat. This loss would have the  
24 potential to displace individuals, if present, and remove the functions and value of potentially

1 suitable habitat. Activities that would impact modeled nesting habitat consist of tunnel, forebay,  
2 and intake construction, temporary access roads, and construction of transmission lines. Most of  
3 the permanent loss of nesting habitat would occur where Intakes 2, 3, and 5 impact the  
4 Sacramento River's east bank between Freeport and Courtland. The riparian areas here are very  
5 small patches, some dominated by valley oak and others by nonnative trees. Temporary losses  
6 of nesting habitat would occur where pipelines cross Snodgrass Slough and other small  
7 waterways east of the Sacramento River, and where temporary work areas surround intake  
8 sites. The riparian habitat in these areas is also composed of very small patches or stringers  
9 bordering waterways, which are composed of valley oak and scrub vegetation. Impacts from  
10 CM1 would occur in the central delta in CZs 3- 6, and CZ 8. There are no occurrences of nesting  
11 cormorants herons egrets that overlap with the construction footprint of CM1. However,  
12 Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance*  
13 *of Nesting Birds*, would be available to minimize impacts on cormorants, herons and egrets if  
14 they were to nest in the vicinity of construction activities. Refer to the Terrestrial Biology Map  
15 Book for a detailed view of Alternative 4 construction locations. Impacts from CM1 would occur  
16 within the first 10 years of Plan implementation.

- 17 ● *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo bypass fisheries enhancement  
18 would result in the combined permanent and temporary loss of up to 177 acres of nesting  
19 habitat (89 acres of permanent loss, 88 acres of temporary loss) in the Yolo Bypass in CZ 2.  
20 Activities through CM2 could involve excavation and grading in valley/foothill riparian areas to  
21 improve passage of fish through the bypasses. Most of the riparian losses would occur at the  
22 north end of Yolo Bypass where major fish passage improvements are planned. Excavation to  
23 improve water movement in the Toe Drain and in the Sacramento Weir would also remove  
24 potential nesting habitat. The loss is expected to occur during the first 10 years of Alternative 4  
25 implementation.
- 26 ● *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and  
27 inundation would permanently remove an estimated 552 acre of nesting habitat for cormorants,  
28 herons and egrets. Trees would not be actively removed but tree mortality would be expected  
29 over time as areas became tidally inundated. Depending on the extent and value of remaining  
30 habitat, this could reduce use of these habitats by these species. There is one CNDDDB occurrence  
31 of a great blue heron rookery that overlaps with the hypothetical restoration footprint for tidal  
32 restoration. The occurrence is on Decker Island and tidal restoration could potentially impact  
33 the nest trees from inundation. This effect would need to be addressed within the project  
34 specific analysis for tidal restoration projects.
- 35 ● *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore  
36 seasonally inundated floodplain would permanently remove approximately 43 acres and  
37 temporarily remove approximately 35 acres of potential cormorants, heron, and egret nesting  
38 habitat. These losses would be expected after the first 10 years of Alternative 4 implementation  
39 along the San Joaquin River and other major waterways in CZ 7.
- 40 ● *CM11 Natural Communities Enhancement and Management*: Habitat management- and  
41 enhancement-related activities could disturb cormorant, heron, and egret nests if they were  
42 present near work sites. A variety of habitat management actions included in CM11 that are  
43 designed to enhance wildlife values in BDCP-protected habitats may result in localized ground  
44 disturbances that could temporarily remove small amounts of cormorant, heron, and egret  
45 habitat and reduce the functions of habitat until restoration is complete. Ground-disturbing  
46 activities, such as removal of nonnative vegetation and road and other infrastructure

1 maintenance, are expected to have minor effects on available habitat for these species and are  
2 expected to result in overall improvements to and maintenance of habitat values over the term  
3 of the BDCP. These effects cannot be quantified, but are expected to be minimal and would be  
4 avoided and minimized by the AMMs listed below.

- 5 ● Permanent and temporary habitat losses from the above conservation measures would  
6 primarily consist of fragmented riparian stands. Temporarily affected areas would be restored  
7 as riparian habitat within 1 year following completion of construction activities. Although the  
8 effects are considered temporary, the restored riparian habitat would require years to several  
9 decades to functionally replace habitat that has been affected and for trees to attain sufficient  
10 size and structure for established rookeries. *AMM18 Swainson's Hawk and White-Tailed Kite*  
11 contains actions described below to reduce the effect of temporal loss of mature riparian  
12 habitat, including the transplanting of mature trees.
- 13 ● Operations and Maintenance: Postconstruction operation and maintenance of the above-ground  
14 water conveyance facilities and restoration infrastructure could result in ongoing but periodic  
15 disturbances that could affect use of the surrounding habitat by cormorants, herons or egrets.  
16 Maintenance activities would include vegetation management, levee and structure repair, and  
17 re-grading of roads and permanent work areas. These effects, however, would be reduced by  
18 AMMs and conservation actions as described below.
- 19 ● The primary impact of concern regarding double-crested cormorant, great blue heron, great  
20 egret, snowy egret, and black-crowned night heron is the loss of existing known nest trees, and  
21 other large trees associated with known nest sites. Because these species are highly traditional  
22 in their use of rookeries, the establishment of new nest sites is unpredictable. To avoid adverse  
23 effects on these species, existing known nest sites would have to be avoided. Mitigation Measure  
24 BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*,  
25 would be available to address these adverse effects on cormorants, herons, and egrets.
- 26 ● Injury and Direct Mortality: Construction-related activities would not be expected to result in  
27 direct mortality of adult or fledged double-crested cormorant, great blue heron, great egret,  
28 snowy egret, and black-crowned night heron if they were present in the Plan Area, because they  
29 would be expected to avoid contact with construction and other equipment. If birds were to nest  
30 in the construction area, construction-related activities, including equipment operation, noise  
31 and visual disturbances could affect nests or lead to their abandonment, potentially resulting in  
32 mortality of eggs and nestlings. Mitigation Measure BIO-75 would be available to address these  
33 effects on cormorants, herons, and egrets.

34 The following paragraphs summarize the combined effects discussed above and describe other  
35 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also  
36 included.

### 37 ***Near-Term Timeframe***

38 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
39 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
40 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
41 effects of construction would not be adverse under NEPA. Alternative 4 would remove 539 acres of  
42 nesting habitat for cormorants, herons, and egrets in the study area in the near-term. These effects  
43 would result from the construction of the water conveyance facilities (CM1, 64 acres of nesting  
44 habitat), and implementing other conservation measures (*CM2 Yolo Bypass Fisheries Enhancement*,

1 *CM4 Tidal Natural Communities Restoration, and CM5 Seasonally Inundated Floodplain Restoration—*  
2 *475 acres of nesting habitat).*

3 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by  
4 CM1 would be 1:1 for restoration/creation and 1:1 protection of valley/foothill riparian habitat for  
5 breeding habitat. Using these ratios would indicate that 64 acres of breeding habitat should be  
6 restored/created and 64 acres should be protected to compensate for the CM1 losses of modeled  
7 cormorant, heron, and egret habitat. In addition, the near-term effects of other conservation actions  
8 would remove 475 acres of modeled breeding habitat, and therefore require 475 acres of  
9 restoration and 475 acres of protection of modeled cormorant, heron, and egret habitat using the  
10 same typical NEPA and CEQA ratios.

11 The majority of riparian protection and restoration acres would occur in CZ 7 as part of a reserve  
12 system with extensive wide bands or large patches of valley/foothill riparian natural community  
13 (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*). Riparian  
14 restoration would expand the patches of existing riparian forest in order to support nesting habitat  
15 for these species. In addition, small but essential nesting habitat associated with cultivated lands  
16 would also be maintained and protected such as isolated trees, tree rows along field borders or  
17 roads, or small clusters of trees in farmyards or at rural residences (Objective CLNC1.3).

18 The 750 acres of protection and 800 acres of restoration contained in the near-term Plan goals  
19 satisfy the typical mitigation ratios that would be applied to the project-level effects of CM1 and  
20 other near-term impacts on cormorant, heron, and egret nesting habitat. The 800 acres of restored  
21 riparian habitat would be initiated in the near-term to offset the loss of potential nesting habitat, but  
22 would require years to several decades to functionally replace habitat that has been affected and for  
23 trees to attain sufficient size and structure suitable for established rookeries. This time lag between  
24 the removal and restoration of nesting habitat could have a substantial impact on cormorants,  
25 herons and egrets in the near-term time period.

26 *AMM18 Swainson's Hawk and White-Tailed Kite* would implement a program to plant large mature  
27 trees, including transplanting trees scheduled for removal. These would be supplemented with  
28 additional saplings and would be expected to reduce the temporal effects of loss of nesting habitat.  
29 The plantings would occur prior to or concurrent with (in the case of transplanting) the loss of trees.  
30 In addition, at least five trees (5-gallon container size) would be planted within the BDCP reserve  
31 system for every tree 20 feet or taller anticipated to be removed by construction during the near-  
32 term period. A variety of native tree species would be planted to provide trees with differing growth  
33 rates, maturation, and life span. Replacement trees that were incorporated into the riparian  
34 restoration would not be clustered in a single region of the study area, but would be distributed  
35 throughout protected lands.

36 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*  
37 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*  
38 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
39 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
40 *Material, and AMM7 Barge Operations Plan. All of these AMMs include elements that would avoid or*  
41 *minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are*  
42 *described in detail in BDCP Appendix 3.C, Avoidance and Minimization Measures. Double-crested*  
43 *cormorant, great blue heron, great egret, snowy egret, and black-crowned night heron are not*  
44 *species that are covered under the BDCP. For the BDCP to avoid adverse effects on individuals,*

1 existing nests and rookeries would have to be avoided. Mitigation Measure BIO-75, *Conduct*  
2 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to  
3 address adverse effects on nesting cormorants, herons, and egrets.

#### 4 **Late Long-Term Timeframe**

5 Based on modeled habitat, the study area supports approximately 17,966 acres of modeled nesting  
6 habitat for cormorants, herons, and egrets. Alternative 4 as a whole would result in the permanent  
7 loss of and temporary effects on 871 acres of potential breeding habitat (5% of the potential  
8 breeding habitat in the Plan Area).

9 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*  
10 *Restoration*, *CM5 Seasonally Inundated Floodplain Restoration*, and *CM7 Riparian Natural Community*  
11 *Restoration* to restore or create at least 5,000 acres and protect at least 750 acres of valley/foothill  
12 riparian natural community (Table 3-4 in Chapter 3, *Description of Alternatives*). The majority of  
13 riparian protection and restoration acres would occur in CZ 7 as part of a reserve system with  
14 extensive wide bands or large patches of valley/foothill riparian natural community (Objectives  
15 VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*). Riparian restoration would  
16 expand the patches of existing riparian forest in order to support nesting habitat for riparian  
17 species. The Plan's objectives would also benefit cormorants, herons, and egrets by protecting small  
18 but essential habitats that occur within cultivated lands, such as tree rows along field borders or  
19 roads, and small clusters of trees in farmyards or rural residences (Objective CLNC1.3). In addition,  
20 the distribution and abundance of potential nest trees would be increased by planting and  
21 maintaining native trees along roadsides and field borders within protected cultivated lands at a  
22 rate of one tree per 10 acres (Objective SWHA2.1).

23 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
24 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
25 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
26 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
27 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
28 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
29 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*. Double-crested  
30 cormorant, great blue heron, great egret, snowy egret, and black-crowned night heron are not  
31 species that are covered under the BDCP. These species are highly traditional in their use of nest  
32 sites and for the BDCP to avoid an adverse effect on individuals, preconstruction surveys would be  
33 required to ensure that nests are detected and any direct and indirect impacts on rookeries are  
34 avoided. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid*  
35 *Disturbance of Nesting Birds*, and Mitigation Measure BIO-117, *Avoid Impacts on Rookeries*, would be  
36 available to address adverse effects on nesting cormorants, herons, and egrets.

37 **NEPA Effects:** The loss of cormorant, heron, and egret habitat and potential direct mortality of these  
38 special-status species under Alternative 4 would represent an adverse effect in the absence of other  
39 conservation actions. However, with habitat protection and restoration associated with CM3, CM5,  
40 CM7, CM8, CM9, and CM11, guided by biological goals and objectives and by AMM1–AMM7 and  
41 *AMM18 Swainson's Hawk and White-Tailed Kite*, which would be in place throughout the  
42 construction period, the effects of habitat loss on cormorants, herons and egrets under Alternative 4  
43 would not be adverse. Double-crested cormorant, great blue heron, great egret, snowy egret, and  
44 black-crowned night heron are not species that are covered under the BDCP. Mitigation Measure

1 BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would  
2 be available to address adverse effects on nesting cormorants, herons, and egrets.

3 **CEQA Conclusion:**

4 **Near-Term Timeframe**

5 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
6 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
7 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
8 effects of construction would be less than significant under NEPA. Alternative 4 would remove 539  
9 acres of nesting habitat for cormorants, herons, and egrets in the study area in the near-term. These  
10 effects would result from the construction of the water conveyance facilities (CM1, 64 acres of  
11 nesting habitat), and implementing other conservation measures (*CM2 Yolo Bypass Fisheries*  
12 *Enhancement*, *CM4 Tidal Natural Communities Restoration*, and *CM5 Seasonally Inundated Floodplain*  
13 *Restoration*—475 acres of nesting habitat).

14 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by  
15 CM1 would be 1:1 for restoration/creation and 1:1 protection of valley/foothill riparian habitat for  
16 breeding habitat. Using these ratios would indicate that 64 acres of breeding habitat should be  
17 restored/created and 64 acres should be protected to mitigate the CM1 losses of modeled  
18 cormorant, heron, and egret habitat. In addition, the near-term effects of other conservation actions  
19 would remove 475 acres of modeled breeding habitat, and therefore require 475 acres of  
20 restoration and 475 acres of protection of modeled cormorant, heron, and egret habitat using the  
21 same typical NEPA and CEQA ratios.

22 The majority of riparian protection and restoration acres would occur in CZ 7 as part of a reserve  
23 system with extensive wide bands or large patches of valley/foothill riparian natural community  
24 (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*). Riparian  
25 restoration would expand the patches of existing riparian forest in order to support nesting habitat  
26 for these species. In addition, small but essential nesting habitat associated with cultivated lands  
27 would also be maintained and protected such as isolated trees, tree rows along field borders or  
28 roads, or small clusters of trees in farmyards or at rural residences (Objective CLNC1.3).

29 The 750 acres of protection and 800 acres of restoration contained in the near-term Plan goals  
30 satisfy the typical mitigation ratios that would be applied to the project-level effects of CM1 and  
31 other near-term impacts on cormorant, heron, and egret nesting habitat. The 800 acres of restored  
32 riparian habitat would be initiated in the near-term to offset the loss of potential nesting habitat, but  
33 would require years to several decades to functionally replace habitat that has been affected and for  
34 trees to attain sufficient size and structure suitable for established rookeries. This time lag between  
35 the removal and restoration of nesting habitat could have a substantial impact on cormorants,  
36 herons and egrets in the near-term time period.

37 *AMM18 Swainson's Hawk and White-Tailed Kite* would implement a program to plant large mature  
38 trees, including transplanting trees scheduled for removal. These would be supplemented with  
39 additional saplings and would be expected to reduce the temporal effects of loss of nesting habitat.  
40 The plantings would occur prior to or concurrent with (in the case of transplanting) the loss of trees.  
41 In addition, at least five trees (5-gallon container size) would be planted within the BDCP reserve  
42 system for every tree 20 feet or taller anticipated to be removed by construction during the near-  
43 term period. A variety of native tree species would be planted to provide trees with differing growth

1 rates, maturation, and life span. Replacement trees that were incorporated into the riparian  
2 restoration would not be clustered in a single region of the study area, but would be distributed  
3 throughout protected lands.

4 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
5 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
6 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
7 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
8 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
9 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
10 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*. Double-crested  
11 cormorant, great blue heron, great egret, snowy egret, and black-crowned night heron are not  
12 species that are covered under the BDCP. For the BDCP to avoid an adverse effect on individuals,  
13 preconstruction surveys for noncovered avian species would be required to ensure that nests are  
14 detected and avoided. Implementation of Mitigation Measure BIO-75, *Conduct Preconstruction*  
15 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would reduce this potential impact to a  
16 less-than-significant level.

#### 17 **Late Long-Term Timeframe**

18 Based on modeled habitat, the study area supports approximately 17,966 acres of modeled nesting  
19 habitat for cormorants, herons, and egrets. Alternative 4 as a whole would result in the permanent  
20 loss of and temporary effects on 871 acres of potential breeding habitat (5% of the potential  
21 breeding habitat in the Plan Area).

22 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*  
23 *Restoration*, *CM5 Seasonally Inundated Floodplain Restoration*, and *CM7 Riparian Natural Community*  
24 *Restoration* to restore or create at least 5,000 acres and protect at least 750 acres of valley/foothill  
25 riparian natural community (Table 3-4 in Chapter 3, *Description of Alternatives*). The majority of  
26 riparian protection and restoration acres would occur in CZ 7 as part of a reserve system with  
27 extensive wide bands or large patches of valley/foothill riparian natural community (Objectives  
28 VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*). Riparian restoration would  
29 expand the patches of existing riparian forest in order to support nesting habitat for riparian  
30 species. The Plan's objectives would also benefit cormorants, herons, and egrets by protecting small  
31 but essential habitats that occur within cultivated lands, such as tree rows along field borders or  
32 roads, and small clusters of trees in farmyards or rural residences (Objective CLNC1.3). In addition,  
33 the distribution and abundance of potential nest trees would be increased by planting and  
34 maintaining native trees along roadsides and field borders within protected cultivated lands at a  
35 rate of one tree per 10 acres (Objective SWHA2.1).

36 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
37 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
38 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
39 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
40 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
41 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
42 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*. Double-crested  
43 cormorant, great blue heron, great egret, snowy egret, and black-crowned night heron are not  
44 species that are covered under the BDCP. These species are highly traditional in their use of nest

1 sites and for the BDCP to avoid a significant impact on individuals, preconstruction surveys would  
2 be required to ensure that nests are detected and any direct and indirect impacts on rookeries are  
3 avoided. Implementation of Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird*  
4 *Surveys and Avoid Disturbance of Nesting Birds*, and Mitigation Measure BIO-117, *Avoid Impacts on*  
5 *Rookeries*, would reduce this potential impact to a less-than-significant level.

6 Considering Alternative 4's protection and restoration provisions, which would provide acreages of  
7 new or enhanced habitat in amounts sufficient to compensate for the loss of riparian habitats lost to  
8 construction and restoration activities, and with implementation of AMM1-AMM7, *AMM18*  
9 *Swainson's Hawk and White-Tailed Kite* and Mitigation Measure BIO-75, the loss of habitat or direct  
10 mortality through implementation of Alternative 4 would not result in a substantial adverse effect  
11 through habitat modifications and would not substantially reduce the number or restrict the range  
12 of these species. Therefore, the loss of habitat or potential mortality under this alternative would  
13 have a less-than-significant impact on cormorants, herons, and egrets.

14 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**  
15 **Disturbance of Nesting Birds**

16 See Mitigation Measure BIO-75 under Impact BIO-75.

17 **Mitigation Measure BIO-117: Avoid Impacts on Rookeries**

18 Herons, egrets, and cormorants are highly traditional in their use of nest sites (rookeries);  
19 therefore, DWR will avoid all direct and indirect impacts on rookeries.

20 **Impact BIO-118: Effects Associated with Electrical Transmission Facilities on Cormorants,**  
21 **Herons and Egrets**

22 New transmission lines would increase the risk for bird-power line strikes, which could result in  
23 injury or mortality of cormorants, herons and egrets. *AMM20 Greater Sandhill Crane* would minimize  
24 the risk for bird-power line strikes, for these species. This measure would ensure that conductor and  
25 ground lines are fitted with flight diverters in compliance with the best available practices, such as  
26 those specified in the USFWS Avian Protection Guidelines and would minimize the potential for an  
27 adverse effect.

28 **NEPA Effects:** New transmission lines would increase the risk for bird-power line strikes, which  
29 could result in injury or mortality of cormorants, herons, and egrets. *AMM20 Greater Sandhill Crane*  
30 would reduce the potential for collisions on new and select existing powerlines in the study area.  
31 The construction of new transmission lines would not result in an adverse effect on cormorants,  
32 herons, and egrets.

33 **CEQA Conclusion:** New transmission lines would increase the risk for bird-power line strikes, which  
34 could result in injury or mortality of cormorants, herons, and egrets. *AMM20 Greater Sandhill Crane*  
35 would reduce birdstrike on new transmission lines and select existing transmission lines with the  
36 installation of flight diverters. With these in place, new transmission lines would have a less-than-  
37 significant impact on cormorants, herons and egrets.

38 **Impact BIO-119: Indirect Effects of Plan Implementation on Cormorants, Herons and Egrets**

39 **Indirect construction- and operation-related effects:** Construction noise above background noise  
40 levels (greater than 50 dBA) could extend 500 to 5,250 feet from the edge of construction activities

1 (BDCP Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of the BDCP Conveyance*  
2 *Facility on Sandhill Crane*, Table 4), although there are no available data to determine the extent to  
3 which these noise levels could affect cormorants, herons, or egrets. If cormorants, herons or egrets  
4 were to nest in or adjacent to work areas, construction and subsequent maintenance-related noise  
5 and visual disturbances could mask calls, disrupt foraging and nesting behaviors, and reduce the  
6 functions of suitable nesting habitat for these species. Mitigation Measure BIO-75, *Conduct*  
7 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would avoid the  
8 potential for adverse effects of construction-related activities on survival and productivity of nesting  
9 cormorants, herons or egrets. The use of mechanical equipment during water conveyance facilities  
10 construction could cause the accidental release of petroleum or other contaminants that could affect  
11 cormorants, herons or egrets in the surrounding habitat. The inadvertent discharge of sediment or  
12 excessive dust adjacent to suitable habitat could also have an adverse effect on these species.  
13 AMM1–AMM7, including *AMM2 Construction Best Management Practices and Monitoring*, would  
14 minimize the likelihood of such spills and ensure that measures are in place to prevent runoff from  
15 the construction area and negative effects of dust on active nests.

16 **Methylmercury Exposure:** Covered activities have the potential to exacerbate bioaccumulation of  
17 mercury in avian species, including cormorants, herons or egrets. Future operational impacts under  
18 CM1 were analyzed using a DSM-2 based model to assess potential effects on mercury concentration  
19 and bioavailability resulting from proposed flows. Subsequently, a regression model was used to  
20 estimate fish-tissue concentrations under these future operational conditions (evaluated starting  
21 operations or ESO). Results indicated that changes in total mercury levels in water and fish tissues  
22 due to ESO were insignificant (see BDCP Appendix 5.D, Tables 5D.4-3, 5D.4-4, and 5D.4-5).

23 Marsh (tidal and nontidal) and floodplain restoration have the potential to increase exposure to  
24 methylmercury. Mercury is transformed into the more bioavailable form of methylmercury in  
25 aquatic systems, especially areas subjected to regular wetting and drying such as tidal marshes and  
26 flood plains (Alpers et al. 2008). Thus, BDCP restoration activities that create newly inundated areas  
27 could increase bioavailability of mercury (see BDCP Chapter 3, *Conservation Strategy*, for details of  
28 restoration). Species sensitivity to methylmercury differs widely and there is a large amount of  
29 uncertainty with respect to species-specific effects. Increased methylmercury associated with  
30 natural community and floodplain restoration could indirectly affect on cormorants, herons or  
31 egrets, via uptake in lower trophic levels (as described in the BDCP, Appendix 5.D, *Contaminants*).

32 In addition, the potential mobilization or creation of methylmercury within the Plan Area varies  
33 with site-specific conditions and would need to be assessed at the project level. *CM12 Methylmercury*  
34 *Management* contains provisions for project-specific Mercury Management Plans. Site-specific  
35 restoration plans that address the creation and mobilization of mercury, as well as monitoring and  
36 adaptive management as described in CM12 would be available to address the uncertainty of  
37 methylmercury levels in restored tidal marsh and potential impacts on cormorants, herons or  
38 egrets.

39 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in  
40 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,  
41 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,  
42 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz  
43 2009). The effect of selenium toxicity differs widely between species and also between age and sex  
44 classes within a species. In addition, the effect of selenium on a species can be confounded by

1 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith  
2 2009).

3 The primary source of selenium bioaccumulation in birds is through their diet (Ackerman and  
4 Eagles-Smith 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the  
5 trophic level at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At  
6 Kesterson Reservoir in the San Joaquin Valley, selenium concentrations in invertebrates have been  
7 found to be two to six times the levels in rooted plants. Furthermore, bivalves sampled in the San  
8 Francisco Bay contained much higher selenium levels than crustaceans such as copepods (Stewart et  
9 al. 2004). Studies conducted at the Grasslands in Merced County recorded higher selenium levels in  
10 black-necked stilts which feed on aquatic invertebrates than in mallards and pintails, which are  
11 primarily herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which  
12 forage on bivalves) have much higher levels of selenium levels than shorebirds that prey on aquatic  
13 invertebrates (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high  
14 levels of selenium have a higher risk of selenium toxicity.

15 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations  
16 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to  
17 exacerbate bioaccumulation of selenium in avian species, including cormorants, herons, and egrets.  
18 Marsh (tidal and nontidal) and floodplain restoration have the potential to mobilize selenium, and  
19 therefore increase avian exposure from ingestion of prey items with elevated selenium levels. Thus,  
20 BDCP restoration activities that create newly inundated areas could increase bioavailability of  
21 selenium (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Changes in  
22 selenium concentrations were analyzed in Chapter 8, *Water Quality*, and it was determined that,  
23 relative to Existing Conditions and the No Action Alternative, CM1 would not result in substantial,  
24 long-term increases in selenium concentrations in water in the Delta under any alternative.  
25 However, it is difficult to determine whether the effects of potential increases in selenium  
26 bioavailability associated with restoration-related conservation measures (CM4, CM5) would lead to  
27 adverse effects on cormorants, herons, and egrets.

28 Because of the uncertainty that exists at this programmatic level of review, there could be a  
29 substantial effect on cormorants, herons, and egrets from increases in selenium associated with  
30 restoration activities. This effect would be addressed through the implementation of *AMM27*  
31 *Selenium Management* (BDCP Appendix 3.C, *Avoidance and Minimization Measures*) which would  
32 provide specific tidal habitat restoration design elements to reduce the potential for  
33 bioaccumulation of selenium and its bioavailability in tidal habitats. Furthermore, the effectiveness  
34 of selenium management to reduce selenium concentrations and/or bioaccumulation would be  
35 evaluated separately for each restoration effort as part of design and implementation. This  
36 avoidance and minimization measure would be implemented as part of the tidal habitat restoration  
37 design schedule.

38 **NEPA Effects:** Noise and visual disturbances from the construction of water conveyance facilities  
39 could reduce cormorant, heron, and egret use of modeled habitat adjacent to work areas. Moreover,  
40 operation and maintenance of the water conveyance facilities, including the transmission facilities,  
41 could result in ongoing but periodic postconstruction disturbances that could affect cormorant,  
42 heron, and egret use of the surrounding habitat. Mitigation Measure BIO-75, *Conduct Preconstruction*  
43 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, and Mitigation Measure BIO-117, *Avoid*  
44 *Impacts on Rookeries*, would be available to address adverse effects on nesting individuals in  
45 addition to AMM1-AMM7. Tidal habitat restoration could result in increased exposure of

1 cormorants, herons, and egrets to selenium. This effect would be addressed through the  
2 implementation of *AMM27 Selenium Management*, which would provide specific tidal habitat  
3 restoration design elements to reduce the potential for bioaccumulation of selenium and its  
4 bioavailability in tidal habitats. The implementation of tidal natural communities restoration or  
5 floodplain restoration could result in increased exposure of cormorants, herons or egrets to  
6 methylmercury through the ingestion of fish in restored tidal areas. However, it is unknown what  
7 concentrations of methylmercury are harmful to these species and the potential for increased  
8 exposure varies substantially within the study area. Site-specific restoration plans that address the  
9 creation and mobilization of mercury, as well as monitoring and adaptive management as described  
10 in CM12, would address the uncertainty of methylmercury levels in restored tidal marsh in the study  
11 area and better inform potential impacts on cormorants, herons, and egrets. The site-specific  
12 planning phase of marsh restoration would be the appropriate place to assess the potential for risk  
13 of methylmercury exposure for cormorants, herons, and egrets once site specific sampling and other  
14 information could be developed.

15 **CEQA Conclusion:** Impacts of noise, the potential for hazardous spills, increased dust and  
16 sedimentation, and operations and maintenance of the water conveyance facilities would be less  
17 than significant with the implementation of Mitigation Measure BIO-75, *Conduct Preconstruction*  
18 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, and Mitigation Measure BIO-117, *Avoid*  
19 *Impacts on Rookeries*, and AMM1–AMM7. The implementation of tidal natural communities  
20 restoration or floodplain restoration could result in increased exposure of cormorants, herons or  
21 egrets to methylmercury, through the ingestion of fish in tidally restored areas. However, it is  
22 unknown what concentrations of methylmercury are harmful to these species. Site-specific  
23 restoration plans that address the creation and mobilization of mercury, as well as monitoring and  
24 adaptive management as described in CM12 would address the potential impacts of methylmercury  
25 levels in restored tidal marsh in the study area on cormorants, herons, and egrets. Tidal habitat  
26 restoration could result in increased exposure of cormorants, herons, and egrets to selenium. This  
27 effect would be addressed through the implementation of *AMM27 Selenium Management*, which  
28 would provide specific tidal habitat restoration design elements to reduce the potential for  
29 bioaccumulation of selenium and its bioavailability in tidal habitats. Therefore, the indirect effects of  
30 Alternative 4 implementation would not have a significant impact on cormorants, herons, and  
31 egrets.

32 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**  
33 **Disturbance of Nesting Birds**

34 See Mitigation Measure BIO-75 under Impact BIO-75.

35 **Measure BIO-117: Avoid Impacts on Rookeries**

36 Herons, egrets, and cormorants are highly traditional in their use of nest sites (rookeries),  
37 therefore all direct and indirect impacts on rookeries must be avoided.

38 **Impact BIO-120: Periodic Effects of Inundation on Cormorants, Herons and Egrets as a Result**  
39 **of Implementation of Conservation Components**

40 Flooding of the Yolo Bypass from Fremont Weir operations (CM2) would increase the frequency and  
41 duration of inundation of approximately 51–92 acres of modeled breeding habitat for cormorants,  
42 herons and egrets. However, increased periodic flooding is not expected to cause any adverse effect

1 on breeding habitat because trees in which nest sites are situated already withstand floods, the  
2 increase in inundation frequency and duration is expected to remain within the range of tolerance of  
3 riparian trees, and nest sites are located above floodwaters.

4 Based on hypothetical floodplain restoration, CM5 implementation could result in periodic  
5 inundation of up to 266 acres of breeding habitat for cormorants, herons and egrets. The overall  
6 effect of seasonal inundation in existing riparian natural communities is likely to be beneficial for  
7 these species, because, historically, flooding was the main natural disturbance regulating ecological  
8 processes in riparian areas, and flooding promotes the germination and establishment of many  
9 native riparian plants.

10 **NEPA Effects:** Increased periodic flooding would not be expected to cause any adverse effect on nest  
11 sites because trees in which nest sites are situated already withstand floods, the increase in  
12 inundation frequency and duration is expected to remain within the range of tolerance of riparian  
13 trees, and nest sites are located above floodwaters. Therefore, increased duration and inundation  
14 from CM2 and CM5 would not result in an adverse effect on cormorants, herons and egrets.

15 **CEQA Conclusion:** Increased periodic flooding would not be expected to cause any adverse effect on  
16 nest sites because trees in which nest sites are situated already withstand floods, the increase in  
17 inundation frequency and duration is expected to remain within the range of tolerance of riparian  
18 trees, and nest sites are located above floodwaters. Therefore, increased duration and inundation  
19 from CM2 and CM5 would have a less-than-significant impact on cormorants, herons and egrets.

## 20 **Short-Eared Owl and Northern Harrier**

21 This section describes the effects of Alternative 4, including water conveyance facilities construction  
22 and implementation of other conservation components, on short-eared owl and northern harrier.  
23 Modeled habitat for short-eared owl and northern harrier include tidal brackish and freshwater  
24 emergent wetland, nontidal freshwater perennial emergent wetland, managed wetland, other  
25 natural seasonal wetland, grassland, alkali seasonal wetland, vernal pool complex, and selected  
26 cultivated lands.

27 Construction and restoration associated with Alternative 4 conservation measures would result in  
28 both temporary and permanent losses of modeled habitat for short-eared owl and northern harrier  
29 as indicated in Table 12-4-46. Full implementation of Alternative 4 would include the following  
30 conservation actions over the term of the BDCP which would also benefit short-eared owl and  
31 northern harrier (BDCP Chapter 3, Section 3.3, *Biological Goals and Objectives*).

- 32 • Restore or create at least 6,000 acres of tidal brackish emergent wetland in CZ 11 including at  
33 least 1,500 acres of middle and high marsh (Objectives TBEWNC1.1 and TBEWNC1.2, associated  
34 with CM4).
- 35 • Restore or create at least 24,000 acres of tidal freshwater emergent wetland in CZ 1, 2, 4, 5, 6,  
36 and/or 7 (Objective TFEWNC1.2, associated with CM4).
- 37 • Create at least 1,200 acres of nontidal marsh consisting of a mosaic of nontidal perennial aquatic  
38 and nontidal freshwater emergent wetland natural communities (Objective NFEW/NPANC1.1,  
39 associated with CM10).
- 40 • Protect at least 8,000 acres of grassland with at least 2,000 acres protected in CZ 1, at least 1,000  
41 acres protected in CZ 8, at least 2,000 acres protected in CZ 11, and the remainder distributed  
42 among CZs 1, 2, 4, 5, 7, 8, and 11 (Objective GNC1.1, associated with CM3).

- 1 • Restore at least 2,000 acres of grasslands (Objective GNC1.2, associated with CM8).
- 2 • Protect at least 150 acres of alkali seasonal wetland and at least 600 acres of existing vernal pool
- 3 complex in CZs 1, 8, and/or 11 (Objectives ASWNC1.1 and VPNC1.1, associated with CM3).
- 4 • Protect and enhance at least 8,100 acres of managed wetland, at least 1,500 acres of which are
- 5 in the Grizzly Island Marsh Complex (Objective MWNC1.1, associated with CM3).
- 6 • Increase prey availability and accessibility for grassland-foraging species (Objectives ASWNC2.4,
- 7 VPNC2.5, and GNC2.4, associated with CM11).

8 As explained below, with the restoration or protection of these amounts of habitat, in addition to  
 9 management activities that would enhance habitat for these species, AMM1–AMM7, *AMM27*  
 10 *Selenium Management* and Mitigation Measure BIO-75, impacts on short-eared owl and northern  
 11 harrier would not be adverse for NEPA purposes and would be less than significant for CEQA  
 12 purposes.

13 **Table 12-4-46. Changes in Short-Eared Owl and Northern Harrier Modeled Habitat Associated with**  
 14 **Alternative 4 (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	Nesting and Foraging	2,012	2,012	773	773	NA	NA
<b>Total Impacts CM1</b>		<b>2,012</b>	<b>2,012</b>	<b>773</b>	<b>773</b>		
CM2–CM18	Nesting and Foraging	12,281	46,700	471	1,224	2,926-8,060	5,978
<b>Total Impacts CM2–CM18</b>		<b>12,281</b>	<b>46,700</b>	<b>471</b>	<b>1,224</b>	<b>2,926-8,060</b>	<b>5,978</b>
<b>TOTAL IMPACTS</b>		<b>14,293</b>	<b>48,712</b>	<b>1,244</b>	<b>1,997</b>	<b>2,926-8,060</b>	<b>5,978</b>

<sup>a</sup> See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

15

16 **Impact BIO-121: Loss or Conversion of Habitat for and Direct Mortality of Short-Eared Owl**  
 17 **and Northern Harrier**

18 Alternative 4 conservation measures would result in the combined permanent and temporary loss  
 19 of up to 50,709 acres of modeled habitat for short-eared owl and northern harrier (of which 48,712  
 20 acres would be a permanent loss and 1,997 acres would be a temporary loss of habitat, Table 12-4-  
 21 46). Conservation measures that would result in these losses are conveyance facilities and  
 22 transmission line construction, and establishment and use of borrow and spoil areas (CM1), Yolo

1 Bypass Fisheries Enhancement (CM2), tidal habitat restoration (CM4), floodplain restoration (CM5),  
2 grassland restoration (CM8), vernal pool and wetland restoration (CM9), marsh restoration (CM10)  
3 and construction of conservation hatcheries (CM18). The majority of habitat loss would result from  
4 CM4. Habitat enhancement and management activities (CM11), which include ground disturbance  
5 or removal of nonnative vegetation, could result in local adverse habitat effects. In addition,  
6 maintenance activities associated with the long-term operation of the water conveyance facilities  
7 and other BDCP physical facilities could degrade or eliminate short-eared owl and northern harrier  
8 modeled habitat. Each of these individual activities is described below. A summary statement of the  
9 combined impacts and NEPA effects, and a CEQA conclusion follow the individual conservation  
10 measure discussions.

- 11 • *CM1 Water Facilities and Operation:* Construction of Alternative 4 conveyance facilities would  
12 result in the combined permanent and temporary loss of up to 2,785 acres of modeled short-  
13 eared owl and northern harrier habitat (2,012 acres of permanent loss, 773 acres of temporary  
14 loss) from CZs 3–6 and CZ 8. Activities that would impact modeled habitat consist of tunnel,  
15 forebay, and intake construction, temporary access roads, and construction of transmission  
16 lines. The majority of habitat removed would consist of grassland and alfalfa fields. There are no  
17 occurrences of nesting short-eared owl and northern harrier that overlap with the construction  
18 footprint of CM1. However, Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird*  
19 *Surveys and Avoid Disturbance of Nesting Birds*, would be available to minimize impacts on short-  
20 eared owl and northern harrier if they were to nest in the vicinity of construction activities.  
21 Refer to the Terrestrial Biology Map Book for a detailed view of Alternative 4 construction  
22 locations. Impacts from CM1 would occur within the first 10 years of Plan implementation.
- 23 • *CM2 Yolo Bypass Fisheries Enhancement:* Construction of the Yolo bypass fisheries enhancement  
24 (CM2) would permanently remove 1,021 acres of modeled short-eared owl and northern harrier  
25 habitat in the Yolo Bypass in CZ 2. In addition, 471 acres of habitat would be temporarily  
26 removed. The impact would primarily consist of loss of acreages of pastures. The conversion is  
27 expected to occur during the first 10 years of Alternative 4 implementation.
- 28 • *CM4 Tidal Natural Communities Restoration:* Tidal habitat restoration site preparation and  
29 inundation would permanently remove an estimated 39,017 acres of modeled short-eared owl  
30 and northern harrier habitat. The majority of the losses would be managed wetlands and  
31 cultivated lands in CZs 1, 2, 4, 5, 6, 7, 8, 10, and 11. Tidal restoration actions through CM4 would  
32 restore an estimated 55,000 acres of tidal natural communities. These restored wetland areas  
33 could provide suitable nesting habitat for short-eared owl and northern harrier. Consequently,  
34 although existing nesting habitat for short-eared owl and northern harrier would be removed,  
35 restoration of wetland habitats is expected to benefit marsh associated ground nesting birds by  
36 increasing the extent and value of their nesting habitat. Grizzley Island supports the only known  
37 resident population of short-eared owls in the Suisun Marsh and Sacramento-San Joaquin River  
38 Delta (Roberson 2008). Grizzley Island does not overlap with the hypothetical footprint for *CM4*  
39 *Tidal Natural Communities Restoration*. However, this is an important breeding area for short-  
40 eared owl and if restoration footprints were changed during the implementation process of  
41 BDCP to overlap with this area, the effects on breeding short-eared owls could likely be adverse.  
42 Future NEPA and CEQA analysis would be conducted for restoration projects under BDCP and if  
43 restoration was proposed to occur outside of the hypothetical footprints used for this  
44 programmatic analysis, potential impacts on these species would be captured in the project-  
45 level analysis (Appendix 3B, Section 3.2.5).

- 1       ● *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore  
2       seasonally inundated floodplain would permanently and temporarily remove approximately  
3       2,086 acres of modeled short-eared owl and northern harrier habitat (1,332 permanent, 754  
4       temporary). These losses would be expected to occur along the San Joaquin River and other  
5       major waterways in CZ 7.
- 6       ● *CM7 Riparian Natural Community Restoration*: Riparian restoration would permanently remove  
7       approximately 623 acres of short-eared owl and northern harrier habitat as part of tidal  
8       restoration and 2,479 acres of habitat as part of seasonal floodplain restoration.
- 9       ● *CM8 Grassland Natural Community Restoration*: Restoration of grassland is expected to be  
10      implemented on agricultural lands and would result in the conversion of 1,066 acres of  
11      cultivated lands to grassland in CZs 1, 2, 4, 5, 7, 8, and 11. The resulting 2,000 acres of grassland  
12      would provide habitat for short-eared owl and northern harrier.
- 13      ● *CM11 Natural Communities Enhancement and Management*: A variety of habitat management  
14      actions included in CM11 that are designed to enhance wildlife values in restored or protected  
15      habitats could result in localized ground disturbances that could temporarily remove small  
16      amounts of modeled habitat. Ground-disturbing activities, such as removal of nonnative  
17      vegetation and road and other infrastructure maintenance activities, would be expected to have  
18      minor adverse effects on available habitat and would be expected to result in overall  
19      improvements to and maintenance of habitat values over the term of the BDCP.  
20      Habitat management- and enhancement-related activities could short-eared owl and northern  
21      harrier nests. If either species were to nest in the vicinity of a worksite, equipment operation  
22      could destroy nests, and noise and visual disturbances could lead to their abandonment,  
23      resulting in mortality of eggs and nestlings. Mitigation Measure BIO-75, *Conduct Preconstruction*  
24      *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to minimize  
25      these adverse effects.
- 26      ● *CM18 Conservation Hatcheries*: Implementation of CM18 would remove up to 35 acres of short-  
27      eared owl and northern harrier habitat for the development of a delta and longfin smelt  
28      conservation hatchery in CZ 1. The loss is expected to occur during the first 10 years of Plan  
29      implementation.
- 30      ● *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground  
31      water conveyance facilities and restoration infrastructure could result in ongoing but periodic  
32      disturbances that could affect short-eared owl and northern harrier use of the surrounding  
33      habitat. Maintenance activities would include vegetation management, levee and structure  
34      repair, and re-grading of roads and permanent work areas. These effects, however, would be  
35      reduced by AMM1–AMM7, Mitigation Measure BIO-75, and conservation actions as described  
36      below.
- 37      ● *Injury and Direct Mortality*: Construction-related activities would not be expected to result in  
38      direct mortality of adult or fledged short-eared owl and northern harrier if they were present in  
39      the Plan Area, because they would be expected to avoid contact with construction and other  
40      equipment. If either species were to nest in the construction area, construction-related  
41      activities, including equipment operation, noise and visual disturbances could destroy nests or  
42      lead to their abandonment, resulting in mortality of eggs and nestlings. Mitigation Measure BIO-  
43      75 would be available to minimize these adverse effects.

1 The following paragraphs summarize the combined effects discussed above and describe other  
2 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also  
3 included.

#### 4 ***Near-Term Timeframe***

5 Because the water conveyance facilities construction is being evaluated at the project level, the near-  
6 term BDCP conservation strategy has been evaluated to determine whether it would provide  
7 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the effects of  
8 construction would not be adverse under NEPA. Alternative 4 would remove 15,537 acres of  
9 modeled habitat (14,293 permanent, 1,244 temporary) for short-eared owl and northern harrier in  
10 the study area in the near-term. These effects would result from the construction of the water  
11 conveyance facilities (CM1, 2,785 acres), and implementing other conservation measures (*CM2 Yolo*  
12 *Bypass Fisheries Enhancement, CM4 Tidal Natural Communities Restoration, CM5 Seasonally*  
13 *Inundated Floodplain Restoration, CM7, Riparian Natural Community Restoration, CM8 Grassland*  
14 *Natural Community Restoration, CM10 Nontidal Marsh Restoration, and CM18 Conservation*  
15 *Hatcheries—12,752 acres).*

16 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by  
17 CM1 would be 1:1 for restoration/creation and 1:1 protection of habitat. Using these typical ratios  
18 would indicate that 2,785 acres of habitat should be restored and 2,785 acres should be protected to  
19 compensate for the CM1 losses of short-eared owl and northern harrier habitat. The near-term  
20 effects of other conservation actions would remove 12,752 acres of modeled habitat, and therefore  
21 require 12,752 acres of restoration and 12,752 acres of protection of short-eared owl and northern  
22 harrier habitat using the same typical NEPA and CEQA ratios (1:1 for restoration and 1:1 for  
23 protection).

24 The BDCP has committed to near-term goals of protecting 2,000 acres and restoring 1,140 acres of  
25 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of  
26 alkali seasonal wetland complex, protecting 4,800 acres of managed wetland natural community,  
27 protecting 15,400 acres of non-rice cultivated lands, protecting 900 acres of rice or rice equivalent  
28 habitat, and restoring 19,150 acres of tidal wetlands (Table 3-4 in Chapter 3, *Description of*  
29 *Alternatives*). These conservation actions are associated with CM3, CM4, and CM8 and would occur  
30 in the same timeframe as the construction and early restoration losses. The acres of protection and  
31 restoration contained in the near-term Plan goals satisfy the typical mitigation ratios that would be  
32 applied to the project-level effects of CM1 and the effects from other near-term restoration actions.

33 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1  
34 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali  
35 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous  
36 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would  
37 provide nesting and foraging habitat for short-eared owl and northern harrier and reduce the effects  
38 of current levels of habitat fragmentation. Small mammal populations would also be increased on  
39 protected lands, enhancing the foraging value of these natural communities (Objectives ASWNC2.4,  
40 VPNC2.5, and GNC2.4). Foraging opportunities would also be improved by enhancing prey  
41 populations through the establishment of 20- to 30-foot-wide hedgerows along field borders and  
42 roadsides within protected cultivated lands (Objective SWHA2.2). Remnant patches of grassland or  
43 other uncultivated areas would also be protected and maintained as part of the cultivated lands  
44 reserve system which would provide additional foraging habitat and a source of rodent prey that

1 could recolonize cultivated fields (Objective CLNC1.3). The protection of managed wetlands  
2 (including upland grassland components) would preserve habitat for short-eared owl and northern  
3 harrier (Objective MWNC1.1). Protection and enhancement of managed wetlands to meet this  
4 objective would focus on highly degraded areas in order to provide the greatest possible level of  
5 enhancement benefit to the managed wetland natural community and associated species. Managed  
6 wetland protection and enhancement would be concentrated in Suisun Marsh, which currently  
7 supports a high concentration of nesting short-eared owls on Grizzley Island.

8 The restoration of 19,150 acres of tidal natural communities, including transitional uplands would  
9 provide nesting and foraging habitat for short-eared owl and northern harrier. Short-eared owl and  
10 northern harrier nest in open habitats within cultivated lands including alfalfa, irrigated pasture,  
11 and other grain fields. At least 15,400 acres of cultivated lands that provide habitat for covered and  
12 other native wildlife species would be protected in the near-term time period (Objective CLNC1.1). A  
13 minimum of 87% of cultivated lands protected by the late long-term time period would be in alfalfa,  
14 irrigated pasture, and other hay crops (Objective SH1.2). This biological objective provides an  
15 estimate for the proportion of cultivated lands protected in the near-term time period which would  
16 provide suitable nesting and foraging habitat for short-eared owl and northern harrier. These  
17 biological goals and objectives would inform the near-term protection and restoration efforts and  
18 represent performance standards for considering the effectiveness of restoration actions.

19 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*  
20 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*  
21 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
22 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
23 *Material, and AMM7 Barge Operations Plan. All of these AMMs include elements that would avoid or*  
24 *minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are*  
25 *described in detail in BDCP Appendix 3.C, Avoidance and Minimization Measures.*

26 The short-eared owl and the northern harrier are not covered species under the BDCP. For the BDCP  
27 to avoid adverse effects on individuals, preconstruction surveys for noncovered avian species would  
28 be required to ensure that nests are detected and avoided. Mitigation Measure BIO-75, *Conduct*  
29 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to  
30 address this adverse effect.

### 31 **Late Long-Term Timeframe**

32 Based on modeled habitat, the study area supports approximately 406,784 acres of modeled nesting  
33 and foraging habitat for short-eared owl and northern harrier. Alternative 4 as a whole would result  
34 in the permanent loss of and temporary effects on 50,709 acres of modeled short-eared owl and  
35 northern harrier habitat during the term of the Plan (12% of the modeled habitat in the study area).  
36 The locations of these losses are described above in the analyses of individual conservation  
37 measures.

38 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*  
39 *Restoration, CM4 Tidal Natural Communities Restoration, and CM8 Grassland Natural Community*  
40 *Restoration*, to protect 8,000 acres and restore 2,000 acres of grassland natural community, protect  
41 600 acres of vernal pool complex, protect 150 acres of alkali seasonal wetland complex, protect  
42 8,100 acres of managed wetland, protect 48,625 acres of cultivated lands that provide suitable  
43 habitat for native wildlife species, and restore at least 65,000 acres of tidal wetlands (Table 3-4 in  
44 Chapter 3).

1 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1  
2 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali  
3 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous  
4 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would  
5 provide nesting and foraging habitat for short-eared owl and northern harrier and reduce the effects  
6 of current levels of habitat fragmentation. Small mammal populations would also be increased on  
7 protected lands, enhancing the foraging value of these natural communities (Objectives ASWNC2.4,  
8 VPNC2.5, and GNC2.4). Foraging opportunities would also be improved by enhancing prey  
9 populations through the establishment of 20- to 30-foot-wide hedgerows along field borders and  
10 roadsides within protected cultivated lands (Objective SWHA2.2). Remnant patches of grassland or  
11 other uncultivated areas would also be protected and maintained as part of the cultivated lands  
12 reserve system which would provide additional foraging habitat and a source of rodent prey that  
13 could recolonize cultivated fields (Objective CLNC1.3). The protection of managed wetlands  
14 (including upland grassland components) would preserve habitat for short-eared owl and northern  
15 harrier (Objective MWNC1.1). Protection and enhancement of managed wetlands to meet this  
16 objective would focus on highly degraded areas in order to provide the greatest possible level of  
17 enhancement benefit to the managed wetland natural community and associated species. Managed  
18 wetland protection and enhancement would be concentrated in Suisun Marsh, which supports a  
19 high concentration of nesting short-eared owls on Grizzley Island. At least 1,500 acres of the  
20 managed wetlands would be protected and enhanced on Grizzley Island by the late long-term time  
21 period. The restoration of 19,150 acres of tidal natural communities, including transitional uplands  
22 would provide nesting and foraging habitat for short-eared owl and northern harrier. Short-eared  
23 owl and northern harrier nest in open habitats within cultivated lands including alfalfa, irrigated  
24 pasture, and other grain fields. A minimum of 87% of the 48,625 acres of cultivated lands protected  
25 by the late long-term time period (Objective CLNC1.1) would be managed in alfalfa, irrigated  
26 pasture, and other hay crops (Objective SH1.2) which are compatible crop types for these species.

27 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
28 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
29 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
30 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
31 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
32 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
33 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*. Short-eared owl  
34 and northern harrier are not species that are covered under the BDCP. For the BDCP to avoid an  
35 adverse effect on individuals, preconstruction surveys for noncovered avian species would be  
36 required to ensure that active nests are detected and avoided. Mitigation Measure BIO-75, *Conduct*  
37 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to  
38 address this effect.

39 **NEPA Effects:** The loss of short-eared owl and northern harrier habitat and potential direct  
40 mortality of these special-status species under Alternative 4 would represent an adverse effect in  
41 the absence of other conservation actions. However, with habitat protection and restoration  
42 associated with CM3, CM8, and CM11, guided by biological goals and objectives and by AMM1–  
43 AMM7, which would be in place throughout the construction period, the effects of habitat loss from  
44 Alternative 4 would not be adverse. Short-eared owl and northern harrier are not covered species  
45 under the BDCP, and preconstruction surveys for noncovered avian species would be required to

1 ensure that nests are detected and avoided. Mitigation Measure BIO-75 would be available to  
2 address the adverse effect of direct mortality on short-eared owl and northern harrier.

3 **CEQA Conclusion:**

4 **Near-Term Timeframe**

5 Because the water conveyance facilities construction is being evaluated at the project level, the near-  
6 term BDCP conservation strategy has been evaluated to determine whether it would provide  
7 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the effects of  
8 construction would be less than significant under CEQA. Alternative 4 would remove 15,537 acres of  
9 modeled habitat (14,293 permanent, 1,244 temporary) for short-eared owl and northern harrier in  
10 the study area in the near-term. These effects would result from the construction of the water  
11 conveyance facilities (CM1, 2,785 acres), and implementing other conservation measures (CM2 Yolo  
12 Bypass Fisheries Enhancement, CM4 Tidal Natural Communities Restoration, CM5 Seasonally  
13 Inundated Floodplain Restoration, CM7, Riparian Natural Community Restoration, CM8 Grassland  
14 Natural Community Restoration, CM10 Nontidal Marsh Restoration, and CM18 Conservation  
15 Hatcheries—12,752 acres).

16 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by  
17 CM1 would be 1:1 for restoration/creation and 1:1 protection of habitat. Using these typical ratios  
18 would indicate that 2,785 acres of habitat should be restored and 2,785 acres should be protected to  
19 compensate for the CM1 losses of short-eared owl and northern harrier habitat. The near-term  
20 effects of other conservation actions would remove 12,752 acres of modeled habitat, and therefore  
21 require 12,752 acres of restoration and 12,752 acres of protection of short-eared owl and northern  
22 harrier habitat using the same typical NEPA and CEQA ratios (1:1 for restoration and 1:1 for  
23 protection).

24 The BDCP has committed to near-term goals of protecting 2,000 acres and restoring 1,140 acres of  
25 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of  
26 alkali seasonal wetland complex, protecting 4,800 acres of managed wetland natural community,  
27 protecting 15,400 acres of non-rice cultivated lands, protecting 900 acres of rice or rice equivalent  
28 habitat, and restoring 19,150 acres of tidal wetlands (Table 3-4 in Chapter 3). These conservation  
29 actions are associated with CM3, CM4, and CM8 and would occur in the same timeframe as the  
30 construction and early restoration losses. The acres of protection and restoration contained in the  
31 near-term Plan goals satisfy the typical mitigation ratios that would be applied to the project-level  
32 effects of CM1 and the effects from other near-term restoration actions.

33 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1  
34 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali  
35 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous  
36 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would  
37 provide nesting and foraging habitat for short-eared owl and northern harrier and reduce the effects  
38 of current levels of habitat fragmentation. Small mammal populations would also be increased on  
39 protected lands, enhancing the foraging value of these natural communities (Objectives ASWNC2.4,  
40 VPNC2.5, and GNC2.4). Foraging opportunities would also be improved by enhancing prey  
41 populations through the establishment of 20- to 30-foot-wide hedgerows along field borders and  
42 roadsides within protected cultivated lands (Objective SWHA2.2). Remnant patches of grassland or  
43 other uncultivated areas would also be protected and maintained as part of the cultivated lands  
44 reserve system which would provide additional foraging habitat and a source of rodent prey that

1 could recolonize cultivated fields (Objective CLNC1.3). The protection of managed wetlands  
2 (including upland grassland components) would preserve habitat for short-eared owl and northern  
3 harrier (Objective MWNC1.1). Protection and enhancement of managed wetlands to meet this  
4 objective would focus on highly degraded areas in order to provide the greatest possible level of  
5 enhancement benefit to the managed wetland natural community and associated species. Managed  
6 wetland protection and enhancement would be concentrated in Suisun Marsh, which supports a  
7 high concentration of nesting short-eared owls on Grizzley Island.

8 The restoration of 19,150 acres of tidal natural communities, including transitional uplands would  
9 provide nesting and foraging habitat for short-eared owl and northern harrier. Short-eared owl and  
10 northern harrier nest in open habitats within cultivated lands including alfalfa, irrigated pasture,  
11 and other grain fields. At least 15,400 acres of cultivated lands that provide habitat for covered and  
12 other native wildlife species would be protected in the near-term time period (Objective CLNC1.1). A  
13 minimum of 87% of cultivated lands protected by the late long-term time period would be in alfalfa,  
14 irrigated pasture, and other hay crops (Objective SH1.2). This biological objective provides an  
15 estimate for the proportion of cultivated lands protected in the near-term time period which would  
16 provide suitable nesting and foraging habitat for short-eared owl and northern harrier. These  
17 biological goals and objectives would inform the near-term protection and restoration efforts and  
18 represent performance standards for considering the effectiveness of restoration actions.

19 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
20 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
21 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
22 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
23 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
24 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
25 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

26 The short-eared owl and the northern harrier are not covered species under the BDCP. In order for  
27 the BDCP to avoid adverse effects on individuals, preconstruction surveys for noncovered avian  
28 species would be required to ensure that nests are detected and avoided. The implementation of  
29 Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of*  
30 *Nesting Birds*, would reduce this potential impact to a less-than-significant level.

### 31 ***Late Long-Term Timeframe***

32 Based on modeled habitat, the study area supports approximately 406,784 acres of modeled nesting  
33 and foraging habitat for short-eared owl and northern harrier. Alternative 4 as a whole would result  
34 in the permanent loss of and temporary effects on 50,709 acres of modeled short-eared owl and  
35 northern harrier habitat during the term of the Plan (12% of the modeled habitat in the study area).  
36 The locations of these losses are described above in the analyses of individual conservation  
37 measures.

38 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*  
39 *Restoration*, *CM4 Tidal Natural Communities Restoration*, and *CM8 Grassland Natural Community*  
40 *Restoration* to protect 8,000 acres and restore 2,000 acres of grassland natural community, protect  
41 600 acres of vernal pool complex, protect 150 acres of alkali seasonal wetland complex, protect  
42 8,100 acres of managed wetland, protect 48,625 acres of cultivated lands that provide suitable  
43 habitat for native wildlife species, and restore at least 65,000 acres of tidal wetlands (Table 3-4 in  
44 Chapter 3).

1 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1  
2 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali  
3 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous  
4 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would  
5 provide nesting and foraging habitat for short-eared owl and northern harrier and reduce the effects  
6 of current levels of habitat fragmentation. Small mammal populations would also be increased on  
7 protected lands, enhancing the foraging value of these natural communities (Objectives ASWNC2.4,  
8 VPNC2.5, and GNC2.4). Foraging opportunities would also be improved by enhancing prey  
9 populations through the establishment of 20- to 30-foot-wide hedgerows along field borders and  
10 roadsides within protected cultivated lands (Objective SWHA2.2). Remnant patches of grassland or  
11 other uncultivated areas would also be protected and maintained as part of the cultivated lands  
12 reserve system which would provide additional foraging habitat and a source of rodent prey that  
13 could recolonize cultivated fields (Objective CLNC1.3). The protection of managed wetlands  
14 (including upland grassland components) would preserve habitat for short-eared owl and northern  
15 harrier (Objective MWNC1.1). Protection and enhancement of managed wetlands to meet this  
16 objective would focus on highly degraded areas in order to provide the greatest possible level of  
17 enhancement benefit to the managed wetland natural community and associated species. Managed  
18 wetland protection and enhancement would be concentrated in Suisun Marsh, which supports a  
19 high concentration of nesting short-eared owls on Grizzley Island. At least 1,500 acres of the  
20 managed wetlands would be protected and enhanced on Grizzley Island by the late long-term time  
21 period. The restoration of 19,150 acres of tidal natural communities, including transitional uplands  
22 would provide nesting and foraging habitat for short-eared owl and northern harrier. Short-eared  
23 owl and northern harrier nest in open habitats within cultivated lands including alfalfa, irrigated  
24 pasture, and other grain fields. A minimum of 87% of the 48,625 acres of cultivated lands protected  
25 by the late long-term time period (Objective CLNC1.1) would be managed in alfalfa, irrigated  
26 pasture, and other hay crops (Objective SH1.2) which are compatible crop types for these species.

27 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
28 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
29 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
30 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
31 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
32 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
33 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*. Short-eared owl  
34 and northern harrier are not species that are covered under the BDCP. For the BDCP to have a less-  
35 than-significant impact on individuals, preconstruction surveys for noncovered avian species would  
36 be required to ensure that active nests are detected and avoided. Implementation of Mitigation  
37 Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting*  
38 *Birds*, would be reduce the impact to a less-than-significant level.

39 Considering Alternative 4's protection and restoration provisions, which would provide acreages of  
40 new high-value or enhanced habitat in amounts suitable to compensate for habitats lost to  
41 construction and restoration activities, and with the implementation of AMM1-AMM7 and  
42 Mitigation Measure BIO-75, the loss of habitat or direct mortality through implementation of  
43 Alternative 4 would not result in a substantial adverse effect through habitat modifications and  
44 would not substantially reduce the number or restrict the range of either species. Therefore, the loss  
45 of habitat or potential mortality under this alternative would have a less-than-significant impact on  
46 short-eared owl and northern harrier.

1           **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**  
2           **Disturbance of Nesting Birds**

3           See Mitigation Measure BIO-75 under Impact BIO-75.

4           **Impact BIO-122: Effects on Short-Eared Owl and Northern Harrier Associated with Electrical**  
5           **Transmission Facilities**

6           New transmission lines would increase the risk that short-eared owl and northern harrier could be  
7           subject to power line strikes, which could result in injury or mortality of these species. Short-eared  
8           owl and northern harrier would be at low risk of bird strike mortality based on factors assessed in  
9           the bird strike vulnerability analysis (BDCP Attachment 5.J-2, *Memorandum: Analysis of Potential*  
10          *Bird Collisions at Proposed BDCP Transmission Lines*). Factors analyzed include the height of the new  
11          transmission lines and the flight behavior of species. The existing network of transmission lines in  
12          the Plan Area currently poses the same small risk for these species, and any incremental risk  
13          associated with the new power line corridors would also be expected to be low. *AMM20 Greater*  
14          *Sandhill Crane*, would further reduce any potential effects.

15          **NEPA Effects:** New transmission lines would minimally increase the risk for short-eared owl and  
16          northern harrier power line strikes. With the implementation of *AMM20 Greater Sandhill Crane*, the  
17          potential effect of the construction of new transmission lines on short-eared owl and northern  
18          harrier would not be adverse.

19          **CEQA Conclusion:** New transmission lines would minimally increase the risk for short-eared owl  
20          and northern harrier power line strikes. *AMM20 Greater Sandhill Crane* would reduce the potential  
21          impact of the construction of new transmission lines on short-eared owl and northern harrier to a  
22          less-than-significant level.

23          **Impact BIO-123: Indirect Effects of Plan Implementation on Short-Eared Owl and Northern**  
24          **Harrier**

25          **Indirect construction- and operation-related effects:** Noise and visual disturbances associated  
26          with construction-related activities could result in temporary disturbances that affect short-eared  
27          owl and northern harrier use of modeled habitat. Construction noise above background noise levels  
28          (greater than 50 dBA) could extend 500 to 5,250 feet from the edge of construction activities (BDCP  
29          Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of the BDCP Conveyance Facility on*  
30          *Sandhill Crane*, Table 4), although there are no available data to determine the extent to which these  
31          noise levels could affect short-eared owl or northern harrier. Indirect effects associated with  
32          construction include noise, dust, and visual disturbance caused by grading, filling, contouring, and  
33          other ground-disturbing operations. Construction-related noise and visual disturbances could  
34          disrupt nesting and foraging behaviors, and reduce the functions of suitable habitat which could  
35          result in an adverse effect on these species. Mitigation Measure BIO-75, *Conduct Preconstruction*  
36          *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to minimize adverse  
37          effects on active nests. The use of mechanical equipment during water conveyance construction  
38          could cause the accidental release of petroleum or other contaminants that could affect these  
39          species or their prey in the surrounding habitat. AMM1–AMM7, including *AMM2 Construction Best*  
40          *Management Practices and Monitoring*, would minimize the likelihood of such spills from occurring.  
41          The inadvertent discharge of sediment or excessive dust adjacent to short-eared owl and northern  
42          harrier could also have a negative effect on these species. AMM1–AMM7 would ensure that

1 measures are in place to prevent runoff from the construction area and the negative effects of dust  
2 on wildlife adjacent to work areas.

3 **Methylmercury Exposure:** Covered activities have the potential to exacerbate bioaccumulation of  
4 mercury in avian species, including short-eared owl and northern harrier. Marsh (tidal and nontidal)  
5 and floodplain restoration have the potential to increase exposure to methylmercury. Mercury is  
6 transformed into the more bioavailable form of methylmercury in aquatic systems, especially areas  
7 subjected to regular wetting and drying such as tidal marshes and flood plains (Alpers et al. 2008).  
8 Thus, BDCP restoration activities that create newly inundated areas could increase bioavailability of  
9 mercury (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Species sensitivity  
10 to methylmercury differs widely and there is a large amount of uncertainty with respect to species-  
11 specific effects. Increased methylmercury associated with natural community and floodplain  
12 restoration could indirectly affect short-eared owl and northern harrier, via uptake in lower trophic  
13 levels (as described in the BDCP Appendix 5.D, *Contaminants*).

14 In addition, the potential mobilization or creation of methylmercury within the Plan Area varies  
15 with site-specific conditions and would need to be assessed at the project level. *CM12 Methylmercury*  
16 *Management* contains provisions for project-specific Mercury Management Plans. Site-specific  
17 restoration plans that address the creation and mobilization of mercury, as well as monitoring and  
18 adaptive management as described in CM12 would be available to address the uncertainty of  
19 methylmercury levels in restored tidal marsh and potential impacts on short-eared owl and  
20 northern harrier.

21 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in  
22 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,  
23 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,  
24 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz  
25 2009). The effect of selenium toxicity differs widely between species and also between age and sex  
26 classes within a species. In addition, the effect of selenium on a species can be confounded by  
27 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith  
28 2009).

29 The primary source of selenium bioaccumulation in birds is through their diet (Ackerman and  
30 Eagles-Smith 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the  
31 trophic level at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At  
32 Kesterson Reservoir in the San Joaquin Valley, selenium concentrations in invertebrates have been  
33 found to be two to six times the levels in rooted plants. Furthermore, bivalves sampled in the San  
34 Francisco Bay contained much higher selenium levels than crustaceans such as copepods (Stewart et  
35 al. 2004). Studies conducted at the Grasslands in Merced County recorded higher selenium levels in  
36 black-necked stilts which feed on aquatic invertebrates than in mallards and pintails, which are  
37 primarily herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which  
38 forage on bivalves) have much higher levels of selenium levels than shorebirds that prey on aquatic  
39 invertebrates (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high  
40 levels of selenium have a higher risk of selenium toxicity.

41 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations  
42 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to  
43 exacerbate bioaccumulation of selenium in avian species, including short-eared owl and northern  
44 harrier. Marsh (tidal and nontidal) and floodplain restoration have the potential to mobilize

1 selenium, and therefore increase avian exposure from ingestion of prey items with elevated  
2 selenium levels. Thus, BDCP restoration activities that create newly inundated areas could increase  
3 bioavailability of selenium (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration).  
4 Changes in selenium concentrations were analyzed in Chapter 8, *Water Quality*, and it was  
5 determined that, relative to Existing Conditions and the No Action Alternative, CM1 would not result  
6 in substantial, long-term increases in selenium concentrations in water in the Delta under any  
7 alternative. However, it is difficult to determine whether the effects of potential increases in  
8 selenium bioavailability associated with restoration-related conservation measures (CM4, CM5)  
9 would lead to adverse effects on short-eared owl and northern harrier.

10 Because of the uncertainty that exists at this programmatic level of review, there could be a  
11 substantial effect on short-eared owl and northern harrier from increases in selenium associated  
12 with restoration activities. This effect would be addressed through the implementation of *AMM27*  
13 *Selenium Management* (BDCP Appendix 3.C, *Avoidance and Minimization Measures*) which would  
14 provide specific tidal habitat restoration design elements to reduce the potential for  
15 bioaccumulation of selenium and its bioavailability in tidal habitats. Furthermore, the effectiveness  
16 of selenium management to reduce selenium concentrations and/or bioaccumulation would be  
17 evaluated separately for each restoration effort as part of design and implementation. This  
18 avoidance and minimization measure would be implemented as part of the tidal habitat restoration  
19 design schedule.

20 **NEPA Effects:** Noise and visual disturbances from the construction of water conveyance facilities  
21 could reduce short-eared owl and northern harrier use of modeled habitat adjacent to work areas.  
22 Moreover, operation and maintenance of the water conveyance facilities, including the transmission  
23 facilities, could result in ongoing but periodic postconstruction disturbances that could affect short-  
24 eared owl and northern harrier use of the surrounding habitat. Mitigation Measure BIO-75, *Conduct*  
25 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to  
26 address adverse effects on nesting individuals in addition to AMM1–AMM7. Tidal habitat restoration  
27 could result in increased exposure of short-eared owl and northern harrier. This effect would be  
28 addressed through the implementation of *AMM27 Selenium Management*, which would provide  
29 specific tidal habitat restoration design elements to reduce the potential for bioaccumulation of  
30 selenium and its bioavailability in tidal habitats.

31 Tidal habitat restoration is unlikely to have an adverse effect on short-eared owl and northern  
32 harrier through increased exposure to methylmercury, as these species currently nest and forage in  
33 tidal marshes where elevated methylmercury levels exist. However, it is unknown what  
34 concentrations of methylmercury are harmful to the species and the potential for increased  
35 exposure varies substantially within the study area. Site-specific restoration plans in addition to  
36 monitoring and adaptive management, described in CM12 *Methylmercury Management*, would  
37 address the uncertainty of methylmercury levels in restored tidal marsh. The site-specific planning  
38 phase of marsh restoration would be the appropriate place to assess the potential for risk of  
39 methylmercury exposure for California least tern, once site specific sampling and other information  
40 could be developed.

41 **CEQA Conclusion:** Noise, the potential for hazardous spills, increased dust and sedimentation, and  
42 operations and maintenance of the water conveyance facilities would have a less-than-significant  
43 impact on short-eared owl and northern harrier with the implementation of Mitigation Measure  
44 BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, and  
45 AMM1–AMM7. Tidal habitat restoration is unlikely to have a significant impact on short-eared owl

1 and northern harrier through increased exposure to methylmercury, as these species currently nest  
2 and forage in tidal marshes where elevated methylmercury levels exist. However, it is unknown  
3 what concentrations of methylmercury are harmful to these species. Site-specific restoration plans  
4 that address the creation and mobilization of mercury, as well as monitoring and adaptive  
5 management as described in CM12 would better inform potential impacts and address the  
6 uncertainty of methylmercury levels in restored tidal marsh in the study area. Tidal habitat  
7 restoration could result in increased exposure of short-eared owl and northern harrier to selenium.  
8 This effect would be addressed through the implementation of *AMM27 Selenium Management*, which  
9 would provide specific tidal habitat restoration design elements to reduce the potential for  
10 bioaccumulation of selenium and its bioavailability in tidal habitats. Therefore, the indirect effects of  
11 Alternative 4 implementation would not have an adverse effect on short-eared owl and northern  
12 harrier.

13 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**  
14 **Disturbance of Nesting Birds**

15 See Mitigation Measure BIO-75 under Impact BIO-75.

16 **Impact BIO-124: Periodic Effects of Inundation on Short-Eared Owl and Northern Harrier as a**  
17 **Result of Implementation of Conservation Components**

18 Flooding of the Yolo Bypass from Fremont Weir operations (*CM2 Yolo Bypass Fisheries*  
19 *Enhancement*) would increase the frequency and duration of inundation on approximately 2,926–  
20 8,060 acres of modeled short-eared owl and northern harrier habitat (Table 12-4-46).

21 Based on hypothetical footprints, implementation of *CM5 Seasonally Inundated Floodplain*  
22 *Restoration* could result in the periodic inundation of up to approximately 5,978 acres of modeled  
23 habitat (Table 12-4-46), the majority of which would be pasture and other cultivated lands.

24 Reduced foraging habitat availability may be expected during the fledgling period of the nesting  
25 season due to periodic inundation. However, inundation would occur during the nonbreeding  
26 season and would not be expected to have an adverse effect on either species.

27 **NEPA Effects:** Periodic inundation of floodplains would not result in an adverse effect on short-  
28 eared owl and northern harrier because inundation is expected to occur prior to the breeding  
29 season.

30 **CEQA Conclusion:** Periodic inundation of floodplains would not have a significant impact on short-  
31 eared owl and northern harrier because inundation is expected to occur prior to the breeding  
32 season.

33 **Redhead and Tule Greater White-Fronted Goose**

34 Impacts, relevant protection and restoration actions, and mitigation requirements under CEQA are  
35 discussed for these species in the *General Terrestrial Biology Effects* section under Impacts BIO-178  
36 through BIO-183. Further details of the methods of analysis for waterfowl and shorebirds can be  
37 found in the *BDCP Waterfowl and Shorebird Effects Analysis* (Ducks Unlimited 2013).

1       **Mountain Plover**

2       This section describes the effects of Alternative 4, including water conveyance facilities construction  
3       and implementation of other conservation components, on mountain plover. Modeled habitat for  
4       mountain plover include grassland, alkali seasonal wetland, vernal pool complex, alfalfa, grain and  
5       hay, pasture, and idle cropland throughout the study area.

6       Construction and restoration associated with Alternative 4 conservation measures would result in  
7       both temporary and permanent losses of modeled habitat for mountain plover as indicated in Table  
8       12-4-47. Full implementation of Alternative 4 would include the following biological objectives over  
9       the term of the BDCP which would also benefit the mountain plover (BDCP Chapter 3, Section 3.3,  
10      *Biological Goals and Objectives*).

- 11      • Protect at least 8,000 acres of grassland with at least 2,000 acres protected in CZ 1, at least 1,000  
12      acres protected in CZ 8, at least 2,000 acres protected in CZ 11, and the remainder distributed  
13      among CZs 1, 2, 4, 5, 7, 8, and 11 (Objective GNC1.1, associated with CM3).
- 14      • Restore at least 2,000 acres of grasslands (Objective GNC1.2, associated with CM8).
- 15      • Protect at least 150 acres of alkali seasonal wetland and at least 600 acres of existing vernal pool  
16      complex in CZs 1, 8, and/or 11 (Objectives ASWNC1.1 and VPNC1.1, associated with CM3).
- 17      • Increase prey availability and accessibility for grassland-foraging species (Objectives ASWNC2.4,  
18      VPNC2.5, GNC2.4, associated with CM11).
- 19      • Protect at least 48,625 acres of cultivated lands that provide suitable habitat for covered and  
20      other native wildlife species (Objective CLNC1.1, associated with CM3).
- 21      • Within the at least 48,625 acres of protected cultivated lands, protect at least 42,275 acres of  
22      cultivated lands as Swainson's hawk foraging habitat with at least 50% in very high-value  
23      habitat in CZs 2, 3, 4, 5, 7, 8, 9, and 11 (Objective SH1.2, associated with CM3).

24      As explained below, with the restoration or protection of these amounts of habitat, in addition to  
25      management activities that would enhance these natural communities for the species, impacts on  
26      mountain plover would not be adverse for NEPA purposes and would be less than significant for  
27      CEQA purposes.

1 **Table 12-4-47. Changes in Mountain Plover Modeled Habitat Associated with Alternative 4 (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	Wintering	1,969	1,969	633	633	NA	NA
<b>Total Impacts CM1</b>		<b>1,969</b>	<b>1,969</b>	<b>633</b>	<b>633</b>		
CM2-CM18	Wintering	5,450	26,198	376	893	1,158-3,650	3,823
<b>Total Impacts CM2-CM18</b>		<b>5,450</b>	<b>26,198</b>	<b>376</b>	<b>893</b>	<b>1,158-3,650</b>	<b>3,823</b>
<b>TOTAL IMPACTS</b>		<b>7,419</b>	<b>28,167</b>	<b>1,009</b>	<b>1,526</b>	<b>1,158-3,650</b>	<b>3,823</b>

<sup>a</sup> See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

2

3 **Impact BIO-125: Loss or Conversion of Habitat for and Direct Mortality of Mountain Plover**

4 Alternative 4 conservation measures would result in the combined permanent and temporary loss  
 5 of up to 29,693 acres of modeled wintering habitat for mountain plover (28,167 acres of permanent  
 6 loss and 1,526 of temporary loss, Table 12-4-47). Conservation measures that would result in these  
 7 losses are conveyance facilities and transmission line construction, and establishment and use of  
 8 borrow and spoil areas (CM1), Yolo Bypass fisheries improvements (CM2), tidal habitat restoration  
 9 (CM4), floodplain restoration (CM5), riparian restoration (CM7), grassland restoration (CM8),  
 10 vernal pool and wetland restoration (CM9), nontidal marsh restoration (CM10), and construction of  
 11 conservation hatcheries (CM18). The majority of habitat loss (20,880 acres) would result from CM4.  
 12 Habitat enhancement and management activities (CM11), which include ground disturbance or  
 13 removal of nonnative vegetation, and the construction of recreational trails, signs, and facilities,  
 14 could result in local adverse habitat effects. In addition, maintenance activities associated with the  
 15 long-term operation of the water conveyance facilities and other BDCP physical facilities could  
 16 degrade or eliminate mountain plover modeled wintering habitat. Each of these individual activities  
 17 is described below. A summary statement of the combined impacts and NEPA effects, and a CEQA  
 18 conclusion follow the individual conservation measure discussions.

- 19 • *CM1 Water Facilities and Operation*: Construction of Alternative 4 conveyance facilities would  
 20 result in the combined permanent and temporary loss of up to 2,602 acres of modeled mountain  
 21 plover habitat (1,969 acres of permanent loss, 633 acres of temporary loss). The construction of  
 22 the permanent and temporary transmission line corridors through CZs 4-6 and 9 would remove  
 23 suitable wintering habitat for the species. Approximately 685 acres of impact would be from the  
 24 new forebay constructed south of the Clifton court Forebay in CZ 8. Some of the grassland  
 25 habitat lost at the sites of new canals south of Clifton Court Forebay is composed of larger stands  
 26 of ruderal and herbaceous vegetation and California annual grassland, which is also suitable

1 habitat for the species. There are no CNDDDB occurrences of mountain plover that intersect with  
2 the CM1 footprint. However, the study area does overlap with the wintering range for the  
3 species. Refer to the Terrestrial Biology Map Book for a detailed view of Alternative 4  
4 construction locations. Impacts from CM1 would occur within the first 10 years of Plan  
5 implementation.

- 6 • *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo bypass fisheries enhancement  
7 would result in the combined permanent and temporary loss of up to 1,274 acres of modeled  
8 mountain plover wintering habitat (898 acres of permanent loss, 376 acres of temporary loss) in  
9 the Yolo Bypass in CZ 2. Impacted habitat would consist primarily of grassland and pasture.  
10 Most of the grassland losses would occur at the north end of the bypass below Fremont Weir,  
11 along the Toe Drain/Tule Canal, and along the west side channels. Realignment of Putah Creek  
12 could also involve excavation and grading in alkali seasonal wetland complex habitat as a new  
13 channel is constructed. The loss is expected to occur during the first 10 years of Alternative 4  
14 implementation.
- 15 • *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and  
16 inundation would permanently remove an estimated 20,880 acres of modeled mountain plover  
17 habitat. The majority of the acres lost would consist of cultivated lands in CZs 1, 2, 4, 5, 6, and/or  
18 7. Grassland losses would likely occur in the vicinity of Cache Slough, on Decker Island in the  
19 West Delta ROA, on the upslope fringes of Suisun Marsh, and along narrow bands adjacent to  
20 waterways in the South Delta ROA. Tidal restoration would directly impact and fragment  
21 grassland just north of Rio Vista in and around French and Prospect Islands, and in an area  
22 south of Rio Vista around Threemile Slough. Losses of alkali seasonal wetland complex habitat  
23 would likely occur in the south end of the Yolo Bypass and on the northern fringes of Suisun  
24 Marsh.
- 25 • *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore  
26 seasonally inundated floodplain would permanently and temporarily remove approximately  
27 1,450 acres of modeled mountain plover habitat (933 permanent, 517 temporary). These losses  
28 would be expected after the first 10 years of Alternative 4 implementation along the San Joaquin  
29 River and other major waterways in CZ 7.
- 30 • *CM7 Riparian Natural Community Restoration*: Riparian restoration would permanently remove  
31 approximately 370 acres of mountain plover wintering habitat as part of tidal restoration and  
32 1,489 acres of habitat as part of seasonal floodplain restoration.
- 33 • *CM8 Grassland Natural Community Restoration and CM9 Vernal Pool and Alkali Seasonal Wetland*  
34 *Complex Restoration*: Temporary construction-related disturbance of grassland habitat would  
35 result from implementation of CM8 and CM9 in in CZs 1, 2, 4, 5, 7, 8, and 11. However, all areas  
36 would be restored after the construction periods. Grassland restoration would be implemented  
37 on agricultural lands that also provide wintering habitat for mountain plover and would result  
38 in the conversion of 837 acres of cultivated lands to grassland.
- 39 • *CM10 Nontidal Marsh Restoration*: Implementation of CM10 would result in the permanent  
40 removal of 705 acres of mountain plover habitat.
- 41 • *CM11 Natural Communities Enhancement and Management*: A variety of habitat management  
42 actions included in CM11 that are designed to enhance wildlife values in restored or protected  
43 habitats could result in localized ground disturbances that could temporarily remove small  
44 amounts of mountain plover habitat. Ground-disturbing activities, such as removal of nonnative

1 vegetation and road and other infrastructure maintenance activities, would be expected to have  
2 minor adverse effects on available mountain plover habitat. CM11 would also include the  
3 construction of recreational-related facilities including trails, interpretive signs, and picnic  
4 tables (BDCP Chapter 4, *Covered Activities and Associated Federal Actions*). The construction of  
5 trailhead facilities, signs, staging areas, picnic areas, bathrooms, etc. would be placed on existing,  
6 disturbed areas when and where possible. However, approximately 50 acres of grassland  
7 habitat would be lost from the construction of trails and facilities.

- 8 ● *CM18 Conservation Hatcheries*: Implementation of CM18 would remove up to 35 acres of  
9 modeled mountain plover habitat for the development of a delta and longfin smelt conservation  
10 hatchery in CZ 1.
- 11 ● *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground  
12 water conveyance facilities and restoration infrastructure could result in ongoing but periodic  
13 disturbances that could affect mountain plover use of the surrounding habitat. Maintenance  
14 activities would include vegetation management, levee and structure repair, and re-grading of  
15 roads and permanent work areas. These effects, however, would be reduced by AMM1–AMM7  
16 and conservation actions as described below.
- 17 ● *Injury and Direct Mortality*: Construction would not be expected to result in direct mortality of  
18 mountain plover because foraging individuals would be expected to temporarily avoid the  
19 increased noise and activity associated with construction areas.

20 The following paragraphs summarize the combined effects discussed above and describe other  
21 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also  
22 included.

### 23 ***Near-Term Timeframe***

24 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
25 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
26 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
27 effects of construction would not be adverse under NEPA. Alternative 4 would remove 8,428 acres  
28 (7,419 permanent, 1,009 temporary) of modeled mountain plover wintering habitat in the study  
29 area in the near-term. These effects would result from the construction of the water conveyance  
30 facilities (CM1, 2,602 acres), and implementing other conservation measures (*CM2 Yolo Bypass*  
31 *Fisheries Enhancement*, *CM4 Tidal Natural Communities Restoration*, *CM7 Riparian Natural*  
32 *Community Restoration*, *CM8 Grassland Natural Community Restoration*, *CM9 Vernal Pool and Alkali*  
33 *Seasonal Wetland Complex Restoration*, *CM11 Natural Communities Enhancement and Management*  
34 *and CM18 Conservation Hatcheries*—5,826 acres).

35 The typical NEPA and CEQA project-level mitigation ratio for those natural communities affected  
36 would be 2:1 for protection of habitat. Using this ratio would indicate that 5,204 acres should be  
37 protected to compensate for the CM1 losses of 2,602 acres of mountain plover wintering habitat.  
38 The near-term effects of other conservation actions would remove 5,826 acres of modeled habitat,  
39 and therefore require 11,652 acres of protection of mountain plover habitat using the same typical  
40 NEPA and CEQA ratio (2:1 for protection).

41 The BDCP has committed to near-term goals of protecting 2,000 acres and restoring 1,140 acres of  
42 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of  
43 alkali seasonal wetland complex, and protecting 15,400 acres of non-rice cultivated lands (Table 3-4

1 in Chapter 3, *Description of Alternatives*). These conservation actions are associated with CM3, CM8,  
2 and CM9 and would occur in the same timeframe as the construction and early restoration losses  
3 thereby avoiding adverse effects of habitat loss on mountain plover wintering in the study area.  
4 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1  
5 and GNC1.2). Grassland protection in CZs 1, 8, and 11 would be associated with vernal pool and  
6 alkali seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a  
7 contiguous matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which  
8 would expand mountain plover wintering habitat and reduce the effects of current levels of habitat  
9 fragmentation. Under *CM11 Natural Communities Enhancement and Management*, insect prey  
10 populations would be increased on protected lands, enhancing the foraging value of these natural  
11 communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4). Cultivated lands that provide habitat  
12 for covered and other native wildlife species would provide approximately 15,400 acres of potential  
13 wintering habitat for mountain plover (Objective CLNC1.1). Approximately 87% of cultivated lands  
14 protected by the late long-term time period would be in alfalfa and pasture crop types (very high-  
15 and high-value crop types for Swainson's hawk (Objective SH1.2) which are also modeled habitat for  
16 wintering mountain plover. This biological objective provides an estimate for the high proportion of  
17 cultivated lands protected in the near-term time period which would be suitable for mountain  
18 plover.

19 The acres of restoration and protection contained in the near-term Plan goals and the additional  
20 detail in the biological objectives satisfy the typical mitigation that would be applied to the project-  
21 level effects of CM1 on mountain plover, as well as mitigate the near-term effects of the other  
22 conservation measures with the consideration that some portion of the 15,400 acres of cultivated  
23 lands protected in the near-term timeframe would be managed in suitable crop types to compensate  
24 for the loss of habitat at a ratio of 2:1. Mitigation Measure BIO-125, *Compensate for the Near-Term*  
25 *Loss of Mountain Plover Wintering Habitat*, would be available to address the adverse effect of  
26 habitat loss in the near-term.

27 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
28 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
29 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
30 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
31 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
32 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
33 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

#### 34 ***Late Long-Term Timeframe***

35 Based on the habitat model, the study area supports approximately 269,411 acres of potential  
36 habitat for mountain plover. Alternative 4 as a whole would result in the permanent loss of and  
37 temporary effects on 29,692 acres of modeled mountain plover wintering habitat during the term of  
38 the Plan. The locations of these losses are described above in the analyses of individual conservation  
39 measures. The Plan includes conservation commitments through *CM3 Natural Communities*  
40 *Protection and Restoration*, *CM8 Grassland Natural Community Restoration*, and *CM9 Vernal Pool and*  
41 *Alkali Seasonal Wetland Complex Restoration* to protect 8,000 acres and restore 2,000 acres of  
42 grassland natural community, protect 600 acres of vernal pool complex, protect 150 acres of alkali  
43 seasonal wetland complex and protect 48,625 acres of cultivated lands that provide suitable habitat  
44 for native wildlife species (Table 3-4 in Chapter 3). Grassland restoration and protection would  
45 occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1 and GNC1.2). Grassland protection in CZs 1, 8,

1 and 11 would be associated with vernal pool and alkali seasonal wetland complexes (Objectives  
2 ASWNC1.1 and VPNC1.1) and would result in a contiguous matrix of grassland, alkali seasonal  
3 wetland, and vernal pool natural communities which would expand habitat for mountain plover and  
4 reduce the effects of current levels of habitat fragmentation. Under *CM11 Natural Communities*  
5 *Enhancement and Management*, insect prey populations would be increased on protected lands,  
6 enhancing the foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and  
7 GNC2.4). Cultivated lands that provide habitat for covered and other native wildlife species would  
8 provide approximately 15,400 acres of potential wintering habitat for mountain plover (Objective  
9 CLNC1.1). Approximately 42,275 acres of cultivated lands protected would be in alfalfa and pasture  
10 crop types (very high- and high-value crop types for Swainson's hawk (Objective SH1.2) which  
11 would also provide potential wintering habitat for mountain plover. The Plan also includes  
12 commitments to implement *AMM1 Worker Awareness Training*, *AMM2 Construction Best*  
13 *Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention Plan*, *AMM4 Erosion*  
14 *and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and Countermeasure Plan*, *AMM6*  
15 *Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged Material*, and *AMM7 Barge*  
16 *Operations Plan*. All of these AMMs include elements that would avoid or minimize the risk of  
17 affecting individuals and species habitats adjacent to work areas. The AMMs are described in detail  
18 in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

19 **NEPA Effects:** The loss of mountain plover habitat and potential mortality of this special-status  
20 species under Alternative 4 would represent an adverse effect in the absence of other conservation  
21 actions. However, with habitat protection and restoration associated with CM3, CM8, CM9, and  
22 CM11, guided by biological goals and objectives and by AMM1–AMM7, which would be in place  
23 throughout the construction period, and with implementation of Mitigation Measure BIO-125,  
24 *Compensate for the Near-Term Loss of Mountain Plover Wintering Habitat*, the effects of habitat loss  
25 and potential direct mortality on mountain plover under Alternative 4 would not be adverse.

26 **CEQA Conclusion:**

27 **Near-Term Timeframe**

28 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
29 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
30 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
31 effects of construction would be less than significant under CEQA. Alternative 4 would remove 8,428  
32 acres (7,419 permanent, 1,009 temporary) of modeled wintering habitat for mountain plover in the  
33 study area in the near-term. These effects would result from the construction of the water  
34 conveyance facilities (CM1, 2,602 acres), and implementing other conservation measures (*CM2 Yolo*  
35 *Bypass Fisheries Enhancement*, *CM4 Tidal Natural Communities Restoration*, *CM7 Riparian Natural*  
36 *Community Restoration*, *CM8 Grassland Natural Community Restoration*, *CM9 Vernal Pool and Alkali*  
37 *Seasonal Wetland Complex Restoration*, *CM11 Natural Communities Enhancement and Management*  
38 and *CM18 Conservation Hatcheries*—5,826 acres).

39 The typical NEPA and CEQA project-level mitigation ratio for those natural communities affected  
40 would be 2:1 for protection of habitat. Using this ratio would indicate that 5,204 acres should be  
41 protected to mitigate the CM1 losses of 2,602 acres of mountain plover habitat. The near-term  
42 effects of other conservation actions would remove 5,826 acres of modeled habitat, and therefore  
43 require 11,652 acres of protection of mountain plover wintering habitat using the same typical  
44 NEPA and CEQA ratio (2:1 for protection).

1 The BDCP has committed to near-term goals of protecting 2,000 acres and restoring 1,140 acres of  
2 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of  
3 alkali seasonal wetland complex, and protecting 15,400 acres of non-rice cultivated lands (Table 3-4  
4 in Chapter 3). These conservation actions are associated with CM3, CM8, and CM9 and would occur  
5 in the same timeframe as the construction and early restoration losses thereby avoiding significant  
6 impacts of habitat loss on mountain plover. Grassland restoration and protection would occur in CZs  
7 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1 and GNC1.2). Grassland protection in CZs 1, 8, and 11  
8 would be associated with vernal pool and alkali seasonal wetland complexes (Objectives ASWNC1.1  
9 and VPNC1.1) and would result in a contiguous matrix of grassland, alkali seasonal wetland, and  
10 vernal pool natural communities which would expand wintering habitat for mountain plover and  
11 reduce the effects of current levels of habitat fragmentation. Under *CM11 Natural Communities*  
12 *Enhancement and Management*, insect prey populations would be increased on protected lands,  
13 enhancing the foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and  
14 GNC2.4). Cultivated lands that provide habitat for covered and other native wildlife species would  
15 provide approximately 15,400 acres of potential wintering habitat for mountain plover (Objective  
16 CLNC1.1). Approximately 87% of cultivated lands protected by the late long-term time period would  
17 be in alfalfa and pasture crop types (very high- and high-value crop types for Swainson's hawk  
18 (Objective SH1.2) which would also provide potential habitat for mountain plover wintering in the  
19 study area. This biological objective provides an estimate for the high proportion of cultivated lands  
20 protected in the near-term time period which would provide habitat for mountain plover.

21 These Plan objectives represent performance standards for considering the effectiveness of  
22 conservation actions. The acres of restoration and protection contained in the near-term Plan goals  
23 and the additional detail in the biological objectives satisfy the typical mitigation that would be  
24 applied to the project-level effects of CM1 on mountain plover, as well as mitigate the near-term  
25 effects of the other conservation measures with the consideration that some portion of the 15,400  
26 acres of cultivated lands protected in the near-term timeframe would be managed in suitable crop  
27 types to compensate for the loss of habitat at a ratio of 2:1. The implementation of Mitigation  
28 Measure BIO-125, *Compensate for the Near-Term Loss of Mountain Plover Wintering Habitat* would  
29 reduce the impact of habitat loss in the near-term to a less-than-significant level.

30 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
31 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
32 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
33 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
34 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
35 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
36 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

### 37 **Late Long-Term Timeframe**

38 Alternative 4 as a whole would result in the permanent loss of and temporary effects on 29,692  
39 acres of mountain plover habitat during the term of the Plan (11% of the total habitat in the study  
40 area). The locations of these losses are described above in the analyses of individual conservation  
41 measures. The Plan includes conservation commitments through *CM3 Natural Communities*  
42 *Protection and Restoration*, *CM8 Grassland Natural Community Restoration*, and *CM9 Vernal Pool and*  
43 *Alkali Seasonal Wetland Complex Restoration* to protect 8,000 acres and restore 2,000 acres of  
44 grassland natural community, protect 600 acres of vernal pool complex, protect 150 acres of alkali  
45 seasonal wetland complex and protect 48,625 acres of cultivated lands that provide suitable habitat

1 for native wildlife species (Table 3-4 in Chapter 3). Grassland restoration and protection would  
2 occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1 and GNC1.2). Grassland protection in CZs 1, 8,  
3 and 11 would be associated with vernal pool and alkali seasonal wetland complexes (Objectives  
4 ASWNC1.1 and VPNC1.1) and would result in a contiguous matrix of grassland, alkali seasonal  
5 wetland, and vernal pool natural communities which would expand wintering habitat for mountain  
6 plover and reduce the effects of current levels of habitat fragmentation. Under *CM11 Natural*  
7 *Communities Enhancement and Management*, insect prey populations would be increased on  
8 protected lands, enhancing the foraging value of these natural communities (Objectives ASWNC2.4,  
9 VPNC2.5, and GNC2.4). Cultivated lands that provide habitat for covered and other native wildlife  
10 species would provide approximately 15,400 acres of potential habitat for mountain plover  
11 (Objective CLNC1.1). Approximately 42,275 acres of cultivated lands protected would be in alfalfa  
12 and pasture crop types (very high- and high-value crop types for Swainson's hawk (Objective SH1.2)  
13 which would also provide habitat for mountain plover.

14 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
15 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
16 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
17 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
18 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
19 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
20 described in detail in BDCP Appendix 3.C, Avoidance and Minimization Measures.

21 Considering Alternative 4's protection and restoration provisions, which would provide acreages of  
22 new or enhanced habitat in amounts suitable to compensate for habitats lost to construction and  
23 restoration activities, and with the implementation of AMM1-AMM7, and Mitigation Measure BIO-  
24 125, *Compensate for the Near-Term Loss of Mountain Plover Wintering Habitat*, the loss of habitat or  
25 direct mortality through implementation of Alternative 4 would not result in a substantial adverse  
26 effect through habitat modifications and would not substantially reduce the number or restrict the  
27 range of mountain plover. Therefore, the loss of habitat or potential mortality under this alternative  
28 would have a less-than-significant impact on mountain plover.

29 **Mitigation Measure BIO-125: Compensate for the Near-term Loss of Mountain Plover**  
30 **Wintering Habitat**

31 DWR will manage and protect sufficient acres of cultivated lands such as pasture, grain and hay  
32 crops, or alfalfa to provide habitat for mountain plover such that the total acres of high-value  
33 habitat impacted in the near-term timeframe are mitigated at a ratio of 2:1. Additional grassland  
34 protection, enhancement, and management may be substituted for the protection of high-value  
35 cultivated lands.

36 **Impact BIO-126: Effects on Mountain Plover Associated with Electrical Transmission**  
37 **Facilities**

38 New transmission lines would increase the risk for bird-power line strikes, which could result in  
39 injury or mortality of mountain plover. Mountain plovers congregate in flocks during the winter and  
40 travel between grasslands and cultivated lands that provide foraging habitat for the species. This  
41 flocking behavior puts them at risk of collisions with powerlines. Existing transmission lines in the  
42 study area currently pose this risk. Plovers are primarily visual foragers and therefore, the risk for

1 collision would be reduced by *AMM20 Greater Sandhill Crane*, which would require the installation  
2 of bird flight diverters on new and selected existing transmission lines in the study area.

3 **NEPA Effects:** New transmission lines are not expected to have an adverse effect on mountain plover  
4 because mortality from powerline strikes would be minimized with the implementation of *AMM20*  
5 *Greater Sandhill Crane*, which would require the installation of bird flight diverters on new and  
6 selected existing transmission lines in the study area. The risk for bird-power line strikes is,  
7 therefore, not expected to have an adverse effect on mountain plover.

8 **CEQA Conclusion:** New transmission lines would have a less-than-significant impact on mountain  
9 plover because mortality from powerline strikes would be minimized with the implementation of  
10 *AMM20 Greater Sandhill Crane*, which would require the installation of bird flight diverters on new  
11 and selected existing transmission lines in the study area.

### 12 **Impact BIO-127: Indirect Effects of Plan Implementation on Mountain Plover**

13 Construction- and subsequent maintenance-related noise and visual disturbances could disrupt  
14 foraging, and reduce the functions of suitable foraging habitat for mountain plover. Construction  
15 noise above background noise levels (greater than 50 dBA) could extend 500 to 5,250 feet from the  
16 edge of construction activities (BDCP Appendix 5.J, Attachment 5J.D, *Indirect Effects of the*  
17 *Construction of the BDCP Conveyance Facility on Sandhill Crane*, Table 4), although there are no  
18 available data to determine the extent to which these noise levels could affect mountain plover.  
19 Indirect effects associated with construction include noise, dust, and visual disturbance caused by  
20 grading, filling, contouring, and other ground-disturbing operations. The use of mechanical  
21 equipment during water conveyance facilities construction could cause the accidental release of  
22 petroleum or other contaminants that could affect these species or their prey in the surrounding  
23 habitat. AMM1–AMM7 would minimize the likelihood of such spills from occurring. The inadvertent  
24 discharge of sediment or excessive dust adjacent to mountain plover grassland habitat could also  
25 have a negative effect on the species. However, AMM1–AMM7 would also ensure that measures  
26 would be in place to prevent runoff from the construction area and the negative effects of dust on  
27 wildlife adjacent to work areas.

28 **NEPA Effects:** Indirect effects on mountain plover as a result of Plan implementation could have  
29 adverse effects on the species through the modification of habitat. With the With the  
30 implementation of AMM1–AMM7, indirect effects as a result of Alternative 4 implementation would  
31 not have an adverse effect mountain plover.

32 **CEQA Conclusion:** Indirect effects on mountain plover as a result of Plan implementation could have  
33 a significant impact on the species from modification of habitat. With the implementation of AMM1–  
34 AMM7, indirect effects as a result of Alternative 4 implementation would have a less-than-significant  
35 impact on mountain plover.

### 36 **Impact BIO-128: Periodic Effects of Inundation on Mountain Plover as a Result of** 37 **Implementation of Conservation Components**

38 Flooding of the Yolo Bypass from Fremont Weir operations (*CM2 Yolo Bypass Fisheries*  
39 *Enhancement*) would increase the frequency and duration of inundation on approximately 1,158–  
40 3,650 acres of modeled mountain plover wintering habitat (Table 12-4-47). Based on hypothetical  
41 footprints, implementation of *CM5 Seasonally Inundated Floodplain Restoration* could result in the

1 periodic inundation of up to approximately 3,823 acres of modeled mountain plover habitat (Table  
2 12-4-47).

3 **NEPA Effects:** Implementation of CM2 and CM5 would periodically inundate suitable mountain  
4 plover foraging habitat. However, effects of periodic inundation would not have an adverse effect on  
5 mountain plover because birds would be expected to move to adjacent foraging habitat.

6 **CEQA Conclusion:** Implementation of CM2 and CM5 would periodically inundate suitable mountain  
7 plover foraging habitat. However, effects of periodic inundation would have a less-than-significant  
8 impact on mountain plover because birds would be expected to move to adjacent foraging habitat.

### 9 **Black Tern**

10 This section describes the effects of Alternative 4, including water conveyance facilities construction  
11 and implementation of other conservation components, on black tern. Modeled nesting habitat for  
12 black tern in the study area is currently limited to rice in CZ 2.

13 Construction and restoration associated with Alternative 4 conservation measures would result in  
14 both temporary and permanent losses of modeled habitat for black tern as indicated in Table 12-4-  
15 48. Full implementation of Alternative 4 would include the following biological objectives over the  
16 term of the BDCP which would also benefit the black tern (BDCP Chapter 3, Section 3.3, *Biological*  
17 *Goals and Objectives*).

- 18 ● Protect 700 acres of cultivated lands, with at least 500 acres consisting of rice land, to expand  
19 upon and buffer newly restored/created nontidal perennial habitat in CZ 2, (Objective GGS2.3,  
20 associated with CM3).
- 21 ● Protect up to 1,700 acres of rice land or equivalent habitat (e.g. perennial wetland) in the Yolo  
22 Bypass if this portion meets the criteria specified in CM3, *Reserve Design Requirements by Species*  
23 for giant garter snake. Any remaining acreage (from a total 2,740 acre commitment) will consist  
24 of rice land or equivalent-value habitat outside the Yolo Bypass in CZs 1, 2, 4, or 5 (Objective  
25 GGS3.1, associated with CM3).

26 As explained below, with the restoration and protection of these amounts of habitat, in addition to  
27 management activities that would enhance this habitat for the species and implementation of  
28 AMM1–AMM7 and Mitigation Measure BIO-75, impacts on black tern would not be adverse for NEPA  
29 purposes and would be less than significant for CEQA purposes.

1 **Table 12-4-48. Changes in Black Tern Modeled Habitat Associated with Alternative 4 (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	Nesting	0	0	0	0	NA	NA
<b>Total Impacts CM1</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>		
CM2–CM18	Nesting	76	260	0	0	791–1,582	0
<b>Total Impacts CM2–CM18</b>		<b>76</b>	<b>260</b>	<b>0</b>	<b>0</b>	<b>791–1,582</b>	<b>0</b>
<b>TOTAL IMPACTS</b>		<b>76</b>	<b>260</b>	<b>0</b>	<b>0</b>	<b>791–1,582</b>	<b>0</b>

<sup>a</sup> See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

2

3 **Impact BIO-129a: Loss or Conversion of Habitat for and Direct Mortality of Black Tern**

4 Alternative 4 conservation measures would result in the permanent loss of up to 260 acres of  
 5 modeled nesting habitat for black tern, consisting of rice in CZ 2 (Table 12-4-48). Conservation  
 6 measures that would result in these losses are grassland restoration (CM8) and nontidal marsh  
 7 restoration (CM10). Each of these individual activities is described below. A summary statement of  
 8 the combined impacts and NEPA effects, and a CEQA conclusion follows the individual conservation  
 9 measure discussions.

- 10 • *CM8 Grassland Natural Community Restoration*: Restoration of grassland is expected to be  
 11 implemented on agricultural lands and would result in the conversion of 52 acres of rice lands  
 12 to grassland in CZ 2 by the late-long time period. An estimated 30 acres of impact would occur in  
 13 the first 10 years.
- 14 • *CM10 Nontidal Marsh Restoration*: Implementation of *CM10* would result in the permanent  
 15 removal of 208 acres of black tern nesting habitat in in CZ 2. An estimated 46 acres would be  
 16 removed in the first 10 years.
- 17 • *CM11 Natural Communities Enhancement and Management*: A variety of habitat management  
 18 actions that are designed to enhance wildlife values in restored or protected habitats could  
 19 result in localized ground disturbances that could temporarily remove small amounts of  
 20 modeled habitat. Ground-disturbing activities, such as removal of nonnative vegetation and road  
 21 and other infrastructure maintenance activities, would be expected to have minor adverse  
 22 effects on available habitat and would be expected to result in overall improvements to and  
 23 maintenance of habitat values over the term of the BDCP. Habitat management- and  
 24 enhancement-related activities could disturb nesting black terns if they were to nest in the  
 25 vicinity of a worksite. Equipment operation could destroy nests, and noise and visual

1 disturbances could lead to their abandonment, resulting in mortality of eggs and nestlings. The  
2 potential for these activities to result in direct mortality of black tern would be minimized with  
3 the implementation of and Mitigation Measure BIO-75, Conduct Preconstruction Nesting Bird  
4 Surveys and Avoid Disturbance of Nesting Birds.

- 5 ● Operations and Maintenance: Postconstruction operation and maintenance of the restoration  
6 infrastructure could result in ongoing but periodic disturbances that could affect black tern  
7 nesting adjacent to maintenance areas. Maintenance activities would include vegetation  
8 management, levee and structure repair, and re-grading of roads and permanent work areas.  
9 These effects, however, would be reduced by AMM1–AMM7, Mitigation Measure BIO-75, and  
10 conservation actions as described below.
- 11 ● Injury and Direct Mortality: Construction-related activities would not be expected to result in  
12 direct mortality of adult or fledged black tern individuals if they were present in the study area,  
13 because they would be expected to avoid contact with construction and other equipment. If  
14 black tern were to nest in the construction area, construction-related activities, including  
15 equipment operation, noise and visual disturbances could destroy nests or lead to their  
16 abandonment, resulting in mortality of eggs and nestlings. These effects would be avoided and  
17 minimized with the implementation of Mitigation Measure BIO-75.
- 18 ● Late season flooding in the Yolo Bypass could result in the loss of rice (nesting habitat for black  
19 tern) by precluding the preparation and planting of rice fields. The methods for estimating loss  
20 of rice in the bypass and results are provided in BDCP Appendix 5.J, Attachment 5J.E, *Estimation*  
21 *of BDCP Impact on Giant Garter Snake Summer Foraging Habitat in the Yolo Bypass*. This analysis  
22 concludes that the estimated loss of rice could be up to 1,662 acres by the late long-term  
23 timeframe. This potential impact is further described under Impact BIO-129c below.

24 The following paragraphs summarize the combined effects discussed above and describe other  
25 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also  
26 included.

### 27 ***Near-Term Timeframe***

28 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
29 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
30 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
31 effects of construction would not be adverse under NEPA. There would be no impacts on black tern  
32 nesting habitat resulting from the construction of the water conveyance facilities (CM1). However,  
33 there would be a loss of 76 acres of modeled nesting habitat for black tern in the study area in the  
34 near-term. These effects would result from implementing *CM8 Grassland Natural Community*  
35 *Restoration* and *CM10 Nontidal Marsh Restoration*.

36 The typical NEPA and CEQA project-level mitigation ratio would be 1:1 protection for the loss of  
37 cultivated lands including rice. Using this ratio would indicate that 76 acres of rice lands should be  
38 protected in CZ 2 to compensate for the losses of black tern nesting habitat.

39 The BDCP has committed to near-term goals of protecting 200 acres of rice and 700 acres of rice or  
40 equivalent habitat (Table 3-4 in Chapter 3, *Description of Alternatives*). These conservation actions  
41 are associated with CM3 and would occur in the same timeframe as the early restoration losses. The  
42 BDCP also contains objectives for the giant garter snake to protect at least 500 acres of rice in CZ 2  
43 and to protect up to 1,700 acres of rice land or equivalent habitat in the Yolo Bypass (if this portion

1 meets the criteria specified in CM3, *Reserve Design Requirements by Species* for giant garter snake,  
2 Objectives GGS2.3 and GGS 3.1) by the late long-term time period. These objectives would inform the  
3 near-term protection actions, and therefore some portion of the 200 acres of rice and 700 acres of  
4 rice or equivalent habitat would be expected to be restored in CZ 2. However, there is no near-term  
5 acreage commitment in the plan that is specific to CZ 2. In order to avoid an adverse effect on black  
6 tern from habitat loss, protection of 76 acres of rice would need to occur in CZ 2 in the near-term  
7 timeframe. Mitigation Measure BIO-129a, *Compensate for Loss of Black Tern Nesting Habitat*, would  
8 be available to address this adverse effect.

9 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
10 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
11 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
12 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
13 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
14 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
15 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*. Black tern is not a  
16 covered species under the BDCP. For the BDCP to avoid an adverse effect on individuals,  
17 preconstruction surveys for noncovered avian species would be required to ensure that nests are  
18 detected and avoided. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and*  
19 *Avoid Disturbance of Nesting Birds*, would be available to address this adverse effect.

#### 20 **Late Long-Term Timeframe**

21 Alternative 4 as a whole would result in the permanent loss of 260 acres of modeled black tern  
22 nesting habitat during the term of the Plan. This impact would result from the removal of rice in CZ  
23 2. The Plan includes conservation commitments through *CM3 Natural Communities Protection and*  
24 *Restoration* to protect 500 acres of rice lands (Table 3-4 in Chapter 3) and up to 1,700 acres of rice  
25 lands or equivalent habitat for the giant garter snake (Objective GGS3.1) in CZ 2. The nesting habitat  
26 for black tern in the northern part of the study area has largely been reduced to rice lands, and these  
27 acres would provide protected nesting habitat for the species.

28 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
29 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
30 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
31 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
32 *Material*, and *CM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
33 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
34 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*. Black tern is not a  
35 covered species under the BDCP. For the BDCP to avoid an adverse effect on individuals,  
36 preconstruction surveys for noncovered avian species would be required to ensure that nests are  
37 detected and avoided. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and*  
38 *Avoid Disturbance of Nesting Birds*, would be available to address this adverse effect.

39 **NEPA Effects:** The loss of black tern nesting habitat and potential mortality of this special-status  
40 species under Alternative 4 would represent an adverse effect in the absence of other conservation  
41 actions. However, with habitat protection associated with CM3, guided by biological goals and  
42 objectives and by AMM1–AMM7, which would be in place throughout the construction period, the  
43 effects of habitat loss under Alternative 4 would not be adverse. Black tern is not a covered species  
44 under the BDCP, and potential mortality would be an adverse effect without preconstruction  
45 surveys to ensure that nests are detected and avoided. Mitigation Measure BIO-75, *Conduct*

1        *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to  
2        address this effect.

3        **CEQA Conclusion:**

4        **Near-Term Timeframe**

5        Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
6        the near-term BDCP conservation strategy has been evaluated to determine whether it would  
7        provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
8        effects of construction would be less than significant under CEQA. There would be no impacts on  
9        black tern nesting habitat resulting from the construction of the water conveyance facilities (CM1).  
10       However, there would be a loss of 76 acres of modeled nesting habitat for black tern in the study  
11       area in the near-term. These effects would result from implementing *CM8 Grassland Natural*  
12       *Community Restoration* and *CM10 Nontidal Marsh Restoration*.

13       The typical NEPA and CEQA project-level mitigation ratio would be 1:1 protection for the loss of  
14       cultivated lands including rice. Using this ratio would indicate that 76 acres of rice lands should be  
15       protected in CZ 2 to mitigate the losses of black tern nesting habitat.

16       The BDCP has committed to near-term goals of protecting 200 acres of rice and 700 acres of rice or  
17       equivalent habitat (Table 3-4 in Chapter 3). These conservation actions are associated with CM3 and  
18       would occur in the same timeframe as the early restoration losses. The BDCP also contains  
19       objectives for the giant garter snake to protect at least 500 acres of rice in CZ 2 and to protect up to  
20       1,700 acres of rice land or equivalent habitat in the Yolo Bypass (if this portion meets the criteria  
21       specified in CM3, *Reserve Design Requirements by Species* for giant garter snake, Objectives GGS2.3  
22       and GGS 3.1) by the late long-term time period. These objectives would inform the near-term  
23       protection actions, and therefore some portion of the 200 acres of rice and 700 acres of rice or  
24       equivalent habitat would be expected to be restored in CZ 2. However, there is no near-term acreage  
25       commitment in the plan that is specific to CZ 2. Mitigation Measure BIO-129a, *Compensate for Loss of*  
26       *Black Tern Nesting Habitat*, which would require 1:1 protection of habitat in CZ 2 in the near-term  
27       time frame would reduce this potential impact to a less-than-significant level.

28       The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
29       *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
30       *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
31       *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
32       *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
33       minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
34       described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*. Black tern is not a  
35       covered species under the BDCP. For the BDCP to have a less-than-significant impact on individuals,  
36       preconstruction would be required to ensure that nests are detected and avoided. Implementation  
37       of Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of*  
38       *Nesting Birds*, would reduce the potential impact on nesting black tern to a less-than-significant  
39       level.

40       **Late Long-Term Timeframe**

41       Alternative 4 as a whole would result in the permanent loss of 260 acres of modeled black tern  
42       nesting habitat during the term of the Plan. This impact would result from the removal of rice in CZ  
43       2. The Plan includes conservation commitments through *CM3 Natural Communities Protection and*

1 *Restoration* to protect 500 acres of rice lands (Table 3-4 in Chapter 3) and up to 1,700 acres of rice  
2 lands or equivalent habitat for the giant garter snake (Objective GGS3.1) in CZ 2.

3 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*  
4 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*  
5 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
6 *Countermeasure Plan, and AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
7 *Material*. All of these AMMs include elements that would avoid or minimize the risk of affecting  
8 individuals and species habitats adjacent to work areas. The AMMs are described in detail in BDCP  
9 Appendix 3.C, *Avoidance and Minimization Measures*. Black tern is not a covered species under the  
10 BDCP. For the BDCP to avoid an adverse effect on individuals, preconstruction surveys for  
11 noncovered avian species would be required to ensure that nests are detected and avoided.  
12 Implementation of Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and*  
13 *Avoid Disturbance of Nesting Birds*, would reduce the potential impact on nesting black tern to a less-  
14 than-significant level.

15 Considering Alternative 4's habitat protection provisions, which would provide acreages of new or  
16 enhanced habitat in amounts greater than necessary to compensate for habitats lost to construction  
17 and restoration activities, loss of habitat or direct mortality through implementation of Alternative 4  
18 would not result in a substantial adverse effect through habitat modifications and would not  
19 substantially reduce the number or restrict the range of the species. Therefore, the alternative  
20 would have a less-than-significant impact on black tern.

21 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**  
22 **Disturbance of Nesting Birds**

23 See Mitigation Measure BIO-75 under Impact BIO-75.

24 **Mitigation Measure BIO-129a: Compensate for Loss of Black Tern Nesting Habitat**

25 Because there is no near-term acreage commitment associated with the protection of rice in CZ  
26 2, BDCP proponents must protect rice at a 1:1 ratio for each acre of rice impacted in CZ 2.

27 **Impact BIO-129b: Indirect Effects of Plan Implementation on Black Tern**

28 Construction noise above background noise levels (greater than 50 dBA) could extend 500 to 5,250  
29 feet from the edge of construction activities (BDCP Appendix 5.J, Attachment 5J.D, *Indirect Effects of*  
30 *the Construction of the BDCP Conveyance Facility on Sandhill Crane*, Table 4), although there are no  
31 available data to determine the extent to which these noise levels could affect black tern. If black  
32 terns were to nest in or adjacent to work areas, construction and subsequent maintenance-related  
33 noise and visual disturbances could mask calls, disrupt foraging and nesting behaviors, and reduce  
34 the functions of suitable nesting habitat for these species. Mitigation Measure BIO-75, *Conduct*  
35 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would avoid the  
36 potential for adverse effects of construction-related activities on survival and productivity of nesting  
37 black terns. The use of mechanical equipment during restoration activities could cause the  
38 accidental release of petroleum or other contaminants that could affect black terns in the  
39 surrounding habitat. The inadvertent discharge of sediment or excessive dust adjacent to suitable  
40 habitat could also have an adverse effect on these species. AMM1–AMM7, including *AMM2*  
41 *Construction Best Management Practices and Monitoring*, would minimize the likelihood of such

1 spills and ensure that measures are in place to prevent runoff from the construction area and  
2 negative effects of dust on active nests.

3 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in  
4 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,  
5 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,  
6 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz  
7 2009). The effect of selenium toxicity differs widely between species and also between age and sex  
8 classes within a species. In addition, the effect of selenium on a species can be confounded by  
9 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith  
10 2009).

11 The primary source of selenium bioaccumulation in birds is through their diet (Ackerman and  
12 Eagles-Smith 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the  
13 trophic level at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At  
14 Kesterson Reservoir in the San Joaquin Valley, selenium concentrations in invertebrates have been  
15 found to be two to six times the levels in rooted plants. Furthermore, bivalves sampled in the San  
16 Francisco Bay contained much higher selenium levels than crustaceans such as copepods (Stewart et  
17 al. 2004). Studies conducted at the Grasslands in Merced County recorded higher selenium levels in  
18 black-necked stilts which feed on aquatic invertebrates than in mallards and pintails, which are  
19 primarily herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which  
20 forage on bivalves) have much higher levels of selenium levels than shorebirds that prey on aquatic  
21 invertebrates (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high  
22 levels of selenium have a higher risk of selenium toxicity.

23 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations  
24 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to  
25 exacerbate bioaccumulation of selenium in avian species, including black tern. Marsh (tidal and  
26 nontidal) and floodplain restoration have the potential to mobilize selenium, and therefore increase  
27 avian exposure from ingestion of prey items with elevated selenium levels. Thus, BDCP restoration  
28 activities that create newly inundated areas could increase bioavailability of selenium (see BDCP  
29 Chapter 3, *Conservation Strategy*, for details of restoration). Changes in selenium concentrations  
30 were analyzed in Chapter 8, *Water Quality*, and it was determined that, relative to Existing  
31 Conditions and the No Action Alternative, CM1 would not result in substantial, long-term increases  
32 in selenium concentrations in water in the Delta under any alternative. However, it is difficult to  
33 determine whether the effects of potential increases in selenium bioavailability associated with  
34 restoration-related conservation measures (CM4, CM5) would lead to adverse effects on black tern.

35 Because of the uncertainty that exists at this programmatic level of review, there could be an effect  
36 on black tern from increases in selenium associated with restoration activities. This effect would be  
37 addressed through the implementation of *AMM27 Selenium Management* (BDCP Appendix 3.C,  
38 *Avoidance and Minimization Measures*) which would provide specific tidal habitat restoration design  
39 elements to reduce the potential for bioaccumulation of selenium and its bioavailability in tidal  
40 habitats. Furthermore, the effectiveness of selenium management to reduce selenium  
41 concentrations and/or bioaccumulation would be evaluated separately for each restoration effort as  
42 part of design and implementation. This avoidance and minimization measure would be  
43 implemented as part of the tidal habitat restoration design schedule.

1 **NEPA Effects:** Noise and visual disturbances from the construction of conservation components  
2 could black tern use of modeled habitat adjacent to work areas. Moreover, the use of mechanical  
3 equipment for the construction of conservation components could cause the accidental release of  
4 petroleum or other contaminants, or the inadvertent discharge of sediment or excess dust adjacent  
5 to suitable habitat. AMM1–AMM7 and Mitigation Measure BIO-75, *Conduct Preconstruction Nesting*  
6 *Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to address adverse effects on  
7 nesting individuals. Tidal habitat restoration could result in increased exposure of black tern to  
8 selenium. This effect would be addressed through the implementation of *AMM27 Selenium*  
9 *Management*, which would provide specific tidal habitat restoration design elements to reduce the  
10 potential for bioaccumulation of selenium and its bioavailability in tidal habitats.

11 **CEQA Conclusion:** Noise and visual disturbances from the construction of conservation components  
12 could black tern use of modeled habitat adjacent to work areas. Moreover, the use of mechanical  
13 equipment for the construction of conservation components could cause the accidental release of  
14 petroleum or other contaminants, or the inadvertent discharge of sediment or excess dust adjacent  
15 to suitable habitat. AMM1–AMM7, and Mitigation Measure BIO-75, *Conduct Preconstruction Nesting*  
16 *Bird Surveys and Avoid Disturbance of Nesting Birds*, would reduce these impacts to a less-than-  
17 significant level. Tidal habitat restoration could result in increased exposure of black tern to  
18 selenium. This effect would be addressed through the implementation of *AMM27 Selenium*  
19 *Management*, which would provide specific tidal habitat restoration design elements to reduce the  
20 potential for bioaccumulation of selenium and its bioavailability in tidal habitats.

21 **Impact BIO-129c: Periodic Effects of Inundation on Black Tern Nesting Habitat as a Result of**  
22 **Implementation of Conservation Components**

23 Flooding of the Yolo Bypass would inundate 791–1,582 acres of suitable black tern nesting habitat  
24 (land currently managed as rice in CZ 2). Inundation would occur during the nonbreeding season  
25 but could reduce the availability of nesting habitat during years that flooding extends into the  
26 nesting season (past March). Extended inundation of the Yolo Bypass would not be expected to  
27 affect black tern nesting habitat. However, if periodic inundation took land out of rice production,  
28 this could have an adverse effect on black tern nesting habitat. Late season flooding in the Yolo  
29 Bypass could result in the loss of rice (nesting habitat for black tern) by precluding the preparation  
30 and planting of rice fields. The methods for estimating loss of rice in the bypass and results are  
31 provided in BDCP Appendix 5.J, Attachment 5J.E, *Estimation of BDCP Impact on Giant Garter Snake*  
32 *Summer Foraging Habitat in the Yolo Bypass*. This analysis concludes that the estimated loss of rice  
33 could be up to 1,662 acres by the late long-term timeframe. The BDCP has committed to protect,  
34 restore and/or create up to 1,700 acres of rice in the Yolo Bypass (Objective GGS3.1). These acres of  
35 rice would be protected in areas that are less susceptible to inundation, which would benefit the  
36 black tern during years in which the magnitude and duration of inundation were increased.

37 **NEPA Effects:** Flooding of the Yolo Bypass is not expected to adversely affect nesting habitat for  
38 black tern. However, if flooding were to extend into the nesting season or were to significantly  
39 reduce rice production it could also reduce suitable black tern nesting habitat. This potential effect  
40 would not be adverse with the creation and/or protection of 1,700 acres of rice in CZ 2 under  
41 Objective GGS3.1 in the BDCP.

42 **CEQA Conclusion:** Flooding of the Yolo Bypass is not expected to have a significant impact on  
43 nesting habitat for black tern. However, if flooding were to extend into the nesting season or were to  
44 significantly reduce rice production it could also reduce suitable black tern nesting habitat. This

1 potential impact would be reduced to less than significant by the creation and/or protection of  
2 1,700 acres of rice in CZ 2 under Objective GGS3.1 in the BDCP.

### 3 **California Horned Lark and Grasshopper Sparrow**

4 This section describes the effects of Alternative 4, including water conveyance facilities construction  
5 and implementation of other conservation components, on California horned lark and grasshopper  
6 sparrow. The primary impact of concern for grasshopper sparrow and California horned lark would  
7 be the loss of breeding habitat in the Plan Area, which includes grassland vernal pool complex, and  
8 alkali seasonal wetland natural communities and selected cultivated lands including grain and hay  
9 crops and pasture. Construction and restoration associated with Alternative 4 conservation  
10 measures would result in both temporary and permanent losses of modeled breeding habitat for  
11 California horned lark and grasshopper sparrow as indicated in Table 12-4-49. Full implementation  
12 of Alternative 4 would include the following biological objectives over the term of the BDCP which  
13 would also benefit the California horned lark and the grasshopper sparrow (BDCP Chapter 3, Section  
14 3.3, *Biological Goals and Objectives*).

- 15 ● Protect at least 8,000 acres of grassland with at least 2,000 acres protected in CZ 1, at least 1,000  
16 acres protected in CZ 8, at least 2,000 acres protected in CZ 11, and the remainder distributed  
17 among CZs 1, 2, 4, 5, 7, 8, and 11 (Objective GNC1.1, associated with CM3).
- 18 ● Restore at least 2,000 acres of grasslands (Objective GNC1.2, associated with CM8).
- 19 ● Protect at least 150 acres of alkali seasonal wetland and at least 600 acres of existing vernal pool  
20 complex in CZs 1, 8, and/or 11 (Objectives ASWNC1.1 and VPNC1.1, associated with CM3).
- 21 ● Protect at least 48,625 acres of cultivated lands that provide suitable habitat for covered and  
22 other native wildlife species (Objective CLNC1.1, associated with CM3).
- 23 ● Within the at least 48,625 acres of protected cultivated lands, protect at least 42,275 acres of  
24 cultivated lands as Swainson's hawk foraging habitat with at least 50% in very high-value  
25 habitat in CZs 2, 3, 4, 5, 7, 8, 9, and 11 (Objective SH1.2, associated with CM3).
- 26 ● Increase prey availability and accessibility for grassland-foraging species (Objectives ASWNC2.4,  
27 VPNC2.5, and GNC2.4, associated with CM11).

28 As explained below, with the restoration or protection of these amounts of habitat, in addition to  
29 management activities that would enhance habitat for these species and implementation of AMM1-  
30 AMM7 and Mitigation Measure BIO-75, impacts on California horned lark and grasshopper sparrow  
31 would not be adverse for NEPA purposes and would be less than significant for CEQA purposes.

1 **Table 12-4-49. Changes in California Horned Lark and Grasshopper Sparrow Modeled Habitat**  
2 **Associated with Alternative 4 (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	Breeding	1,969	1,969	633	633	NA	NA
<b>Total Impacts CM1</b>		<b>1,969</b>	<b>1,969</b>	<b>633</b>	<b>633</b>	<b>NA</b>	<b>NA</b>
CM2-CM18	Breeding	5,450	26,198	376	893	1,158-3,650	3,823
<b>Total Impacts CM2-CM18</b>		<b>5,450</b>	<b>26,198</b>	<b>376</b>	<b>893</b>	<b>1,158-3,650</b>	<b>3,823</b>
<b>TOTAL IMPACTS</b>		<b>7,419</b>	<b>28,167</b>	<b>1,009</b>	<b>1,526</b>	<b>1,158-3,650</b>	<b>3,823</b>

<sup>a</sup> See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-130: Loss or Conversion of Habitat for and Direct Mortality of California Horned**  
5 **Lark and Grasshopper Sparrow**

6 Alternative 4 conservation measures would result in the combined permanent and temporary loss  
7 of up to 29,693 acres of modeled nesting habitat for California horned lark and grasshopper sparrow  
8 (of which 28,167 acres would be a permanent loss and 1,526 acres would be a temporary loss of  
9 habitat, Table 12-4-49). Conservation measures that would result in these losses are conveyance  
10 facilities and transmission line construction, and establishment and use of borrow and spoil areas  
11 (CM1), Yolo Bypass fisheries improvements (CM2), tidal habitat restoration (CM4), floodplain  
12 restoration (CM5), riparian restoration (CM7), grassland restoration (CM8), vernal pool and wetland  
13 restoration (CM9), nontidal marsh restoration (CM10), and construction of conservation hatcheries  
14 (CM18). The majority of habitat loss (20,880 acres) would result from CM4. Habitat enhancement  
15 and management activities (CM11), which include ground disturbance or removal of nonnative  
16 vegetation, and the construction of recreational trails, signs, and facilities, could result in local  
17 adverse habitat effects. In addition, maintenance activities associated with the long-term operation  
18 of the water conveyance facilities and other BDCP physical facilities could degrade or eliminate  
19 California horned lark and grasshopper sparrow modeled habitat. Each of these individual activities  
20 is described below. A summary statement of the combined impacts and NEPA effects, and a CEQA  
21 conclusion follow the individual conservation measure discussions.

- 22 • *CM1 Water Facilities and Operation*: Construction of Alternative 4 conveyance facilities would  
23 result in the combined permanent and temporary loss of up to 2,602 acres of modeled California  
24 horned lark and grasshopper sparrow habitat (1,969 acres of permanent loss, 633 acres of  
25 temporary loss). Impacts would occur from the construction of intakes 2, 3, and 5 and associated  
26 temporary work areas and access roads in CZ 4 between Clarksburg and Courtland. The

1 construction of the permanent and temporary transmission line corridors through CZs 4-6 and 9  
2 would also remove suitable nesting habitat. Approximately 685 acres of impact would be from  
3 the new forebay constructed south of the Clifton Court Forebay in CZ 8. Some of the grassland  
4 habitat lost at the sites of new canals south of Clifton Court Forebay is composed of larger stands  
5 of ruderal and herbaceous vegetation and California annual grassland, which is also suitable  
6 nesting habitat for the species. Grasshopper sparrows were detected in DHCCP surveys south of  
7 Byron Highway in CZ 8 (1 occurrence) and east of Intakes 2 and 3 (6 occurrences), in the Stone  
8 Lakes NWR. However, the CM1 footprint does not overlap with any grasshopper sparrow or  
9 California horned lark occurrences. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting*  
10 *Bird Surveys and Avoid Disturbance of Nesting Birds*, would require preconstruction surveys and  
11 the establishment of no-disturbance buffers and would be available to address adverse effects  
12 on nesting California horned larks or grasshopper sparrows. Refer to the Terrestrial Biology  
13 Map Book for a detailed view of Alternative 4 construction locations. Impacts from CM1 would  
14 occur within the first 10 years of Plan implementation.

- 15 ● *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo bypass fisheries enhancement  
16 would result in the combined permanent and temporary loss of up to 1,274 acres of modeled  
17 California horned lark and grasshopper sparrow habitat (898 acres of permanent loss, 376 acres  
18 of temporary loss) in the Yolo Bypass in CZ 2. Impacted habitat would consist primarily of  
19 grassland and pasture. Most of the grassland losses would occur at the north end of the bypass  
20 below Fremont Weir, along the Toe Drain/Tule Canal, and along the west side channels.  
21 Realignment of Putah Creek could also involve excavation and grading in alkali seasonal wetland  
22 complex habitat as a new channel is constructed. The loss is expected to occur during the first 10  
23 years of Alternative 4 implementation.
- 24 ● *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and  
25 inundation would permanently remove an estimated 20,880 acres of modeled California horned  
26 lark and grasshopper sparrow habitat. The majority of the acres lost would consist of cultivated  
27 lands in CZs 1, 2, 4, 5, 6, and/or 7. Grassland losses would likely occur in the vicinity of Cache  
28 Slough, on Decker Island in the West Delta ROA, on the upslope fringes of Suisun Marsh, and  
29 along narrow bands adjacent to waterways in the South Delta ROA. Tidal restoration would  
30 directly impact and fragment grassland just north of Rio Vista in and around French and  
31 Prospect Islands, and in an area south of Rio Vista around Threemile Slough. Losses of alkali  
32 seasonal wetland complex habitat would likely occur in the south end of the Yolo Bypass and on  
33 the northern fringes of Suisun Marsh.
- 34 ● *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore  
35 seasonally inundated floodplain would permanently and temporarily remove approximately  
36 1,450 acres of modeled California horned lark and grasshopper sparrow nesting habitat (933  
37 permanent, 517 temporary). These losses would be expected after the first 10 years of  
38 Alternative 4 implementation along the San Joaquin River and other major waterways in CZ 7.
- 39 ● *CM7 Riparian Natural Community Restoration*: Riparian restoration would permanently remove  
40 approximately 370 acres of California horned lark and grasshopper sparrow nesting habitat as  
41 part of tidal restoration and 1,489 acres as part of seasonal floodplain restoration.
- 42 ● *CM8 Grassland Natural Community Restoration and CM9 Vernal Pool and Alkali Seasonal Wetland*  
43 *Complex Restoration*: Temporary construction-related disturbance of grassland habitat would  
44 result from implementation of CM8 and CM9 in CZs 1, 2, 4, 5, 7, 8, and 11. However, all areas  
45 would be restored after the construction periods. Grassland restoration would be implemented

1 on agricultural lands that also provide nesting habitat for California horned lark and  
2 grasshopper sparrow and would result in the conversion of 837 acres of cultivated lands to  
3 grassland.

- 4 ● *CM10 Nontidal Marsh Restoration*: Implementation of CM10 would result in the permanent  
5 removal of 705 acres of California horned lark and grasshopper sparrow nesting habitat.
- 6 ● *CM11 Natural Communities Enhancement and Management*: A variety of habitat management  
7 actions included in CM11 that are designed to enhance wildlife values in restored or protected  
8 habitats could result in localized ground disturbances that could temporarily remove small  
9 amounts of modeled habitat. Ground-disturbing activities, such as removal of nonnative  
10 vegetation and road and other infrastructure maintenance activities, would be expected to have  
11 minor adverse effects on available habitat and would be expected to result in overall  
12 improvements to and maintenance of habitat values over the term of the BDCP. CM11 would  
13 also include the construction of recreational-related facilities including trails, interpretive signs,  
14 and picnic tables (BDCP Chapter 4, *Covered Activities and Associated Federal Actions*). The  
15 construction of trailhead facilities, signs, staging areas, picnic areas, bathrooms, etc. would be  
16 placed on existing, disturbed areas when and where possible. However, approximately 50 acres  
17 of grassland habitat would be lost from the construction of trails and facilities.

18 Habitat management- and enhancement-related activities could disturb California horned lark  
19 and grasshopper sparrow nests. If either species were to nest in the vicinity of a worksite,  
20 equipment operation could destroy nests, and noise and visual disturbances could lead to their  
21 abandonment, resulting in mortality of eggs and nestlings. Mitigation Measure BIO-75, *Conduct*  
22 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available  
23 to address these adverse effects.

- 24 ● *CM18 Conservation Hatcheries*: Implementation of CM18 would remove up to 35 acres of  
25 modeled California horned lark and grasshopper sparrow habitat for the development of a delta  
26 and longfin smelt conservation hatchery in CZ 1.
- 27 ● *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground  
28 water conveyance facilities and restoration infrastructure could result in ongoing but periodic  
29 disturbances that could affect California horned lark and grasshopper sparrow use of the  
30 surrounding habitat. Maintenance activities would include vegetation management, levee and  
31 structure repair, and re-grading of roads and permanent work areas. These effects, however,  
32 would be reduced by AMM1–AMM7, Mitigation Measure BIO-75, and conservation actions as  
33 described below.
- 34 ● *Injury and Direct Mortality*: Construction-related activities would not be expected to result in  
35 direct mortality of adult or fledged California horned lark and grasshopper sparrow if they were  
36 present in the Plan Area, because they would be expected to avoid contact with construction and  
37 other equipment. If either species were to nest in the construction area, construction-related  
38 activities, including equipment operation, noise and visual disturbances could destroy nests or  
39 lead to their abandonment, resulting in mortality of eggs and nestlings. Mitigation Measure BIO-  
40 75 would be available to address these adverse effects.

41 The following paragraphs summarize the combined effects discussed above and describe other  
42 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also  
43 included.

1 **Near-Term Timeframe**

2 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
3 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
4 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
5 effects of construction would not be adverse under NEPA. Alternative 4 would remove 8,428 acres  
6 (7,419 permanent, 1,009 temporary) of modeled breeding habitat for California horned lark and  
7 grasshopper sparrow in the study area in the near-term. These effects would result from the  
8 construction of the water conveyance facilities (CM1, 2,602 acres), and implementing other  
9 conservation measures (*CM2 Yolo Bypass Fisheries Enhancement, CM4 Tidal Natural Communities*  
10 *Restoration, CM7 Riparian Natural Community Restoration, CM8 Grassland Natural Community*  
11 *Restoration, CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration, CM11 Natural*  
12 *Communities Enhancement and Management, and CM18 Conservation Hatcheries—5,826 acres).*

13 The typical NEPA and CEQA project-level mitigation ratio for those natural communities affected  
14 would be 2:1 for protection of habitat. Using this ratio would indicate that 5,204 acres should be  
15 protected to compensate for the CM1 losses of 2,602 acres of California horned lark and  
16 grasshopper sparrow habitat. The near-term effects of other conservation actions would remove  
17 5,826 acres of modeled habitat, and therefore require 11,652 acres of protection of California  
18 horned lark and grasshopper sparrow nesting habitat using the same typical NEPA and CEQA ratio  
19 (2:1 for protection).

20 The BDCP has committed to near-term goals of protecting 2,000 acres and restoring 1,140 acres of  
21 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of  
22 alkali seasonal wetland complex, and protecting 15,400 acres of non-rice cultivated lands (Table 3-4  
23 in Chapter 3, *Description of Alternatives*). These conservation actions are associated with CM3, CM8,  
24 and CM9 and would occur in the same timeframe as the construction and early restoration losses  
25 thereby avoiding adverse effects of habitat loss on California horned lark and grasshopper sparrow.  
26 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1  
27 and GNC1.2). Grassland protection in CZs 1, 8, and 11 would be associated with vernal pool and  
28 alkali seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a  
29 contiguous matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which  
30 would expand breeding habitat for California horned lark and grasshopper sparrow and reduce the  
31 effects of current levels of habitat fragmentation. Under *CM11 Natural Communities Enhancement*  
32 *and Management*, insect prey populations would be increased on protected lands, enhancing the  
33 foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4).  
34 Cultivated lands that provide habitat for covered and other native wildlife species would provide  
35 approximately 15,400 acres of potential nesting habitat for California horned lark and grasshopper  
36 sparrow (Objective CLNC1.1). Approximately 87% of cultivated lands protected by the late long-  
37 term time period would be in alfalfa and pasture crop types (very high- and high-value crop types  
38 for Swainson's hawk (Objective SH1.2) which would also provide potential nesting habitat for  
39 California horned lark and grasshopper sparrow. This biological objective provides an estimate for  
40 the high proportion of cultivated lands protected in the near-term time period which would provide  
41 nesting habitat for California horned lark and grasshopper sparrow.

42 The acres of restoration and protection contained in the near-term Plan goals and the additional  
43 detail in the biological objectives satisfy the typical mitigation that would be applied to the project-  
44 level effects of CM1 on California horned lark and grasshopper sparrow, as well as mitigate the near-  
45 term effects of the other conservation measures with the consideration that some portion of the

1 15,400 acres of cultivated lands protected in the near-term timeframe would be managed in suitable  
2 crop types to compensate for the loss of habitat at a ratio of 2:1. Mitigation Measure BIO-130,  
3 *Compensate for the Near-Term Loss of California Horned Lark and Grasshopper Sparrow Habitat*  
4 would be available to address the adverse effect of habitat loss in the near-term.

5 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*  
6 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*  
7 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
8 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
9 *Material, and AMM7 Barge Operations Plan. All of these AMMs include elements that would avoid or*  
10 *minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are*  
11 *described in detail in BDCP Appendix 3.C, Avoidance and Minimization Measures.*

12 California horned lark and grasshopper sparrow are not covered species under the BDCP. For the  
13 BDCP to avoid an adverse effect on individuals, preconstruction surveys for noncovered avian  
14 species would be required to ensure that nests are detected and avoided. Mitigation Measure BIO-  
15 75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be  
16 available to address this adverse effect.

### 17 **Late Long-Term Timeframe**

18 Alternative 4 as a whole would result in the permanent loss of and temporary effects on 29,692  
19 acres of modeled California horned lark and grasshopper sparrow habitat during the term of the  
20 Plan. The locations of these losses are described above in the analyses of individual conservation  
21 measures. The Plan includes conservation commitments through *CM3 Natural Communities*  
22 *Protection and Restoration, CM8 Grassland Natural Community Restoration, and CM9 Vernal Pool and*  
23 *Alkali Seasonal Wetland Complex Restoration* to protect 8,000 acres and restore 2,000 acres of  
24 grassland natural community, protect 600 acres of vernal pool complex, protect 150 acres of alkali  
25 seasonal wetland complex and protect 48,625 acres of cultivated lands that provide suitable habitat  
26 for native wildlife species (Table 3-4 in Chapter 3). Grassland restoration and protection would  
27 occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1 and GNC1.2). Grassland protection in CZs 1, 8,  
28 and 11 would be associated with vernal pool and alkali seasonal wetland complexes (Objectives  
29 ASWNC1.1 and VPNC1.1) and would result in a contiguous matrix of grassland, alkali seasonal  
30 wetland, and vernal pool natural communities which would expand breeding habitat for California  
31 horned lark and grasshopper sparrow and reduce the effects of current levels of habitat  
32 fragmentation. Under *CM11 Natural Communities Enhancement and Management*, insect prey  
33 populations would be increased on protected lands, enhancing the foraging value of these natural  
34 communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4). Cultivated lands that provide habitat  
35 for covered and other native wildlife species would provide approximately 15,400 acres of potential  
36 nesting habitat for California horned lark and grasshopper sparrow (Objective CLNC1.1).  
37 Approximately 42,275 acres of cultivated lands protected would be in alfalfa and pasture crop types.  
38 These are very high- and high-value crop types for Swainson's hawk (Objective SH1.2) and would  
39 provide potential nesting habitat for California horned lark and grasshopper sparrow.

40 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*  
41 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*  
42 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
43 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
44 *Material, and AMM7 Barge Operations Plan. All of these AMMs include elements that would avoid or*  
45 *minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are*

1 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*. California horned  
2 lark and grasshopper sparrow are not covered species under the BDCP. For the BDCP to avoid an  
3 adverse effect on individuals, preconstruction surveys for noncovered avian species would be  
4 required to ensure that nests are detected and avoided. Mitigation Measure BIO-75, *Conduct*  
5 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to  
6 address this adverse effect.

7 **NEPA Effects:** The loss of California horned lark and grasshopper sparrow habitat and potential  
8 mortality of these special-status species under Alternative 4 would represent an adverse effect in  
9 the absence of other conservation actions. However, with habitat protection and restoration  
10 associated with CM3, CM8, CM9, and CM11, guided by biological goals and objectives and by AMM1–  
11 AMM7, which would be in place throughout the construction period, and with implementation of  
12 Mitigation Measure BIO-130, *Compensate for the Near-Term Loss of California Horned Lark and*  
13 *Grasshopper Sparrow Habitat*, the effects of habitat loss on California horned lark and grasshopper  
14 sparrow under Alternative 4 would not be adverse. California horned lark and grasshopper sparrow  
15 are not covered species under the BDCP, and potential mortality would be an adverse effect without  
16 preconstruction surveys to ensure that nests are detected and avoided. Mitigation Measure BIO-75  
17 would be available to address this effect.

18 **CEQA Conclusion:**

19 **Near-Term Timeframe**

20 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
21 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
22 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
23 effects of construction would be less than significant under CEQA. Alternative 4 would remove 8,428  
24 acres (7,419 permanent, 1,009 temporary) of modeled breeding habitat for California horned lark  
25 and grasshopper sparrow in the study area in the near-term. These effects would result from the  
26 construction of the water conveyance facilities (CM1, 2,602 acres), and implementing other  
27 conservation measures (*CM2 Yolo Bypass Fisheries Enhancement, CM4 Tidal Natural Communities*  
28 *Restoration, CM7 Riparian Natural Community Restoration, CM8 Grassland Natural Community*  
29 *Restoration, CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration, CM11 Natural*  
30 *Communities Enhancement and Management and CM18 Conservation Hatcheries—5,826 acres).*

31 The typical NEPA and CEQA project-level mitigation ratio for those natural communities affected  
32 would be 2:1 for protection of habitat. Using this ratio would indicate that 5,204 acres should be  
33 protected to mitigate the CM1 losses of 2,602 acres of California horned lark and grasshopper  
34 sparrow habitat. The near-term effects of other conservation actions would remove 5,826 acres of  
35 modeled habitat, and therefore require 11,652 acres of protection of California horned lark and  
36 grasshopper sparrow nesting habitat using the same typical NEPA and CEQA ratio (2:1 for  
37 protection).

38 The BDCP has committed to near-term goals of protecting 2,000 acres and restoring 1,140 acres of  
39 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of  
40 alkali seasonal wetland complex, and protecting 15,400 acres of non-rice cultivated lands (Table 3-4  
41 in Chapter 3). These conservation actions are associated with CM3, CM8, and CM9 and would occur  
42 in the same timeframe as the construction and early restoration losses thereby avoiding significant  
43 impacts on California horned lark and grasshopper sparrow. Grassland restoration and protection  
44 would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1 and GNC1.2). Grassland protection in

1 CZs 1, 8, and 11 would be associated with vernal pool and alkali seasonal wetland complexes  
2 (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous matrix of grassland, alkali  
3 seasonal wetland, and vernal pool natural communities which would expand breeding habitat for  
4 California horned lark and grasshopper sparrow and reduce the effects of current levels of habitat  
5 fragmentation. Under *CM11 Natural Communities Enhancement and Management*, insect prey  
6 populations would be increased on protected lands, enhancing the foraging value of these natural  
7 communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4). Cultivated lands that provide habitat  
8 for covered and other native wildlife species would provide approximately 15,400 acres of potential  
9 nesting habitat for California horned lark and grasshopper sparrow (Objective CLNC1.1).  
10 Approximately 87% of cultivated lands protected by the late long-term time period would be in  
11 alfalfa and pasture crop types (very high- and high-value crop types for Swainson's hawk (Objective  
12 SH1.2) which would also provide potential nesting habitat for California horned lark and  
13 grasshopper sparrow. This biological objective provides an estimate for the high proportion of  
14 cultivated lands protected in the near-term time period which would provide nesting habitat for  
15 California horned lark and grasshopper sparrow.

16 The acres of restoration and protection contained in the near-term Plan goals and the additional  
17 detail in the biological objectives satisfy the typical mitigation that would be applied to the project-  
18 level effects of CM1 on California horned lark and grasshopper sparrow, as well as mitigate the near-  
19 term effects of the other conservation measures with the consideration that some portion of the  
20 15,400 acres of cultivated lands protected in the near-term timeframe would be managed in suitable  
21 crop types to compensate for the loss of habitat at a ratio of 2:1. Implementation of Mitigation  
22 Measure BIO-130, *Compensate for the Near-Term Loss of California Horned Lark and Grasshopper*  
23 *Sparrow Habitat*, would reduce the impact of habitat loss in the near-term to a less-than-significant  
24 level.

25 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
26 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
27 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
28 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
29 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
30 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
31 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

32 California horned lark and grasshopper sparrow are not covered species under the BDCP. For the  
33 BDCP to avoid an adverse effect on individuals, preconstruction surveys for noncovered avian  
34 species would be required to ensure that nests are detected and avoided. Mitigation Measure BIO-  
35 75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would  
36 reduce this potential impact to a less-than-significant level.

### 37 ***Late Long-Term Timeframe***

38 Alternative 4 as a whole would result in the permanent loss of and temporary effects on 29,692  
39 acres of modeled California horned lark and grasshopper sparrow habitat during the term of the  
40 Plan. The locations of these losses are described above in the analyses of individual conservation  
41 measures. The Plan includes conservation commitments through *CM3 Natural Communities*  
42 *Protection and Restoration*, *CM8 Grassland Natural Community Restoration*, and *CM9 Vernal Pool and*  
43 *Alkali Seasonal Wetland Complex Restoration* to protect 8,000 acres and restore 2,000 acres of  
44 grassland natural community, protect 600 acres of vernal pool complex, protect 150 acres of alkali

1 seasonal wetland complex and protect 48,625 acres of cultivated lands that provide suitable habitat  
2 for native wildlife species (Table 3-4 in Chapter 3). Grassland restoration and protection would  
3 occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1 and GNC1.2). Grassland protection in CZs 1, 8,  
4 and 11 would be associated with vernal pool and alkali seasonal wetland complexes (Objectives  
5 ASWNC1.1 and VPNC1.1) and would result in a contiguous matrix of grassland, alkali seasonal  
6 wetland, and vernal pool natural communities which would expand breeding habitat for California  
7 horned lark and grasshopper sparrow and reduce the effects of current levels of habitat  
8 fragmentation. Under *CM11 Natural Communities Enhancement and Management*, insect prey  
9 populations would be increased on protected lands, enhancing the foraging value of these natural  
10 communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4).

11 Cultivated lands that provide habitat for covered and other native wildlife species would provide  
12 approximately 15,400 acres of potential nesting habitat for California horned lark and grasshopper  
13 sparrow (Objective CLNC1.1). Approximately 42,275 acres of cultivated lands protected would be in  
14 alfalfa and pasture crop types (very high- and high-value crop types for Swainson's hawk (Objective  
15 SH1.2) which would also provide potential nesting habitat for California horned lark and  
16 grasshopper sparrow. The Plan also includes commitments to implement *AMM1 Worker Awareness  
17 Training, AMM2 Construction Best Management Practices and Monitoring, AMM3 Stormwater  
18 Pollution Prevention Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention,  
19 Containment, and Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel  
20 Material, and Dredged Material, and AMM7 Barge Operations Plan*. All of these AMMs include  
21 elements that would avoid or minimize the risk of affecting individuals and species habitats adjacent  
22 to work areas. The AMMs are described in detail in BDCP Appendix 3.C, *Avoidance and Minimization  
23 Measures*. California horned lark and grasshopper sparrow are not covered species under the BDCP.  
24 For the BDCP to avoid impacts on individuals, preconstruction surveys for noncovered avian species  
25 would be required to ensure that nests are detected and avoided. Mitigation Measure BIO-75,  
26 *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would reduce  
27 this impact to a less-than-significant level.

28 Considering Alternative 4's protection and restoration provisions, which would provide acreages of  
29 new high-value or enhanced habitat in amounts suitable to compensate for habitats lost to  
30 construction and restoration activities, and with the implementation of AMM1-AMM7, Mitigation  
31 Measure BIO-75, and Mitigation Measure BIO-130, *Compensate for the Near-Term Loss of California  
32 Horned Lark and Grasshopper Sparrow Habitat*, the loss of habitat or direct mortality through  
33 implementation of Alternative 4 would not result in a substantial adverse effect through habitat  
34 modifications and would not substantially reduce the number or restrict the range of either species.  
35 Therefore, the loss of habitat or potential mortality under this alternative would have a less-than-  
36 significant impact on California horned lark and grasshopper sparrow.

37 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**  
38 **Disturbance of Nesting Birds**

39 See Mitigation Measure BIO-75 under Impact BIO-75.

40 **Mitigation Measure BIO-130: Compensate for the Near-Term Loss of California Horned**  
41 **Lark and Grasshopper Sparrow Habitat**

42 DWR will manage and protect sufficient acres of cultivated lands such as pasture, grain and hay  
43 crops, or alfalfa to provide California horned lark and grasshopper sparrow habitat such that the

1 total acres of habitat impacted in the near-term timeframe are mitigated at a ratio of 2:1  
2 protection. Additional grassland protection, enhancement, and management may be substituted  
3 for the protection of cultivated lands.

4 **Impact BIO-131: Effects on California Horned Lark and Grasshopper Sparrow and Associated**  
5 **with Electrical Transmission Facilities**

6 New transmission lines would increase the risk for bird-power line strikes, which could result in  
7 injury or mortality of grasshopper sparrow and California horned lark. *AMM20 Greater Sandhill*  
8 *Crane* would minimize the risk of bird strikes by installing flight-diverters on new and selected  
9 existing powerlines.

10 **NEPA Effects:** New transmission lines would increase the risk for bird-power line strikes, which  
11 could result in injury or mortality of grasshopper sparrow and California horned lark. With the  
12 implementation of *AMM20 Greater Sandhill Crane*, the effect of new transmission lines on California  
13 horned lark and grasshopper sparrow would not be adverse.

14 **CEQA Conclusion:** New transmission lines would increase the risk for bird-power line strikes, which  
15 could result in injury or mortality of grasshopper sparrow and California horned lark. With the  
16 incorporation of *AMM20 Greater Sandhill Crane*, new transmission lines would have a less-than-  
17 significant impact on grasshopper sparrow and California horned lark.

18 **Impact BIO-132: Indirect Effects of Plan Implementation on California Horned Lark and**  
19 **Grasshopper Sparrow**

20 Noise and visual disturbances associated with construction-related activities could result in  
21 temporary disturbances that affect California horned lark and grasshopper sparrow use of modeled  
22 habitat. Construction noise above background noise levels (greater than 50 dBA) could extend 500  
23 to 5,250 feet from the edge of construction activities (BDCP Appendix 5.J, Attachment 5J.D, *Indirect*  
24 *Effects of the Construction of the BDCP Conveyance Facility on Sandhill Crane*, Table 4), although there  
25 are no available data to determine the extent to which these noise levels could affect California  
26 horned lark or grasshopper sparrow. Indirect effects associated with construction include noise,  
27 dust, and visual disturbance caused by grading, filling, contouring, and other ground-disturbing  
28 operations. Construction-related noise and visual disturbances could disrupt nesting and foraging  
29 behaviors, and reduce the functions of suitable habitat which could result in an adverse effect on  
30 these species. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid*  
31 *Disturbance of Nesting Birds*, would be available to minimize adverse effects on active nests. The use  
32 of mechanical equipment during water conveyance construction could cause the accidental release  
33 of petroleum or other contaminants that could affect these species or their prey in the surrounding  
34 habitat. AMM1–AMM7, including *AMM2 Construction Best Management Practices and Monitoring*,  
35 would minimize the likelihood of such spills. The inadvertent discharge of sediment or excessive  
36 dust adjacent to California horned lark and grasshopper sparrow nesting habitat could also have a  
37 negative effect on these species. AMM1–AMM7 would ensure that measures are in place to prevent  
38 runoff from the construction area and the negative effects of dust on wildlife adjacent to work areas.

39 **NEPA Effects:** Indirect effects on California horned lark and grasshopper sparrow as a result of  
40 Alternative 4 implementation could have adverse effects on these species through the modification  
41 of habitat and potential for direct mortality. California horned lark and grasshopper sparrow are not  
42 covered species under the BDCP, and potential mortality would be an adverse effect without  
43 preconstruction surveys to ensure that nests are detected and avoided. In conjunction with AMM1–

1 AMM7, Mitigation Measure BIO-75 *Conduct Preconstruction Nesting Bird Surveys and Avoid*  
2 *Disturbance of Nesting Birds*, would be available to address this effect.

3 **CEQA Conclusion:** Indirect effects on California horned lark and grasshopper sparrow as a result of  
4 Alternative 4 implementation could have a significant impact on these species. The incorporation of  
5 AMM1–AMM7 into the BDCP and the implementation of Mitigation Measure BIO-75, *Conduct*  
6 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would reduce this  
7 impact to a less-than-significant level.

8 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**  
9 **Disturbance of Nesting Birds**

10 See Mitigation Measure BIO-75 under Impact BIO-75.

11 **Impact BIO-133: Periodic Effects of Inundation on California Horned Lark and Grasshopper**  
12 **Sparrow as a Result of Implementation of Conservation Components**

13 Flooding of the Yolo Bypass from Fremont Weir operations (*CM2 Yolo Bypass Fisheries*  
14 *Enhancement*) would increase the frequency and duration of inundation on approximately 1,158-  
15 3,650 acres of modeled California horned lark and grasshopper sparrow habitat (Table 12-4-49).

16 Based on hypothetical footprints, implementation of *CM5 Seasonally Inundated Floodplain*  
17 *Restoration* could result in the periodic inundation of up to approximately 3,823 acres of modeled  
18 habitat (Table 12-4-49).

19 Reduced foraging habitat availability may be expected during the fledgling period of the nesting  
20 season due to periodic inundation. However, inundation would occur during the nonbreeding  
21 season and would not be expected to have an adverse effect on either species.

22 **NEPA Effects:** Periodic inundation of floodplains would not have adverse effects on grasshopper  
23 sparrow or California horned lark because inundation is expected to occur prior to the breeding  
24 season and inundation.

25 **CEQA Conclusion:** Periodic inundation of floodplains would not have a significant impact on  
26 grasshopper sparrow or California horned lark because inundation is expected to occur prior to the  
27 breeding season.

28 **Least Bittern and White-Faced Ibis**

29 This section describes the effects of Alternative 4, including water conveyance facilities construction  
30 and implementation of other conservation components, on least bittern and white-faced ibis.  
31 Modeled breeding habitat for least bittern and white-faced ibis includes tidal freshwater, nontidal  
32 freshwater emergent wetlands, managed wetlands, and other natural seasonal wetlands in CZ 2, 4,  
33 and 11. Construction and restoration associated with Alternative 4 conservation measures would  
34 result in both temporary and permanent losses of modeled habitat for mountain plover as indicated  
35 in Table 12-4-50. Full implementation of Alternative 4 would include the following biological  
36 objectives over the term of the BDCP which would also benefit least bittern and white-faced ibis  
37 (BDCP Chapter 3, Section 3.3, *Biological Goals and Objectives*).

- 38 • Restore or create at least 24,000 acres of tidal freshwater emergent wetland in CZs 1, 2, 4, 5, 6,  
39 and/or 7 (Objective TFEWNC1.1, associated with CM4).

- Create at least 1,200 acres of nontidal marsh consisting of a mosaic of nontidal perennial aquatic and nontidal freshwater emergent wetland natural communities (Objective NFEW/NPANC1.1, associated with CM10).
- Protect and enhance at least 8,100 acres of managed wetland, at least 1,500 acres of which are in the Grizzly Island Marsh Complex (Objective MWNC1.1, associated with CM3).

As explained below, with the restoration or protection of these amounts of habitat, in addition to management activities that would enhance habitat for these species and implementation of AMM1–AMM7, *AMM27 Selenium Management*, and Mitigation Measure BIO-75, impacts on least bittern and white-faced ibis would not be adverse for NEPA purposes and would be less than significant for CEQA purposes.

**Table 12-4-50. Changes in Least Bittern and White-Faced Ibis Modeled Habitat Associated with Alternative 4 (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	Yolo	Floodplain
CM1	Nesting	1	1	4	4	NA	NA
<b>Total Impacts CM1</b>		<b>1</b>	<b>1</b>	<b>4</b>	<b>4</b>	<b>NA</b>	<b>NA</b>
CM2–CM18	Nesting	5,134	13,063	45	45	961–2,672	NA
<b>Total Impacts CM2–CM18</b>		<b>5,134</b>	<b>13,063</b>	<b>45</b>	<b>45</b>	<b>961–2,672</b>	<b>NA</b>
<b>TOTAL IMPACTS</b>		<b>5,135</b>	<b>13,064</b>	<b>46</b>	<b>46</b>	<b>961–2,672</b>	<b>NA</b>

<sup>a</sup> See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only. Yolo periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

**Impact BIO-134: Loss or Conversion of Habitat for and Direct Mortality of Least Bittern and White-Faced Ibis**

Alternative 4 conservation measures would result in the combined permanent and temporary loss of up to 13,113 acres of modeled habitat for least bittern and white-faced ibis (13,064 acres of permanent loss and 49 of temporary loss, Table 12-4-50). Conservation measures that would result in these losses are conveyance facilities and transmission line construction, and establishment and use of borrow and spoil areas (CM1), Yolo Bypass fisheries improvements (CM2), and tidal habitat restoration (CM4). Habitat enhancement and management activities (CM11), which include ground disturbance or removal of nonnative vegetation, could result in local adverse habitat effects. In addition, maintenance activities associated with the long-term operation of the water conveyance facilities and other BDCP physical facilities could degrade or eliminate least bittern and white-faced ibis habitat. Each of these individual activities is described below. A summary statement of the

1 combined impacts, NEPA effects, and a CEQA conclusion follow the individual conservation measure  
2 discussions.

- 3 • *CM1 Water Facilities and Operation*: Construction of Alternative 4 conveyance facilities would  
4 result in the combined permanent and temporary loss of up to 5 acres of modeled least bittern  
5 and white-faced ibis habitat (1 acre of permanent loss, 4 acres of temporary loss) from CZ 4. The  
6 construction footprint for CM1 does not overlap with any occurrences of least bittern or white-  
7 faced ibis. However, Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys*  
8 *and Avoid Disturbance of Nesting Birds*, would be available to minimize effects on least bittern  
9 and white-faced ibis if they were to nest in the vicinity of the construction footprint. Refer to the  
10 Terrestrial Biology Map Book for a detailed view of Alternative 4 construction locations. Impacts  
11 from CM1 would occur within the first 10 years of Plan implementation.
- 12 • *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo bypass fisheries enhancement  
13 would permanently remove 55 acres of modeled least bittern and white-faced ibis habitat in the  
14 Yolo Bypass in CZ 2. In addition, 45 acres of habitat would be temporarily removed. The loss is  
15 expected to occur during the first 10 years of Alternative 4 implementation.
- 16 • *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and  
17 inundation would permanently remove an estimated 13,008 acres of modeled least bittern and  
18 white-faced ibis habitat in CZ 2, 4, and 11 by the late long-term time period.
- 19 • *CM11 Natural Communities Enhancement and Management*: A variety of habitat management  
20 actions included in *CM11 Natural Communities Enhancement and Management* that are designed  
21 to enhance wildlife values in restored or protected habitats could result in localized ground  
22 disturbances that could temporarily remove small amounts of least bittern and white-faced ibis  
23 habitat. Ground-disturbing activities, such as removal of nonnative vegetation and road and  
24 other infrastructure maintenance activities, would be expected to have minor adverse effects on  
25 available least bittern and white-faced ibis habitat.
- 26 • *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground  
27 water conveyance facilities and restoration infrastructure could result in ongoing but periodic  
28 disturbances that could affect least bittern and white-faced ibis use of the surrounding habitat.  
29 Maintenance activities would include vegetation management, levee and structure repair, and  
30 re-grading of roads and permanent work areas. These effects, however, would be reduced by  
31 AMM1–AMM7. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and*  
32 *Avoid Disturbance of Nesting Birds*, would be available to further reduce effects.
- 33 • *Injury and Direct Mortality*: Construction-related activities would not be expected to result in  
34 direct mortality of least bittern and white-faced ibis because adults and fledged young would be  
35 expected to avoid contact with construction and other equipment. However, if either species  
36 were to nest in the construction area, equipment operation, noise and visual disturbances could  
37 destroy nests or lead to their abandonment, resulting in mortality of eggs and nestlings.  
38 Mitigation Measure BIO-75 would be available to address these adverse effects.

39 The following paragraphs summarize the combined effects discussed above and describe other  
40 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also  
41 included.

1 **Near-Term Timeframe**

2 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
3 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
4 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
5 effects of construction would not be adverse under NEPA. Alternative 4 would remove 5,184 acres  
6 of modeled habitat for least bittern and white-faced ibis in the study area in the near-term (5,135  
7 acres of permanent loss, and 49 acres of temporary loss). These effects would result from the  
8 construction of the water conveyance facilities (CM1, 5 acres), and the implementation of other  
9 conservation measures (Yolo Bypass fisheries enhancement [CM2], and tidal restoration [CM4]  
10 5,179 acres).

11 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected would  
12 be 1:1 for restoration/creation and 1:1 protection of least bittern and white-faced ibis habitat. Using  
13 these ratios would indicate that 5 acres of habitat should be restored and 5 acres of habitat should  
14 be protected to compensate for the CM1 losses of 5 acres of least bittern and white-faced ibis  
15 habitat. The near-term effects of other conservation actions would remove 5,179 acres of modeled  
16 habitat, and therefore require 5,179 acres of restoration and 5,179 acres of protection of least  
17 bittern and white-faced ibis habitat using the same typical NEPA and CEQA ratios (1:1 for  
18 restoration and 1:1 for protection).

19 The BDCP has committed to near-term goals of restoring 8,850 acres of tidal freshwater emergent  
20 wetland and protecting and enhancing 4,800 acres of managed wetland in the Plan Area (Table 3-4  
21 in Chapter 3, *Description of Alternatives*). These conservation actions are associated with CM4 and  
22 CM3 and would occur in the same timeframe as the construction and early restoration losses,  
23 thereby avoiding adverse effects of habitat loss on least bittern and white-faced ibis. The tidal  
24 freshwater emergent wetland would be restored in CZs 1, 2, 4, 5, 6, and/or 7 (Objective TFEWNC1.1  
25 in BDCP Chapter 3, *Conservation Strategy*) and would be restored in a way that creates topographic  
26 heterogeneity and in areas that increase connectivity among protected lands (Objective  
27 TFEWNC2.2). The 4,800 acres of managed wetland would be protected and enhanced in CZ 11 and  
28 would benefit these species through the enhancement of degraded areas (such as areas of bare  
29 ground or marsh where the predominant vegetation consists of invasive species such as perennial  
30 pepperweed) to vegetation such as pickleweed-alkali heath-American bulrush plant associations  
31 (Objective MWNC1.1). In addition, at least 400 acres of nontidal marsh would be created, some of  
32 which would provide nesting habitat for least bittern and white-faced ibis. These Plan objectives  
33 represent performance standards for considering the effectiveness of restoration and protection  
34 actions. The acres of restoration and protection contained in the near-term Plan goals satisfy the  
35 typical mitigation that would be applied to the project-level effects of CM1, as well as mitigate the  
36 near-term effects of the other conservation measures.

37 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
38 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
39 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
40 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
41 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that avoid or  
42 minimize the risk of affecting individuals and species habitats adjacent to work areas and storage  
43 sites. The AMMs are described in detail in BDCP Appendix 3.C, *Avoidance and Minimization*  
44 *Measures*. Least bittern and white-faced ibis are not covered species under the BDCP. For the BDCP

1 to avoid an adverse effect on individuals, preconstruction surveys for noncovered avian species  
2 would be required to ensure that nests are detected and avoided.

3 **Late Long-Term Timeframe**

4 Alternative 4 as a whole would result in the permanent loss of and temporary effects on 13,113  
5 acres (13,064 acres of permanent loss, 49 acres of temporary loss) of least bittern and white-faced  
6 ibis habitat during the term of the Plan. The locations of these losses are described above in the  
7 analyses of individual conservation measures. The Plan includes conservation commitments  
8 through *CM4 Tidal Natural Communities Restoration* to restore or create at least 24,000 acres of tidal  
9 freshwater emergent wetland in CZs 1, 2, 4, 5, 6, and/or 7 (Objective TFEWNC1.1). In addition, 1,200  
10 acres of nontidal marsh would be created through *CM10 Nontidal Marsh Restoration* and 8,100 acres  
11 of managed wetland would be protected and enhanced in CZ 11.

12 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
13 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
14 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
15 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
16 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that avoid or  
17 minimize the risk of affecting individuals and species habitats adjacent to work areas and storage  
18 sites. The AMMs are described in detail in BDCP Appendix 3.C, *Avoidance and Minimization*  
19 *Measures*. Least bittern and white-faced ibis are not covered species under the BDCP. For the BDCP  
20 to avoid an adverse effect on individuals, preconstruction surveys for noncovered avian species  
21 would be required to ensure that nests are detected and avoided.

22 **NEPA Effects:** The loss of least bittern and white-faced ibis habitat and potential mortality of these  
23 special-status species under Alternative 4 would represent an adverse effect in the absence of other  
24 conservation actions. However, with the habitat protection and restoration associated with CM3,  
25 CM4, CM6, CM7, and CM11, guided by biological goals and objectives and by AMM1–AMM7, which  
26 would be in place throughout the construction period, the effects of habitat loss under Alternative 4  
27 on least bittern and white-faced ibis would not be adverse. Least bittern and white-faced ibis are not  
28 covered species under the BDCP, and the potential for mortality would be an adverse effect without  
29 preconstruction surveys to ensure that nests are detected and avoided. Mitigation Measure BIO-75  
30 would be available to address this effect.

31 **CEQA Conclusion:**

32 **Near-Term Timeframe**

33 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
34 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
35 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
36 impacts of construction would be less than significant under CEQA. Alternative 4 would remove  
37 5,184 acres of modeled habitat for least bittern and white-faced ibis in the study area in the near-  
38 term (5,135 acres of permanent loss, and 49 acres of temporary loss). These effects would result  
39 from the construction of the water conveyance facilities (CM1, 5 acres), and the implementation of  
40 other conservation measures (Yolo Bypass fisheries enhancement [CM2], and tidal restoration  
41 [CM4] 5,179 acres).

42 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected would  
43 be 1:1 for restoration/creation and 1:1 protection of least bittern and white-faced ibis habitat. Using

1 these ratios would indicate that 5 acres of habitat should be restored and 5 acres of habitat should  
2 be protected to mitigate the CM1 losses of 5 acres of least bittern and white-faced ibis habitat. The  
3 near-term effects of other conservation actions would remove 5,179 acres of modeled habitat, and  
4 therefore require 5,179 acres of restoration and 5,179 acres of protection of least bittern and white-  
5 faced ibis habitat using the same typical NEPA and CEQA ratios (1:1 for restoration and 1:1 for  
6 protection).

7 The BDCP has committed to near-term goals of restoring 2,000 acres of tidal freshwater emergent  
8 wetland and 4,800 acres of managed wetland in the Plan Area (Table 3-4 in Chapter 3, *Description of*  
9 *Alternatives*). These conservation actions are associated with CM4 and CM3 and would occur in the  
10 same timeframe as the construction and early restoration losses, thereby avoiding adverse effects of  
11 habitat loss on least bittern and white-faced ibis. The tidal freshwater emergent wetland would be  
12 restored in CZs 1, 2, 4, 5, 6, and/or 7 (Objective TFEWNC1.1 in BDCP Chapter 3, *Conservation*  
13 *Strategy*) and would be restored in a way that creates topographic heterogeneity and in areas that  
14 increase connectivity among protected lands (Objective TFEWNC2.2). The 4,800 acres of managed  
15 wetland would be protected and enhanced in CZ 11 and would benefit these species through the  
16 enhancement of degraded areas (such as areas of bare ground or marsh where the predominant  
17 vegetation consists of invasive species such as perennial pepperweed) to vegetation such as  
18 pickleweed-alkali heath-American bulrush plant associations (Objective MWNC1.1). In addition, at  
19 least 400 acres of nontidal marsh would be created, some of which would provide nesting habitat  
20 for least bittern and white-faced ibis. These Plan objectives represent performance standards for  
21 considering the effectiveness of restoration and protection actions. The acres of restoration and  
22 protection contained in the near-term Plan goals satisfy the typical mitigation that would be applied  
23 to the project-level effects of CM1, as well as mitigate the near-term effects of the other conservation  
24 measures.

25 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
26 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
27 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
28 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
29 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that avoid or  
30 minimize the risk of affecting individuals and species habitats adjacent to work areas and storage  
31 sites. The AMMs are described in detail in BDCP Appendix 3.C, *Avoidance and Minimization*  
32 *Measures*. Least bittern and white-faced ibis are not covered species under the BDCP. For the BDCP  
33 to have a less-than-significant impact on individuals, preconstruction surveys would be required to  
34 ensure that nests were detected and avoided. Implementation of Mitigation Measure BIO-75,  
35 *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would reduce  
36 the potential impact on nesting least bittern and white-faced ibis to a less-than-significant level.

### 37 **Late Long-Term Timeframe**

38 Alternative 4 as a whole would result in the permanent loss of and temporary effects on 13,113  
39 acres (13,064 acres of permanent loss, 49 acres of temporary loss) of least bittern and white-faced  
40 ibis habitat during the term of the Plan. The locations of these losses are described above in the  
41 analyses of individual conservation measures. The Plan includes conservation commitments  
42 through *CM4 Tidal Natural Communities Restoration* to restore or create at least 24,000 acres of tidal  
43 freshwater emergent wetland in CZs 1, 2, 4, 5, 6, and/or 7 (Objective TFEWNC1.1). In addition, 1,200  
44 acres of nontidal marsh would be created through *CM10 Nontidal Marsh Restoration* and 8,100 acres  
45 of managed wetland would be protected and enhanced in CZ 11.

1 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*  
2 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*  
3 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
4 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
5 *Material, and AMM7 Barge Operations Plan. All of these AMMs include elements that avoid or*  
6 *minimize the risk of affecting individuals and species habitats adjacent to work areas and storage*  
7 *sites. The AMMs are described in detail in BDCP Appendix 3.C, Avoidance and Minimization*  
8 *Measures. Least bittern and white-faced ibis are not covered species under the BDCP. For the BDCP*  
9 *to have a less than adverse effect on individuals, preconstruction surveys for noncovered avian*  
10 *species would be required to ensure that nests were detected and avoided. Implementation of*  
11 *Mitigation Measure BIO-75 would reduce the potential impact on nesting least bittern and white-*  
12 *ibis and to a less-than-significant level.*

13 Considering Alternative 4's protection and restoration provisions, which would provide acreages of  
14 new high-value or enhanced habitat in amounts suitable to compensate for habitats lost to  
15 construction and restoration activities, and with the implementation of AMM1-AMM7 and  
16 Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of*  
17 *Nesting Birds*, the loss of habitat or direct mortality through implementation of Alternative 4 would  
18 not result in a substantial adverse effect through habitat modifications and would not substantially  
19 reduce the number or restrict the range of the species. Therefore, the loss of habitat or potential  
20 mortality under this alternative would have a less-than-significant impact on least bittern and  
21 white-faced ibis.

22 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**  
23 **Disturbance of Nesting Birds**

24 See Mitigation Measure BIO-75 under Impact BIO-75.

25 **Impact BIO-135: Effects on Least Bittern and White-Faced Ibis Associated with Electrical**  
26 **Transmission Facilities**

27 New transmission lines would increase the risk for bird-power line strikes, which could result in  
28 injury or mortality of least bittern and white-faced ibis. The risk for bird-power line strikes would be  
29 minimized with the incorporation of *AMM20 Greater Sandhill Crane* into the BDCP. This measure  
30 would ensure that conductor and ground lines are fitted with flight diverters in compliance with the  
31 best available practices, such as those specified in the USFWS Avian Protection Guidelines.

32 **NEPA Effects:** New transmission lines would increase the risk for bird-power line strikes, which  
33 could result in injury or mortality of least bittern and white-faced ibis. With the incorporation of  
34 *AMM20 Greater Sandhill Crane* into the BDCP, new transmission lines would not have an adverse  
35 effect on least bittern and white-faced ibis.

36 **CEQA Conclusion:** New transmission lines would increase the risk for bird-power line strikes, which  
37 could result in injury or mortality of least bittern and white-faced ibis. With the incorporation of  
38 *AMM20 Greater Sandhill Crane* into the BDCP, new transmission lines would have a less-than-  
39 significant impact on least bittern and white-faced ibis.

1 **Impact BIO-136: Indirect Effects of Plan Implementation on Least Bittern and White-Faced**  
2 **Ibis**

3 **Indirect construction- and operation-related effects:** Noise and visual disturbances associated  
4 with construction-related activities could result in temporary disturbances that affect least bittern  
5 and white-faced ibis use of modeled habitat. Construction noise above background noise levels  
6 (greater than 50 dBA) could extend 500 to 5,250 feet from the edge of construction activities (BDCP  
7 Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of the BDCP Conveyance Facility on*  
8 *Sandhill Crane*, Table 4), although there are no available data to determine the extent to which these  
9 noise levels could affect least bittern or white-faced ibis. Indirect effects associated with  
10 construction include noise, dust, and visual disturbance caused by grading, filling, contouring, and  
11 other ground-disturbing operations. Construction-related noise and visual disturbances could  
12 disrupt nesting and foraging behaviors, and reduce the functions of suitable habitat which could  
13 result in an adverse effect on these species. Mitigation Measure BIO-75, *Conduct Preconstruction*  
14 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to minimize adverse  
15 effects on active nests. The use of mechanical equipment during water conveyance construction  
16 could cause the accidental release of petroleum or other contaminants that could affect these  
17 species or their prey in the surrounding habitat. AMM1–AMM7, including *AMM2 Construction Best*  
18 *Management Practices and Monitoring*, would minimize the likelihood of such spills from occurring.  
19 The inadvertent discharge of sediment or excessive dust adjacent to least bittern and white-faced  
20 ibis could also have a negative effect on these species. AMM1–AMM7 would ensure that measures  
21 are in place to prevent runoff from the construction area and the negative effects of dust on wildlife  
22 adjacent to work areas.

23 **Methylmercury Exposure:** Marsh (tidal and nontidal) and floodplain restoration have the potential  
24 to increase exposure to methylmercury. Mercury is transformed into the more bioavailable form of  
25 methylmercury in aquatic systems, especially areas subjected to regular wetting and drying such as  
26 tidal marshes and flood plains (Alpers et al. 2008). Thus, BDCP restoration activities that create  
27 newly inundated areas could increase bioavailability of mercury (see BDCP Chapter 3, *Conservation*  
28 *Strategy*, for details of restoration). Species sensitivity to methylmercury differs widely and there is  
29 a large amount of uncertainty with respect to species-specific effects. Increased methylmercury  
30 associated with natural community and floodplain restoration could indirectly affect least bittern  
31 and white-faced ibis, via uptake in lower trophic levels (as described in the BDCP, Appendix 5.D,  
32 *Contaminants*).

33 In addition, the potential mobilization or creation of methylmercury within the Plan Area varies  
34 with site-specific conditions and would need to be assessed at the project level. *CM12 Methylmercury*  
35 *Management* contains provisions for project-specific Mercury Management Plans. Site-specific  
36 restoration plans that address the creation and mobilization of mercury, as well as monitoring and  
37 adaptive management as described in CM12 would be available to address the uncertainty of  
38 methylmercury levels in restored tidal marsh and potential impacts on least bittern and white-faced  
39 ibis.

40 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in  
41 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,  
42 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,  
43 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz  
44 2009). The effect of selenium toxicity differs widely between species and also between age and sex  
45 classes within a species. In addition, the effect of selenium on a species can be confounded by

1 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith  
2 2009).

3 The primary source of selenium bioaccumulation in birds is through their diet (Ackerman and  
4 Eagles-Smith 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the  
5 trophic level at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At  
6 Kesterson Reservoir in the San Joaquin Valley, selenium concentrations in invertebrates have been  
7 found to be two to six times the levels in rooted plants. Furthermore, bivalves sampled in the San  
8 Francisco Bay contained much higher selenium levels than crustaceans such as copepods (Stewart et  
9 al. 2004). Studies conducted at the Grasslands in Merced County recorded higher selenium levels in  
10 black-necked stilts which feed on aquatic invertebrates than in mallards and pintails, which are  
11 primarily herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which  
12 forage on bivalves) have much higher levels of selenium levels than shorebirds that prey on aquatic  
13 invertebrates (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high  
14 levels of selenium have a higher risk of selenium toxicity.

15 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations  
16 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to  
17 exacerbate bioaccumulation of selenium in avian species, including least bittern and white-faced  
18 ibis. Marsh (tidal and nontidal) and floodplain restoration have the potential to mobilize selenium,  
19 and therefore increase avian exposure from ingestion of prey items with elevated selenium levels.  
20 Thus, BDCP restoration activities that create newly inundated areas could increase bioavailability of  
21 selenium (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Changes in  
22 selenium concentrations were analyzed in Chapter 8, *Water Quality*, and it was determined that,  
23 relative to Existing Conditions and the No Action Alternative, CM1 would not result in substantial,  
24 long-term increases in selenium concentrations in water in the Delta under any alternative.  
25 However, it is difficult to determine whether the effects of potential increases in selenium  
26 bioavailability associated with restoration-related conservation measures (CM4 and CM5) would  
27 lead to adverse effects on least bittern and white-faced ibis.

28 Because of the uncertainty that exists at this programmatic level of review, there could be a  
29 substantial effect on least bittern and white-faced ibis from increases in selenium associated with  
30 restoration activities. This effect would be addressed through the implementation of *AMM27*  
31 *Selenium Management* (BDCP Appendix 3.C, *Avoidance and Minimization Measures*) which would  
32 provide specific tidal habitat restoration design elements to reduce the potential for  
33 bioaccumulation of selenium and its bioavailability in tidal habitats. Furthermore, the effectiveness  
34 of selenium management to reduce selenium concentrations and/or bioaccumulation would be  
35 evaluated separately for each restoration effort as part of design and implementation. This  
36 avoidance and minimization measure would be implemented as part of the tidal habitat restoration  
37 design schedule.

38 **NEPA Effects:** Indirect effects on least bittern and white-faced ibis as a result of constructing the  
39 water conveyance facilities could have adverse effects on these species in the absence of other  
40 conservation actions. However, the implementation of AMM1–AMM7 would help to reduce this  
41 effect. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid*  
42 *Disturbance of Nesting Birds*, would also be available to address the adverse indirect effects of  
43 construction on active nests. Tidal habitat restoration could result in increased exposure of least  
44 bittern and white-faced ibis to selenium. This effect would be addressed through the  
45 implementation of *AMM27 Selenium Management*, which would provide specific tidal habitat

1 restoration design elements to reduce the potential for bioaccumulation of selenium and its  
2 bioavailability in tidal habitats.

3 Increased methylmercury associated with natural community and floodplain restoration could  
4 indirectly affect least bittern and white-faced ibis, via uptake in lower trophic levels (as described in  
5 the BDCP, Appendix 5.D, *Contaminants*). However, it is unknown what concentrations of  
6 methylmercury are harmful to the species, and the potential for increased exposure varies  
7 substantially within the study area. *CM12 Methylmercury Management* contains provisions for  
8 project-specific Mercury Management Plans. Site-specific restoration plans that address the creation  
9 and mobilization of mercury, as well as monitoring and adaptive management as described in CM12  
10 would better inform potential adverse effects and address the uncertainty of methylmercury levels  
11 in restored tidal marsh in the study area. The site-specific planning phase of marsh restoration  
12 would be the appropriate place to assess the potential for risk of methylmercury exposure for least  
13 bittern and white-faced ibis, once site specific sampling and other information could be developed.

14 **CEQA Conclusion:** Indirect effects on least bittern and white-faced ibis as a result of constructing the  
15 water conveyance facilities could have a significant impact on these species. The incorporation of  
16 AMM1–AMM7 into the BDCP and the implementation of Mitigation Measure BIO-75, *Conduct*  
17 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would reduce this  
18 impact to a less-than-significant level. Increased methylmercury associated with natural community  
19 and floodplain restoration could indirectly affect least bittern and white-faced ibis, via uptake in  
20 lower trophic levels (as described in the BDCP, Appendix 5.D, *Contaminants*). In addition, the  
21 potential mobilization or creation of methylmercury within the Plan Area varies with site-specific  
22 conditions and would need to be assessed at the project level. *CM12 Methylmercury Management*  
23 contains provisions for project-specific Mercury Management Plans. Tidal habitat restoration could  
24 result in increased exposure of least bittern and white-faced ibis to selenium. This effect would be  
25 addressed through the implementation of *AMM27 Selenium Management*, which would provide  
26 specific tidal habitat restoration design elements to reduce the potential for bioaccumulation of  
27 selenium and its bioavailability in tidal habitats. Therefore, the indirect effects of Alternative 4  
28 implementation would not have a significant impact on least bittern and white-faced ibis.

29 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**  
30 **Disturbance of Nesting Birds**

31 See Mitigation Measure BIO-75 under Impact BIO-75.

32 **Impact BIO-137: Periodic Effects of Inundation on Least Bittern and White-Faced Ibis as a**  
33 **Result of Implementation of Conservation Components**

34 Flooding of the Yolo Bypass from Fremont Weir operations (*CM2 Yolo Bypass Fisheries*  
35 *Enhancement*) would increase the frequency and duration of inundation on approximately 961-  
36 2,672 acres of modeled least bittern and white-faced ibis habitat (Table 12-4-50). However, no  
37 adverse effects of increased inundation frequency on nesting habitat would be expected because  
38 wetland vegetation has persisted under the existing Yolo Bypass flooding regime, and changes to  
39 frequency and inundation are within the tolerance of these vegetation types. Inundation would  
40 occur in the nonbreeding season and wetlands supporting habitat would not be expected to be  
41 affected by flood flows.

42 **NEPA Effects:** Periodic inundation of Yolo Bypass would not be expected to have adverse effects on  
43 least bittern or white-faced ibis because wetland vegetation has persisted under the existing Yolo

1 Bypass flooding regime, and changes to frequency and inundation are within the tolerance of these  
2 vegetation types.

3 **CEQA Conclusion:** Periodic inundation of Yolo Bypass would not be expected to have a significant  
4 impact on least bittern or white-faced ibis because wetland vegetation has persisted under the  
5 existing Yolo Bypass flooding regime, and changes to frequency and inundation are within the  
6 tolerance of these vegetation types.

### 7 **Loggerhead Shrike**

8 This section describes the effects of Alternative 4, including water conveyance facilities construction  
9 and implementation of other conservation components, on loggerhead shrike. Modeled habitat for  
10 loggerhead shrike includes both high-value and low-value modeled habitat. High-value habitat  
11 includes grassland, vernal pool complex and alkali seasonal wetland natural communities in  
12 addition to cultivated lands, including pasture and grain and hay crops. Low-value habitat includes  
13 row crops such as truck and berry crops and field crops which are not considered to be valuable  
14 habitat for the species but were included in the model as they may provide foraging opportunities.

15 Construction and restoration associated with Alternative 4 conservation measures would result in  
16 both temporary and permanent losses of modeled habitat for loggerhead shrike as indicated in  
17 Table 12-4-51. Full implementation of Alternative 4 would include the following biological  
18 objectives over the term of the BDCP which would also benefit loggerhead shrike (BDCP Chapter 3,  
19 Section 3.3, *Biological Goals and Objectives*).

- 20 ● Protect at least 8,000 acres of grassland with at least 2,000 acres protected in CZ 1, at least 1,000  
21 acres protected in CZ 8, at least 2,000 acres protected in CZ 11, and the remainder distributed  
22 among CZs 1, 2, 4, 5, 7, 8, and 11 (Objective GNC1.1, associated with CM3).
- 23 ● Restore at least 2,000 acres of grasslands (Objective GNC1.2, associated with CM8).
- 24 ● Protect at least 150 acres of alkali seasonal wetland and at least 600 acres of existing vernal pool  
25 complex in CZs 1, 8, and/or 11 (Objectives ASWNC1.1 and VPNC1.1, associated with CM3).
- 26 ● Increase prey availability and accessibility for grassland-foraging species (Objectives ASWNC2.4,  
27 VPNC2.5, and GNC2.4, associated with CM11).
- 28 ● Protect at least 48,625 acres of cultivated lands that provide suitable habitat for covered and  
29 other native wildlife species (Objective CLNC1.1, associated with CM3).
- 30 ● Maintain and protect the small patches of important wildlife habitats associated with cultivated  
31 lands that occur in cultivated lands within the reserve system, including isolated valley oak  
32 trees, trees and shrubs along field borders and roadsides, remnant groves, riparian corridors,  
33 water conveyance channels, grasslands, ponds, and wetlands (Objective CLNC1.3, associated  
34 with CM3 and CM11).
- 35 ● Establish 20- to 30-foot-wide hedgerows along field borders and roadsides within protected  
36 cultivated lands at a minimum rate of 400 linear feet per 100 acres (Objective SH2.2, associated  
37 with CM11).

38 As explained below, with the restoration or protection of these amounts of habitat, in addition to  
39 management activities that would enhance habitat for the species and implementation of AMM1-  
40 AMM7, and Mitigation Measure BIO-75, impacts on loggerhead shrike would not be adverse for  
41 NEPA purposes and would be less than significant for CEQA purposes.

1 **Table 12-4-51. Changes in Loggerhead Shrike Modeled Habitat Associated with Alternative 4**  
2 **(acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	High-value	1,969	1,969	633	633	NA	NA
	Low-value	2,274	2,274	575	575	NA	NA
<b>Total Impacts CM1</b>		<b>4,243</b>	<b>4,243</b>	<b>1,208</b>	<b>1,208</b>	<b>NA</b>	<b>NA</b>
CM2-CM18	High-value	5,450	26,198	376	893	777-2,423	3,823
	Low-value	1,801	17,575	97	624	672-1,996	4,315
<b>Total Impacts CM2-CM18</b>		<b>7,251</b>	<b>43,723</b>	<b>474</b>	<b>1,517</b>	<b>1,830-5,646</b>	<b>8,138</b>
<b>Total High-value</b>		<b>7,419</b>	<b>28,167</b>	<b>1,009</b>	<b>1,526</b>		
<b>Total Low-value</b>		<b>4,075</b>	<b>19,848</b>	<b>672</b>	<b>1,199</b>		
<b>TOTAL IMPACTS</b>		<b>11,494</b>	<b>48,015</b>	<b>1,682</b>	<b>2,407</b>	<b>1,830-5,646</b>	<b>8,138</b>

<sup>a</sup> See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only. Yolo periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-138: Loss or Conversion of Modeled Habitat for and Direct Mortality of**  
5 **Loggerhead Shrike**

6 Alternative 4 conservation measures would result in the combined permanent and temporary loss  
7 of up to 50,422 acres of modeled habitat for loggerhead shrike (of which 29,693 acres is of high-  
8 value and 21,047 acres is of low value, Table 12-4-51). Conservation measures that would result in  
9 these losses are conveyance facilities and transmission line construction, and establishment and use  
10 of borrow and spoil areas (CM1), Yolo Bypass fisheries improvements (CM2), tidal habitat  
11 restoration (CM4), floodplain restoration (CM5), channel margin enhancement (CM6), riparian  
12 restoration, (CM7), grassland restoration (CM8), vernal pool and wetland restoration (CM9),  
13 nontidal marsh restoration (CM10), natural communities enhancement and management (CM11)  
14 and construction of conservation hatcheries (CM18). The majority of habitat loss (33,244 acres)  
15 would result from CM4. Habitat enhancement and management activities (CM11), which include  
16 ground disturbance or removal of nonnative vegetation, and the construction of recreational trails,  
17 signs, and facilities, could result in local adverse habitat effects. In addition, maintenance activities  
18 associated with the long-term operation of the water conveyance facilities and other BDCP physical  
19 facilities could degrade or eliminate loggerhead shrike modeled habitat. Each of these individual  
20 activities is described below. A summary statement of the combined impacts and NEPA effects, and a  
21 CEQA conclusion follow the individual conservation measure discussions.

- 1       • *CM1 Water Facilities and Operation*: Construction of Alternative 4 conveyance facilities would  
2 result in the combined permanent and temporary loss of up to 2,602 acres of high-value  
3 loggerhead shrike habitat (1,969 acres of permanent loss, 633 acres of temporary loss). In  
4 addition, 2,849 acres of low-value habitat would be removed (2,274 acres of permanent loss,  
5 575 acres of temporary loss). Impacts would occur from the construction of intakes 2, 3, and 5  
6 and associated temporary work areas and access roads in CZ 4 between Clarksburg and  
7 Courtland. The construction of the permanent and temporary transmission line corridors  
8 through CZs 4-6 and 9 would also remove suitable nesting habitat. The largest impact from CM1  
9 on loggerhead shrike would occur in CZ 8, where there are larger stands of ruderal and  
10 herbaceous vegetation and California annual grassland, which provides high-value habitat for  
11 the species. Approximately 685 acres of impact would be from the new forebay constructed  
12 south of the Clifton Court Forebay in CZ 8. Loggerhead shrikes nest in high abundance in these  
13 grasslands to the south and to the west of Clifton Court Forebay. Shrikes were detected using  
14 this area at a much higher rate than other grasslands and areas in the Delta during DHCCP  
15 surveys (Appendix 12C, *2009 to 2011 Bay Delta Conservation Plan EIR/EIS Environmental Data*  
16 *Report*). Impacts from CM1 that overlap with recorded loggerhead shrike nest occurrences  
17 include the construction of the new forebay (4 occurrences), the Reusable Tunnel Material  
18 storage area north-west of the existing forebay (1 occurrence), and the temporary canal work  
19 area north of Byron highway (1 occurrence). The footprint for the temporary transmission lines  
20 also intersects with one loggerhead shrike occurrence just south of Clifton Court Road and to the  
21 northwest of the RTM storage area, east of Byron. Mitigation Measure BIO-75 *Conduct*  
22 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would require  
23 preconstruction surveys and the establishment of no-disturbance buffers and would be  
24 available to address adverse effects on nesting loggerhead shrikes. Refer to the Terrestrial  
25 Biology Map Book for a detailed view of Alternative 4 construction locations. Impacts from CM1  
26 would occur within the first 10 years of Plan implementation.
- 27       • *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo bypass fisheries enhancement  
28 would result in the combined permanent and temporary loss of up to 1,274 acres of high-value  
29 loggerhead shrike habitat (898 acres of permanent loss, 376 acres of temporary loss) in the Yolo  
30 Bypass in CZ 2. In addition, 182 acres of low-value habitat would be removed (85 acres of  
31 permanent loss, 97 acres of temporary loss). The loss is expected to occur during the first 10  
32 years of Alternative 4 implementation.
- 33       • *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and  
34 inundation would permanently remove an estimated 20,880 acres of high-value loggerhead  
35 shrike habitat and 12,364 acres of low-value habitat. The majority of the acres lost would  
36 consist of cultivated lands in CZs 1, 2, 4, 5, 6, and/or 7. Grassland losses would likely occur in the  
37 vicinity of Cache Slough, on Decker Island in the West Delta ROA, on the upslope fringes of  
38 Suisun Marsh, and along narrow bands adjacent to waterways in the South Delta ROA. Tidal  
39 restoration would directly impact and fragment grassland just north of Rio Vista in and around  
40 French and Prospect Islands, and in an area south of Rio Vista around Threemile Slough. Losses  
41 of alkali seasonal wetland complex habitat would likely occur in the south end of the Yolo  
42 Bypass and on the northern fringes of Suisun Marsh.
- 43       • *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore  
44 seasonally inundated floodplain would permanently and temporarily remove approximately  
45 1,450 acres of high-value loggerhead shrike habitat (933 permanent, 517 temporary). These

1 losses would be expected after the first 10 years of Alternative 4 implementation along the San  
2 Joaquin River and other major waterways in CZ 7.

- 3 • *CM7 Riparian Natural Community Restoration*: Riparian restoration would permanently remove  
4 approximately 370 acres of high-value loggerhead shrike habitat as part of tidal restoration and  
5 1,489 acres as part of seasonal floodplain restoration. In addition, 503 acres of low-value habitat  
6 would be removed as a part of tidal restoration and 1,971 acres would be removed as part of  
7 seasonal floodplain restoration through CM7.
- 8 • *CM8 Grassland Natural Community Restoration and CM9 Vernal Pool and Alkali Seasonal Wetland*  
9 *Complex Restoration*: Temporary construction-related disturbance of grassland habitat would  
10 result from implementation of CM8 and CM9 in in CZs 1, 2, 4, 5, 7, 8, and 11. However, all areas  
11 would be restored after the construction periods. Grassland restoration would be implemented  
12 on agricultural lands that also provide habitat for loggerhead shrike and would result in the  
13 conversion of 1,849 acres of cultivated lands to high-value grassland.
- 14 • *CM10 Nontidal Marsh Restoration*: Implementation of CM10 would result in the permanent  
15 removal of 705 acres of high-value loggerhead shrike habitat and 735 acres of low-value  
16 loggerhead shrike habitat.
- 17 • *CM11 Natural Communities Enhancement and Management*: A variety of habitat management  
18 actions included in CM11 that are designed to enhance wildlife values in restored or protected  
19 habitats could result in localized ground disturbances that could temporarily remove small  
20 amounts of modeled habitat. Ground-disturbing activities, such as removal of nonnative  
21 vegetation and road and other infrastructure maintenance activities, would be expected to have  
22 minor adverse effects on available habitat and would be expected to result in overall  
23 improvements to and maintenance of habitat values over the term of the BDCP. CM11 would  
24 also include the construction of recreational-related facilities including trails, interpretive signs,  
25 and picnic tables (BDCP Chapter 4, *Covered Activities and Associated Federal Actions*). The  
26 construction of trailhead facilities, signs, staging areas, picnic areas, bathrooms, etc. would be  
27 placed on existing, disturbed areas when and where possible. However, approximately 50 acres  
28 of grassland habitat would be lost from the construction of trails and facilities.
- 29 Habitat management- and enhancement-related activities could disturb loggerhead shrike nests.  
30 If either species were to nest in the vicinity of a worksite, equipment operation could destroy  
31 nests, and noise and visual disturbances could lead to their abandonment, resulting in mortality  
32 of eggs and nestlings. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys*  
33 *and Avoid Disturbance of Nesting Birds*, would be available to address these adverse effects.
- 34 • *CM18 Conservation Hatcheries*: Implementation of CM18 would remove up to 35 acres of high-  
35 value loggerhead shrike habitat for the development of a delta and longfin smelt conservation  
36 hatchery in CZ 1. Hatchery construction is expected to occur within the first 10 years of Plan  
37 implementation.
- 38 • *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground  
39 water conveyance facilities and restoration infrastructure could result in ongoing but periodic  
40 disturbances that could affect loggerhead shrike use of the surrounding habitat. Maintenance  
41 activities would include vegetation management, levee and structure repair, and re-grading of  
42 roads and permanent work areas. These effects, however, would be reduced by AMM1–AMM7,  
43 Mitigation Measure BIO-75, and conservation actions as described below.

- Injury and Direct Mortality: Construction-related activities would not be expected to result in direct mortality of adult or fledged loggerhead shrike if they were present in the Plan Area, because they would be expected to avoid contact with construction and other equipment. If either species were to nest in the construction area, construction-related activities, including equipment operation, noise and visual disturbances could destroy nests or lead to their abandonment, resulting in mortality of eggs and nestlings. Mitigation Measure BIO-75 would be available to address these potential effects.

The following paragraphs summarize the combined effects discussed above and describe other BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also included.

### ***Near-Term Timeframe***

Because the water conveyance facilities construction (CM1) is being evaluated at the project level, the near-term BDCP conservation strategy has been evaluated to determine whether it would provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the effects of construction would not be adverse under NEPA. Alternative 4 would remove 8,428 acres (7,419 permanent, 1,009 temporary) of high-value habitat for loggerhead shrike in the study area in the near-term. These effects would result from the construction of the water conveyance facilities (CM1, 2,602 acres), and implementing other conservation measures (*CM2 Yolo Bypass Fisheries Enhancement, CM4 Tidal Natural Communities Restoration, CM5 Seasonally Inundated Floodplain Restoration, CM7 Riparian Natural Community Restoration, CM8 Grassland Natural Community Restoration, CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration, CM11 Natural Communities Enhancement and Management and CM18 Conservation Hatcheries—5,826 acres*). In addition, 7,583 acres of low-value habitat would be removed or converted in the near-term (CM1, 2,849 acres; *CM2 Yolo Bypass Fisheries Enhancement, CM4 Tidal Natural Communities Restoration, CM7 Riparian Natural Community Restoration, CM8 Grassland Natural Community Restoration, CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration, CM11 Natural Communities Enhancement and Management and CM18 Conservation Hatcheries—1,898 acres*).

The typical NEPA and CEQA project-level mitigation ratio for those natural communities affected would be 2:1 protection of high-value habitat. Using this ratio would indicate that 5,204 acres should be protected to compensate for the loss of high-value habitat from CM1. The near-term effects of other conservation actions would require 11,652 acres of protection to compensate for the loss of high-value shrike habitat using the same typical NEPA and CEQA ratio (2:1 protection for the loss of high-value habitat). The loss of low-value habitat would not require mitigation because a large proportion of the low-value habitat would result from the conversion and enhancement to high-value habitats. In addition, temporary impacts on cultivated lands would be restored relatively quickly after completion of construction.

The BDCP has committed to near-term goals of protecting 2,000 acres and restoring 1,140 acres of grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of alkali seasonal wetland complex, and protecting 15,400 acres of non-rice cultivated lands (Table 3-4 in Chapter 3, *Description of Alternatives*). These conservation actions are associated with CM3, CM8, and CM9 and would occur in the same timeframe as the construction and early restoration losses.

Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous

1 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would  
2 create larger, more expansive patches of high-value habitat for loggerhead shrike and reduce the  
3 effects of current levels of habitat fragmentation. Under *CM11 Natural Communities Enhancement*  
4 *and Management*, insect prey populations would be increased on protected lands, enhancing the  
5 foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4).  
6 Cultivated lands that provide habitat for covered and other native wildlife species would provide  
7 approximately 15,400 acres of potential high-value habitat for loggerhead shrike (Objective  
8 CLNC1.1). In addition, there is a commitment in the plan (Objective CLNC1.3) to maintain and  
9 protect small patches of trees and shrubs within cultivated lands that would maintain foraging  
10 perches and nesting habitat for the species. The establishment of 20- to 30-foot-wide hedgerows  
11 along field borders and roadsides within protected cultivated lands would also provide high-value  
12 nesting habitat for loggerhead shrike (Objective SH2.2). These Plan objectives represent  
13 performance standards for considering the effectiveness of conservation actions.

14 The combined acres of restoration and protection of 3,660 acres of grassland, vernal pool complex,  
15 and alkali seasonal wetland contained in the near-term Plan goals and the additional detail in the  
16 biological objectives satisfy the typical mitigation that would be applied to the project-level effects of  
17 CM1 and other near-term effects on loggerhead shrike high-value habitat with the consideration  
18 that some portion of the 15,400 acres of cultivated lands protected in the near-term timeframe  
19 would include suitable high-value crop types for loggerhead shrike. Sufficient acreage of the  
20 protected cultivated lands would need to be managed in pasture, alfalfa, or grain and hay crops such  
21 that the near-term impacts on high-value habitat were compensated for at a ratio of 2:1. Mitigation  
22 Measure BIO-138, *Compensate for the Near-Term Loss of High-Value Loggerhead Shrike Habitat*  
23 would be available to address the adverse effect of near-term high-value habitat loss. With the  
24 management and enhancement of cultivated lands including insect prey enhancement through CM3  
25 and CM11, the protection of shrubs and establishment of hedgerows within protected cultivated  
26 lands would compensate for any potential effect from the loss of low-value loggerhead shrike  
27 foraging habitat.

28 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
29 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
30 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
31 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
32 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
33 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
34 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

35 The loggerhead shrike is not a covered species under the BDCP. For the BDCP to avoid an adverse  
36 effect on individuals, preconstruction surveys for noncovered avian species would be required to  
37 ensure that nests are detected and avoided. Mitigation Measure BIO-75, *Conduct Preconstruction*  
38 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to address this  
39 adverse effect.

#### 40 **Late Long-Term Timeframe**

41 Alternative 4 as a whole would result in the permanent loss of and temporary effects on 29,692  
42 acres of high-value loggerhead shrike habitat during the term of the Plan. In addition, 21,047 acres  
43 of low-value loggerhead shrike habitat would be impacted. The locations of these losses are  
44 described above in the analyses of individual conservation measures. The Plan includes

1 conservation commitments through *CM3 Natural Communities Protection and Restoration*, *CM8*  
2 *Grassland Natural Community Restoration*, and *CM9 Vernal Pool and Alkali Seasonal Wetland Complex*  
3 *Restoration* to protect 8,000 acres and restore 2,000 acres of grassland natural community, protect  
4 600 acres of vernal pool complex, protect 150 acres of alkali seasonal wetland complex and protect  
5 48,625 acres of cultivated lands that provide suitable habitat for native wildlife species (Table 3-4 in  
6 Chapter 3). Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11  
7 (Objectives GNC1.1 and GNC1.2). Grassland protection in CZ 1, 8, and 11 would be associated with  
8 vernal pool and alkali seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would  
9 result in a contiguous matrix of grassland, alkali seasonal wetland, and vernal pool natural  
10 communities which would create larger, more expansive patches of high-value habitat for  
11 loggerhead shrike and reduce the effects of current levels of habitat fragmentation. Under *CM11*  
12 *Natural Communities Enhancement and Management*, insect prey populations would be increased on  
13 protected lands, enhancing the foraging value of these natural communities (Objectives ASWNC2.4,  
14 VPNC2.5, and GNC2.4). Cultivated lands that provide habitat for covered and other native wildlife  
15 species would provide approximately 48,625 acres of potential high-value habitat for loggerhead  
16 shrike (Objective CLNC1.1). In addition, there is a commitment in the plan (Objective CLNC1.3) to  
17 maintain and protect small patches of trees and shrubs within cultivated lands that would maintain  
18 foraging perches and nesting habitat for the species. The establishment of 20- to 30-foot-wide  
19 hedgerows along field borders and roadsides within protected cultivated lands would also provide  
20 high-value nesting habitat for loggerhead shrike (Objective SH2.2).

21 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
22 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
23 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
24 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
25 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
26 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
27 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*. The loggerhead  
28 shrike is not a covered species under the BDCP. For the BDCP to avoid an adverse effect on  
29 individuals, preconstruction surveys for noncovered avian species would be required to ensure that  
30 nests are detected and avoided. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird*  
31 *Surveys and Avoid Disturbance of Nesting Birds*, would be available to address this adverse effect.

32 **NEPA Effects:** The loss of loggerhead shrike habitat and potential mortality of this special-status  
33 species under Alternative 4 would represent an adverse effect in the absence of other conservation  
34 actions. However, with habitat protection and restoration associated with CM3, CM8, CM9, and  
35 CM11, guided by biological goals and objectives and by AMM1–AMM7, and with implementation of  
36 Mitigation Measure BIO-138, *Compensate for the Near-Term Loss of High-Value Loggerhead Shrike*  
37 *Habitat*, which would be available to guide the near-term protection and management of cultivated  
38 lands, the effects of habitat loss on loggerhead shrike under Alternative 4 would not be adverse.  
39 Loggerhead shrike is not a covered species under the BDCP, and potential mortality would be an  
40 adverse effect without preconstruction surveys to ensure that nests are detected and avoided.  
41 Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of*  
42 *Nesting Birds*, would be available to address this effect.

1 **CEQA Conclusion:**

2 **Near-Term Timeframe**

3 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
4 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
5 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
6 effects of construction would be less than significant under CEQA. Alternative 4 would remove 8,428  
7 acres (7,419 permanent, 1,009 temporary) of high-value habitat for loggerhead shrike in the study  
8 area in the near-term. These effects would result from the construction of the water conveyance  
9 facilities (CM1, 2,602 acres), and implementing other conservation measures (*CM2 Yolo Bypass*  
10 *Fisheries Enhancement, CM4 Tidal Natural Communities Restoration, CM7 Riparian Natural*  
11 *Community Restoration, CM8 Grassland Natural Community Restoration, CM9 Vernal Pool and Alkali*  
12 *Seasonal Wetland Complex Restoration, CM11 Natural Communities Enhancement and Management*  
13 *and CM18 Conservation Hatcheries—5,826 acres). In addition, 7,583 acres of low-value habitat*  
14 *would be removed or converted in the near-term (CM1, 2,849 acres; CM2 Yolo Bypass Fisheries*  
15 *Enhancement, CM4 Tidal Natural Communities Restoration, CM7 Riparian Natural Community*  
16 *Restoration, CM8 Grassland Natural Community Restoration, CM9 Vernal Pool and Alkali Seasonal*  
17 *Wetland Complex Restoration, CM11 Natural Communities Enhancement and Management and CM18*  
18 *Conservation Hatcheries—1,898 acres).*

19 The typical NEPA and CEQA project-level mitigation ratio for those natural communities affected  
20 would be 2:1 protection of high-value habitat. Using these typical ratios would indicate that 5,204  
21 acres should be protected to compensate for the loss of high-value habitat from CM1. The near-term  
22 effects of other conservation actions would require 11,652 acres of protection to compensate for the  
23 loss of high-value shrike habitat using the same typical NEPA and CEQA ratio (2:1 protection for the  
24 loss of high-value habitat). The loss of low-value habitat would not require mitigation because a  
25 large proportion of the low-value habitat would result from the conversion and enhancement to  
26 high-value habitats. In addition, temporary impacts on cultivated lands would be restored relatively  
27 quickly after completion of construction.

28 The BDCP has committed to near-term goals of protecting 2,000 acres and restoring 1,140 acres of  
29 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of  
30 alkali seasonal wetland complex, and protecting 15,400 acres of non-rice cultivated lands (Table 3-4  
31 in Chapter 3). These conservation actions are associated with CM3, CM8, and CM9 and would occur  
32 in the same timeframe as the construction and early restoration losses.

33 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1  
34 and GNC1.2). Grassland protection in CZs 1, 8, and 11 would be associated with vernal pool and  
35 alkali seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a  
36 contiguous matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which  
37 would create larger, more expansive patches of high-value habitat for loggerhead shrike and reduce  
38 the effects of current levels of habitat fragmentation. Under *CM11 Natural Communities*  
39 *Enhancement and Management*, insect prey populations would be increased on protected lands,  
40 enhancing the foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and  
41 GNC2.4). Cultivated lands that provide habitat for covered and other native wildlife species would  
42 provide approximately 15,400 acres of potential high-value habitat for loggerhead shrike (Objective  
43 CLNC1.1). In addition, there is a commitment in the plan (Objective CLNC1.3) to maintain and  
44 protect small patches of trees and shrubs within cultivated lands that would maintain foraging

1 perches and nesting habitat for the species. The establishment of 20- to 30-foot-wide hedgerows  
2 along field borders and roadsides within protected cultivated lands would also provide high-value  
3 nesting habitat for loggerhead shrike (Objective SH2.2). These Plan objectives represent  
4 performance standards for considering the effectiveness of conservation actions.

5 The combined acres of restoration and protection of 3,660 acres of grassland, vernal pool complex,  
6 and alkali seasonal wetland contained in the near-term Plan goals and the additional detail in the  
7 biological objectives satisfy the typical mitigation that would be applied to the project-level effects of  
8 CM1 and other near-term effects on loggerhead shrike high-value habitat with the consideration  
9 that some portion of the 15,400 acres of cultivated lands protected in the near-term timeframe  
10 would include suitable high-value crop types for loggerhead shrike. Sufficient acreage of the  
11 protected cultivated lands would need to be managed in pasture, alfalfa, or grain and hay crops such  
12 that the near-term impacts on high-value habitat were compensated for at a ratio of 2:1. The  
13 implementation of Mitigation Measure BIO-138, *Compensate for the Near-term Loss of High-Value*  
14 *Loggerhead Shrike Habitat* would reduce the impact of near-term high-value habitat loss to a less-  
15 than-significant level. With the management and enhancement of cultivated lands including insect  
16 prey enhancement through CM3 and CM11, the protection of shrubs and establishment of  
17 hedgerows within protected cultivated lands would compensate for any potential impact from the  
18 loss of low-value loggerhead shrike foraging habitat.

19 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
20 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
21 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
22 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
23 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
24 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
25 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

26 The loggerhead shrike is not a covered species under the BDCP and in order to avoid an adverse  
27 effect on individuals, preconstruction surveys for noncovered avian species would be required to  
28 ensure that nests are detected and avoided. Implementation of Mitigation Measure BIO-75, *Conduct*  
29 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would reduce this  
30 potential impact to a less-than-significant level.

### 31 **Late Long-Term Timeframe**

32 Alternative 4 as a whole would result in the permanent loss of and temporary effects on 29,692  
33 acres of high-value loggerhead shrike habitat during the term of the Plan. In addition, 21,047 acres  
34 of low-value loggerhead shrike habitat would be impacted. The locations of these losses are  
35 described above in the analyses of individual conservation measures. The Plan includes  
36 conservation commitments through *CM3 Natural Communities Protection and Restoration*, *CM8*  
37 *Grassland Natural Community Restoration*, and *CM9 Vernal Pool and Alkali Seasonal Wetland Complex*  
38 *Restoration* to protect 8,000 acres and restore 2,000 acres of grassland natural community, protect  
39 600 acres of vernal pool complex, protect 150 acres of alkali seasonal wetland complex and protect  
40 48,625 acres of cultivated lands that provide suitable habitat for native wildlife species (Table 3-4 in  
41 Chapter 3). Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11  
42 (Objectives GNC1.1 and GNC1.2). Grassland protection in CZ 1, 8, and 11 would be associated with  
43 vernal pool and alkali seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would  
44 result in a contiguous matrix of grassland, alkali seasonal wetland, and vernal pool natural

1 communities which would create larger, more expansive patches of high-value habitat for  
2 loggerhead shrike and reduce the effects of current levels of habitat fragmentation. Under *CM11*  
3 *Natural Communities Enhancement and Management*, insect prey populations would be increased on  
4 protected lands, enhancing the foraging value of these natural communities (Objectives ASWNC2.4,  
5 VPNC2.5, and GNC2.4). Cultivated lands that provide habitat for covered and other native wildlife  
6 species would provide approximately 48,625 acres of potential high-value habitat for loggerhead  
7 shrike (Objective CLNC1.1). In addition, there is a commitment in the plan (Objective CLNC1.3) to  
8 maintain and protect small patches of trees and shrubs within cultivated lands that would maintain  
9 foraging perches and nesting habitat for the species. The establishment of 20- to 30-foot-wide  
10 hedgerows along field borders and roadsides within protected cultivated lands would also provide  
11 high-value nesting habitat for loggerhead shrike (Objective SH2.2).

12 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
13 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
14 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
15 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
16 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
17 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
18 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*. The loggerhead  
19 shrike is not a covered species under the BDCP. For the BDCP to avoid an adverse effect on  
20 individuals, preconstruction surveys for noncovered avian species would be required to ensure that  
21 nests are detected and avoided. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird*  
22 *Surveys and Avoid Disturbance of Nesting Birds*, would reduce this potential impact to a less-than-  
23 significant level.

24 Considering Alternative 4's protection and restoration provisions, which would provide acreages of  
25 new high-value or enhanced habitat in amounts suitable to compensate for habitats lost to  
26 construction and restoration activities, and with the implementation of AMM1-AMM7, Mitigation  
27 Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting*  
28 *Birds*, and Mitigation Measure BIO-138, *Compensate for the Near-Term Loss of High-Value*  
29 *Loggerhead Shrike Habitat*, the loss of habitat or direct mortality through implementation of  
30 Alternative 4 would not result in a substantial adverse effect through habitat modifications and  
31 would not substantially reduce the number or restrict the range of the species. Therefore, the loss of  
32 habitat or potential mortality under this alternative would have a less-than-significant impact on  
33 loggerhead shrike.

34 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**  
35 **Disturbance of Nesting Birds**

36 See Mitigation Measure BIO-75 under Impact BIO-75.

37 **Mitigation Measure BIO-138: Compensate for the Near-Term Loss of High-Value**  
38 **Loggerhead Shrike Habitat**

39 Because the BDCP does not include acreage commitments for the protection of crop types in the  
40 near-term time period, DWR will manage and protect sufficient acres of cultivated lands such as  
41 pasture, grain and hay crops, or alfalfa as high-value loggerhead shrike habitat such that the  
42 total acres of high-value habitat impacted in the near-term timeframe are mitigated at a ratio of

1 2:1. Additional grassland protection, enhancement, and management may be substituted for the  
2 protection of high-value cultivated lands.

3 **Impact BIO-139: Effects on Loggerhead Shrike Associated with Electrical Transmission**  
4 **Facilities**

5 New transmission lines would increase the risk for bird-power line strikes, which could result in  
6 injury or mortality of loggerhead shrike. The risk for bird-power line strikes, would be minimized  
7 for lesser sandhill crane with the incorporation of *AMM20 Greater Sandhill Crane* into the BDCP. This  
8 measure would ensure that conductor and ground lines are fitted with flight diverters in compliance  
9 with the best available practices, such as those specified in the USFWS Avian Protection Guidelines  
10 and would further ensure no adverse effect from electrical transmission facilities.

11 **NEPA Effects:** New transmission lines would increase the risk for bird-power line strikes, which  
12 could result in injury or mortality of loggerhead shrike. With the implementation of *AMM20 Greater*  
13 *Sandhill Crane* the effect of new transmission lines on loggerhead shrike would not be adverse.

14 **CEQA Conclusion:** New transmission lines would increase the risk for bird-power line strikes, which  
15 could result in injury or mortality of loggerhead shrike. With the incorporation of *AMM20 Greater*  
16 *Sandhill Crane* into the BDCP, new transmission lines would have a less-than-significant impact on  
17 loggerhead shrike.

18 **Impact BIO-140: Indirect Effects of Plan Implementation on Loggerhead Shrike**

19 Noise and visual disturbances associated with construction-related activities could result in  
20 temporary disturbances that affect loggerhead shrike use of modeled habitat. Construction noise  
21 above background noise levels (greater than 50 dBA) could extend 500 to 5,250 feet from the edge  
22 of construction activities (BDCP Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of*  
23 *the BDCP Conveyance Facility on Sandhill Crane*, Table 4), although there are no available data to  
24 determine the extent to which these noise levels could affect loggerhead shrike. Indirect effects  
25 associated with construction include noise, dust, and visual disturbance caused by grading, filling,  
26 contouring, and other ground-disturbing operations. Construction-related noise and visual  
27 disturbances could disrupt nesting and foraging behaviors, and reduce the functions of suitable  
28 habitat which could result in an adverse effect on these species. Indirect effects from construction of  
29 the new forebay in CZ 8 could result in substantial effects on active loggerhead shrike nests. DHCCP  
30 surveys in 2009 detected 10 nest sites south-west of the Clifton Court Forebay (Appendix 12C, *2009*  
31 *to 2011 Bay Delta Conservation Plan EIR/EIS Environmental Data Report*) and the large expanses of  
32 grassland in CZ 8 provide high-value nesting habitat for the species. Mitigation Measure BIO-75,  
33 *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be  
34 available to minimize adverse effects on active nests. The use of mechanical equipment during water  
35 conveyance facilities construction could cause the accidental release of petroleum or other  
36 contaminants that could affect these species or their prey in the surrounding habitat. AMM1–AMM7,  
37 including *AMM2 Construction Best Management Practices and Monitoring*, would minimize the  
38 likelihood of such spills. The inadvertent discharge of sediment or excessive dust adjacent to  
39 loggerhead shrike nesting habitat could also have a negative effect on these species. AMM1–AMM7  
40 would ensure that measures are in place to prevent runoff from the construction area and the  
41 negative effects of dust on wildlife adjacent to work areas.

42 **NEPA Effects:** Indirect effects on loggerhead shrike as a result of Alternative 4 implementation could  
43 have adverse effects on these species through the modification of habitat and potential for direct

1 mortality. Construction of the new forebay in CZ 8 would have the potential to disrupt nesting  
2 loggerhead shrikes in the highly suitable habitat surrounding Clifton Court Forebay and adjacent to  
3 work areas. The loggerhead shrike is not a covered species under the BDCP, and the potential for  
4 mortality would be an adverse effect without preconstruction surveys to ensure that nests are  
5 detected and avoided. In conjunction with AMM1–AMM7, Mitigation Measure BIO-75, *Conduct*  
6 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to  
7 address this adverse effect.

8 **CEQA Conclusion:** Indirect effects on loggerhead shrike as a result of Alternative 4 implementation  
9 could have a significant impact on these species. Construction of the new forebay in CZ 8 would have  
10 the potential to disrupt nesting loggerhead shrikes in the highly suitable habitat surrounding Clifton  
11 Court Forebay and adjacent to work areas. The incorporation of AMM1–AMM7 into the BDCP and  
12 the implementation of Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and*  
13 *Avoid Disturbance of Nesting Birds*, would reduce this impact to a less-than-significant level.

14 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**  
15 **Disturbance of Nesting Birds**

16 See Mitigation Measure BIO-75 under Impact BIO-75.

17 **Impact BIO-141: Periodic Effects of Inundation on Loggerhead Shrike as a Result of**  
18 **Implementation of Conservation Components**

19 Flooding of the Yolo Bypass from Fremont Weir operations (*CM2 Yolo Bypass Fisheries*  
20 *Enhancement*) would increase the frequency and duration of inundation on approximately 1,830–  
21 5,646 acres of modeled loggerhead shrike habitat (consisting of approximately 777–2,423 acres of  
22 high-value habitat; Table 12-4-51). Based on hypothetical footprints, implementation of *CM5*  
23 *Seasonally Inundated Floodplain Restoration* could result in the periodic inundation of up to  
24 approximately 8,138 acres of modeled habitat (Table 12-4-51), consisting of 3,823 acres of high-  
25 value and 4,315 acres of low-value habitat.

26 Reduced foraging habitat availability may be expected during the fledgling period of the nesting  
27 season due to periodic inundation. However, increased frequency and duration of inundation would  
28 occur during the nonbreeding season.

29 **NEPA Effects:** Periodic inundation of floodplains would not result in an adverse effect on loggerhead  
30 shrike from the modification of habitat. Reduced foraging habitat availability may be expected  
31 during the fledgling period of the nesting season due to periodic inundation. However, increased  
32 frequency and duration of inundation would occur during the nonbreeding season.

33 **CEQA Conclusion:** Periodic inundation of floodplains would result in a less-than-significant impact  
34 on loggerhead shrike from the modification of habitat. Reduced foraging habitat availability may be  
35 expected during the fledgling period of the nesting season due to periodic inundation. However,  
36 increased frequency and duration of inundation would occur during the nonbreeding season.

37 **Song Sparrow “Modesto” Population**

38 This section describes the effects of Alternative 4, including water conveyance facilities construction  
39 and implementation of other conservation components, on Modesto song sparrow. The Modesto  
40 song sparrow is common and ubiquitous throughout the Plan area, excluding CZ 11, and modeled

1 habitat for the species includes managed wetlands, tidal freshwater emergent, nontidal freshwater  
2 emergent, and valley/foothill riparian vegetation communities.

3 Construction and restoration associated with Alternative 4 conservation measures would result in  
4 both temporary and permanent removal of Modesto song sparrow habitat in the quantities  
5 indicated in Table 12-4-52. However, BDCP activities are expected to have little impact on the  
6 population. Full implementation of Alternative 4 would include the following biological objectives  
7 over the term of the BDCP which would also benefit Modesto song sparrow (BDCP Chapter 3,  
8 Section 3.3, *Biological Goals and Objectives*).

- 9 ● Restore or create at least 5,000 acres of valley/foothill riparian natural community, with at least  
10 3,000 acres occurring on restored seasonally inundated floodplain (Objective VFRNC1.1,  
11 associated with CM7).
- 12 ● Protect at least 750 acres of existing valley/foothill riparian natural community in CZ 7 by year  
13 10 (Objective VFRNC1.2, associated with CM3).
- 14 ● Restore or create at least 24,000 acres of tidal freshwater emergent wetland in CZ 1, 2, 4, 5, 6,  
15 and/or 7 (Objective TFEWNC1.1, associated with CM4).
- 16 ● Create at least 1,200 acres of nontidal marsh consisting of a mosaic of nontidal perennial aquatic  
17 and nontidal freshwater emergent wetland natural communities (Objective NFEW/NPANC1.1,  
18 associated with CM10)
- 19 ● Create 500 acres of managed wetlands in CZ 3, 4, 5, or 6 (Objectives GSHC1.3 and GSHC1.4,  
20 associated with CM10).
- 21 ● Increase prey availability and accessibility for grassland-foraging species (Objectives ASWNC2.4,  
22 VPNC2.5, and GNC2.4, associated with CM11).
- 23 ● Maintain and protect the small patches of important wildlife habitats associated with cultivated  
24 lands that occur in cultivated lands within the reserve system, including isolated valley oak  
25 trees, trees and shrubs along field borders and roadsides, remnant groves, riparian corridors,  
26 water conveyance channels, grasslands, ponds, and wetlands (Objective CLNC1.3, associated  
27 with CM3).
- 28 ● Establish 20- to 30-foot-wide hedgerows along field borders and roadsides within protected  
29 cultivated lands at a minimum rate of 400 linear feet per 100 acres (Objective SH2.2, associated  
30 with CM3).

31 As explained below, with the restoration or protection of these amounts of habitat, in addition to  
32 implementation of AMM1–AMM7 and Mitigation Measure BIO-75, impacts on Modesto song  
33 sparrow would not be adverse for NEPA purposes and would be less than significant for CEQA  
34 purposes.

1  
2

**Table 12-4-52. Changes in Modesto Song Sparrow Modeled Habitat Associated with Alternative 4 (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	Nesting	49	49	73	73	NA	NA
<b>Total Impacts CM1</b>		<b>49</b>	<b>49</b>	<b>73</b>	<b>73</b>	<b>NA</b>	<b>NA</b>
CM2-CM18	Nesting	2,444	3,253	133	169	81-158	284
<b>Total Impacts CM2-CM18</b>		<b>2,444</b>	<b>3,253</b>	<b>133</b>	<b>169</b>	<b>81-158</b>	<b>284</b>
<b>TOTAL IMPACTS</b>		<b>2,493</b>	<b>3,302</b>	<b>206</b>	<b>242</b>	<b>81-158</b>	<b>284</b>

<sup>a</sup> See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-142: Loss or Conversion of Habitat for and Direct Mortality of Modesto Song**  
5 **Sparrow**

6 Alternative 4 conservation measures would result in the combined permanent and temporary loss  
7 of up to 3,544 acres of modeled habitat for Modesto song sparrow (3,302 acres of permanent loss  
8 and 242 acres of temporary loss, Table 12-4-52). Conservation measures that would result in these  
9 losses are conveyance facilities and transmission line construction, and establishment and use of  
10 borrow and spoil areas (CM1), Yolo Bypass fisheries improvements (CM2), tidal habitat restoration  
11 (CM4), and floodplain restoration (CM5). Habitat enhancement and management activities (CM11),  
12 which include ground disturbance or removal of nonnative vegetation, could result in local adverse  
13 habitat effects. In addition, maintenance activities associated with the long-term operation of the  
14 water conveyance facilities and other BDCP physical facilities could degrade or eliminate Modesto  
15 song sparrow modeled habitat. Each of these individual activities is described below. A summary  
16 statement of the combined impacts and NEPA effects, and a CEQA conclusion follows the individual  
17 conservation measure discussions.

- 18 • *CM1 Water Facilities and Operation:* Construction of Alternative 4 conveyance facilities would  
19 result in the combined permanent and temporary loss of up to 122 acres of modeled Modesto  
20 song sparrow habitat (49 acres of permanent loss, 73 acres of temporary loss) from CZs 3-6 and  
21 CZ 8. The CM1 construction footprint overlaps with 35 Modesto song sparrow occurrences and  
22 the species is ubiquitous throughout the Delta. The reusable tunnel material storage areas  
23 throughout the central Delta overlaps with 25 occurrences, the permanent transmission line  
24 overlaps with four occurrences, and three occurrences overlap with the construction of the new  
25 forebay in CZ 8. In addition, the temporary transmission line, and a barge unloading facility  
26 north of Bacon Island overlap with three occurrences of Modesto song sparrow. Mitigation

1 Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting*  
2 *Birds*, would require preconstruction surveys and the establishment of no-disturbance buffers  
3 and would be available to address adverse effects on nesting Modesto song sparrows. Refer to  
4 the Terrestrial Biology Map Book for a detailed view of Alternative 4 construction locations.  
5 Construction of the water conveyance facilities and the resultant impacts would occur within the  
6 first 10 years of Plan implementation.

- 7 • *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo bypass fisheries enhancement  
8 would permanently remove 143 acres of modeled Modesto song sparrow habitat in the Yolo  
9 Bypass in CZ 2. In addition, 133 acres of habitat would be temporarily removed. These losses  
10 would occur in the near-term timeframe and primarily consist of valley/foothill riparian natural  
11 community and managed wetland. The loss is expected to occur during the first 10 years of  
12 Alternative 4 implementation.
- 13 • *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and  
14 inundation would result in the conversion of an estimated loss of 3,066 acres of modeled  
15 Modesto song sparrow habitat by the late long-term timeframe.
- 16 • *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore  
17 seasonally inundated floodplain would permanently and temporarily remove approximately 80  
18 acres of modeled Modesto song sparrow habitat (44 permanent, 36 temporary). These losses  
19 would be expected to occur along the San Joaquin River and other major waterways in CZ 7. The  
20 BDCP is expected to restore approximately 5,000 acres of valley/foothill riparian natural  
21 community. These lands would be managed as a mosaic of seral stages, age classes, and plant  
22 heights, some of which would provide suitable nesting habitat for Modesto song sparrow.
- 23 • *CM6 Channel Margin Enhancement*: Channel margin habitat enhancement could result in  
24 removal of small amounts of valley/foothill riparian habitat along 20 miles of river and sloughs.  
25 The extent of this loss cannot be quantified at this time, but the majority of the enhancement  
26 activity would occur along waterway margins where riparian habitat stringers exist, including  
27 levees and channel banks. The improvements would occur within the study area on sections of  
28 the Sacramento, San Joaquin and Mokelumne Rivers, and along Steamboat and Sutter Sloughs.  
29 Some of the restored riparian habitat in the channel margin would be expected to support  
30 nesting habitat for Modesto song sparrow.
- 31 • *CM11 Natural Communities Enhancement and Management*: A variety of habitat management  
32 actions included in CM11 that are designed to enhance wildlife values in restored or protected  
33 habitats could result in localized ground disturbances that could temporarily remove small  
34 amounts of modeled habitat. Ground-disturbing activities, such as removal of nonnative  
35 vegetation and road and other infrastructure maintenance activities, would be expected to have  
36 minor adverse effects on available habitat and would be expected to result in overall  
37 improvements to and maintenance of habitat values over the term of the BDCP.

38 Habitat management- and enhancement-related activities could affect Modesto song sparrow  
39 nests. If the individuals were to nest in the vicinity of a worksite, equipment operation could  
40 destroy nests, and noise and visual disturbances could lead to their abandonment, resulting in  
41 mortality of eggs and nestlings. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting*  
42 *Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to address these adverse  
43 effects.

- 1 • Operations and Maintenance: Postconstruction operation and maintenance of the above-ground  
2 water conveyance facilities and restoration infrastructure could result in ongoing but periodic  
3 disturbances that could affect Modesto song sparrow use of the surrounding habitat.  
4 Maintenance activities would include vegetation management, levee and structure repair, and  
5 re-grading of roads and permanent work areas. These effects, however, would be reduced by  
6 AMMs and conservation actions as described below.
- 7 • Injury and Direct Mortality: Construction-related activities would not be expected to result in  
8 direct mortality of adult or fledged Modesto song sparrow if they were present in the Plan Area,  
9 because they would be expected to avoid contact with construction and other equipment. If  
10 either species were to nest in the construction area, construction-related activities, including  
11 equipment operation, noise and visual disturbances could destroy nests or lead to their  
12 abandonment, resulting in mortality of eggs and nestlings. Mitigation Measure BIO-75 would be  
13 available to address these effects.

14 The following paragraphs summarize the combined effects discussed above and describe other  
15 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also  
16 included.

#### 17 ***Near-Term Timeframe***

18 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
19 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
20 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
21 effects of construction would not be adverse under NEPA. Alternative 4 would remove 2,699 acres  
22 of modeled habitat (2,493 permanent, 206 temporary) for Modesto song sparrow in the study area  
23 in the near-term. These effects would result from the construction of the water conveyance facilities  
24 (CM1, 122 acres), and implementing other conservation measures (*CM2 Yolo Bypass Fisheries*  
25 *Enhancement*, *CM4 Tidal Natural Communities Restoration*, and *CM5 Seasonally Inundated Floodplain*  
26 *Restoration—2,577 acres*).

27 Typical NEPA and CEQA project-level mitigation ratios for those natural communities that would be  
28 affected would be 1:1 for restoration/creation and 1:1 protection of habitat. Using these ratios  
29 would indicate that 122 acres of suitable habitat should be restored/created and 122 acres should  
30 be protected to compensate for the CM1 losses of 122 acres of Modesto song sparrow habitat. The  
31 near-term effects of other conservation actions would remove 2,577 acres of modeled habitat, and  
32 therefore require 2,577 acres of restoration/creation and 2,577 acres of protection of Modesto song  
33 sparrow habitat using the same typical NEPA and CEQA ratios (1:1 for restoration/creation and 1:1  
34 for protection).

35 The BDCP has committed to near-term goals of protecting 750 acres and restoring 800 acres of the  
36 valley/foothill riparian natural community, restoring 2,000 acres of tidal freshwater emergent  
37 wetland, restoring 500 acres of managed wetland, and restoring 400 acres of nontidal marsh in the  
38 Plan Area (Table 3-4 in Chapter 3, *Description of Alternatives*). These conservation actions are  
39 associated with CM3, CM4, CM7, and CM10 and would occur in the same timeframe as the  
40 construction and early restoration losses, thereby avoiding adverse effects of habitat loss on  
41 Modesto song sparrow. The majority of the riparian restoration acres would occur in CZ 7 as part of  
42 a reserve system with extensive wide bands or large patches of valley/foothill riparian natural  
43 community (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*) and  
44 would provide suitable Modesto song sparrow nesting habitat. The tidal freshwater emergent

1 wetland would be restored in CZs 1, 2, 4, 5, 6, and/or 7 (Objective TFEWNC1.1) and would be  
2 restored in a way that creates topographic heterogeneity and in areas that increase connectivity  
3 among protected lands (Objective TFEWNC2.2). The nontidal marsh restoration would occur in CZs  
4 2, 4, and/or 5, and the managed wetland restoration would occur in CZs 3, 4, 5, or 6. Both the  
5 nontidal marsh and managed wetland restoration are associated with CM10 and would provide  
6 nesting habitat for Modesto song sparrow.

7 The Plan also includes commitments to protect patches of important wildlife habitat on cultivated  
8 lands such as trees and shrubs along borders and roadside, riparian corridors, and wetlands  
9 (Objective CLNC1.3). In addition, 20- to 30-foot-wide hedgerows would be established along field  
10 borders and roadsides, which would provide additional habitat for the species (Objective SH2.2).  
11 The management of protected grasslands to increase insect prey through techniques such as the  
12 avoidance of use of pesticides (Objectives ASWNC2.4, VPNC2.5, and GNC2.4) would provide further  
13 benefits to foraging Modesto song sparrows. These Plan objectives represent performance  
14 standards for considering the effectiveness of conservation actions. The acres of restoration and  
15 protection contained in the near-term Plan goals and the additional detail in the biological objectives  
16 satisfy the typical mitigation that would be applied to the project-level effects of CM1 on Modesto  
17 song sparrow, as well as mitigate the near-term effects of the other conservation measures.

18 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
19 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
20 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
21 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
22 *Material* and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
23 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
24 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

25 Modesto song sparrow is not a covered species under the BDCP. For the BDCP to avoid an adverse  
26 effect on individuals, preconstruction surveys for noncovered avian species would be required to  
27 ensure that nests are detected and avoided. Mitigation Measure BIO-75, *Conduct Preconstruction*  
28 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to address this  
29 adverse effect.

### 30 **Late Long-Term Timeframe**

31 Alternative 4 as a whole would result in the permanent loss of and temporary effects on 3,544 acres  
32 (3,302 acres of permanent loss, 242 acres of temporary loss) of modeled Modesto song sparrow  
33 habitat during the term of the Plan. The locations of these losses are described above in the analyses  
34 of individual conservation measures. The Plan includes conservation commitments through *CM3*  
35 *Natural Communities Protection and Restoration*, *CM4 Tidal Natural Communities Restoration*, and  
36 *CM10 Nontidal Marsh Restoration* to protect 750 acres and restore 5,000 acres of the valley/foothill  
37 riparian natural community, restore 24,000 acres of tidal freshwater emergent wetland, restore 500  
38 acres of managed wetland, and restore 1,200 acres of nontidal marsh in the Plan Area (Table 3-4 in  
39 Chapter 3, *Description of Alternatives*). Additional acres of valley/foothill riparian habitat would be  
40 restored as a component of channel margin enhancement actions (CM6) along 20 miles of river and  
41 slough channels in the Delta, some of which would be expected to support nesting habitat for  
42 Modesto song sparrow. Of the 5,000 acres of restored riparian natural communities, a minimum of  
43 3,000 acres of valley/foothill riparian would be restored within the seasonally inundated floodplain,  
44 and 1,000 acres would be managed as dense early to mid-successional riparian forest (Objectives

1 VFRNC1.1 and VFRNC1.2). Goals and objectives in the Plan for riparian restoration also include the  
2 maintenance and enhancement of structural heterogeneity (Objective VFRNC2.1) which would  
3 provide suitable nesting habitat for Modesto song sparrow.

4 The tidal freshwater emergent wetland would be restored in CZs 1, 2, 4, 5, 6, and/or 7 (Objective  
5 TFEWNC1.1) and would be restored in a way that creates topographic heterogeneity and in areas  
6 that increase connectivity among protected lands (Objective TFEWNC2.2). The nontidal marsh  
7 restoration would occur in CZs 2, 4, and/or 5, and the managed wetland restoration would occur in  
8 CZs 3, 4, 5, or 6. Both the nontidal marsh and managed wetland restoration are associated with  
9 CM10 and would provide nesting habitat for Modesto song sparrow.

10 The Plan includes commitments to protect patches of important wildlife habitat on cultivated lands  
11 such as trees and shrubs along borders and roadside, riparian corridors, and wetlands (Objective  
12 CLNC1.3). In addition, 20- to 30-foot-wide hedgerows would be established along field borders and  
13 roadsides, which would provide additional habitat for the species (Objective SH2.2). The  
14 management of protected grasslands to increase insect prey through techniques such as the  
15 avoidance of use of pesticides (Objectives ASWNC2.4, VPNC2.5, and GNC2.4) would provide further  
16 benefits to foraging Modesto song sparrows. These Plan objectives represent performance  
17 standards for considering the effectiveness of conservation actions. The acres of restoration and  
18 protection contained in the near-term Plan goals and the additional detail in the biological objectives  
19 satisfy the typical mitigation that would be applied to the project-level effects of CM1 on Modesto  
20 song sparrow, as well as mitigate the near-term effects of the other conservation measures.

21 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
22 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
23 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
24 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
25 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
26 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
27 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*. Modesto song  
28 sparrow is not a covered species under the BDCP. For the BDCP to avoid an adverse effect on  
29 individuals, preconstruction surveys for noncovered avian species would be required to ensure that  
30 nests are detected and avoided. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird*  
31 *Surveys and Avoid Disturbance of Nesting Birds*, would be available to address this effect.

32 **NEPA Effects:** The loss of Modesto song sparrow habitat and potential mortality of this special-  
33 status species under Alternative 4 would represent an adverse effect in the absence of other  
34 conservation actions. However, with habitat protection and restoration associated with CM3, CM4,  
35 CM6, CM7, and CM11, guided by biological goals and objectives and by AMM1–AMM7, which would  
36 be in place throughout the construction period, the effects of habitat loss on Modesto song sparrow  
37 under Alternative 4 would not be adverse. The Modesto song sparrow is not a covered species under  
38 the BDCP, and potential mortality would be an adverse effect without preconstruction surveys to  
39 ensure that nests are detected and avoided. Mitigation Measure BIO-75 would be available to  
40 address this effect.

1 **CEQA Conclusion:**

2 **Near-Term Timeframe**

3 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
4 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
5 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
6 effects of construction would be less than significant under CEQA. Alternative 4 would remove 2,699  
7 acres of modeled habitat (2,493 permanent, 206 temporary) for Modesto song sparrow in the study  
8 area in the near-term. These effects would result from the construction of the water conveyance  
9 facilities (CM1, 122 acres), and implementing other conservation measures (CM2 *Yolo Bypass*  
10 *Fisheries Enhancement*, CM4 *Tidal Natural Communities Restoration*, and CM5 *Seasonally Inundated*  
11 *Floodplain Restoration*—2,577 acres).

12 Typical NEPA and CEQA project-level mitigation ratios for those natural communities that would be  
13 affected would be 1:1 for restoration/creation and 1:1 protection of habitat. Using these ratios  
14 would indicate that 122 acres of suitable habitat should be restored/created and 122 acres should  
15 be protected to mitigate the CM1 losses of 122 acres of Modesto song sparrow habitat. The near-  
16 term effects of other conservation actions would remove 2,577 acres of modeled habitat, and  
17 therefore require 2,577 acres of restoration/creation and 2,577 acres of protection of Modesto song  
18 sparrow habitat using the same typical NEPA and CEQA ratios (1:1 for restoration/creation and 1:1  
19 for protection).

20 The BDCP has committed to near-term goals of protecting 750 acres and restoring 800 acres of the  
21 valley/foothill riparian natural community, restoring 2,000 acres of tidal freshwater emergent  
22 wetland, restoring 500 acres of managed wetland, and restoring 400 acres of nontidal marsh in the  
23 Plan Area (Table 3-4 in Chapter 3, *Description of Alternatives*). These conservation actions are  
24 associated with CM3, CM4, CM7, and CM10 and would occur in the same timeframe as the  
25 construction and early restoration losses, thereby avoiding a significant impact of habitat loss on  
26 Modesto song sparrow. The majority of the riparian restoration acres would occur in CZ 7 as part of  
27 a reserve system with extensive wide bands or large patches of valley/foothill riparian natural  
28 community (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*) and  
29 would provide suitable Modesto song sparrow nesting habitat. The tidal freshwater emergent  
30 wetland would be restored in CZs 1, 2, 4, 5, 6, and/or 7 (Objective TFEWNC1.1) and would be  
31 restored in a way that creates topographic heterogeneity and in areas that increase connectivity  
32 among protected lands (Objective TFEWNC2.2). The nontidal marsh restoration would occur in CZs  
33 2, 4, and/or 5, and the managed wetland restoration would occur in CZs 3, 4, 5, or 6. Both the  
34 nontidal marsh and managed wetland restoration are associated with CM10 and would provide  
35 nesting habitat for Modesto song sparrow.

36 The Plan also includes commitments to protect patches of important wildlife habitat on cultivated  
37 lands such as trees and shrubs along borders and roadside, riparian corridors, and wetlands  
38 (Objective CLNC1.3). In addition, 20- to 30-foot-wide hedgerows would be established along field  
39 borders and roadsides, which would provide additional habitat for the species (Objective SH2.2).  
40 The management of protected grasslands to increase insect prey through techniques such as the  
41 avoidance of use of pesticides (Objectives ASWNC2.4, VPNC2.5, and GNC2.4) would provide further  
42 benefits to foraging Modesto song sparrows. These Plan objectives represent performance  
43 standards for considering the effectiveness of conservation actions. The acres of restoration and  
44 protection contained in the near-term Plan goals and the additional detail in the biological objectives

1 satisfy the typical mitigation that would be applied to the project-level effects of CM1 on Modesto  
2 song sparrow, as well as mitigate the near-term effects of the other conservation measures.

3 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
4 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
5 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
6 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
7 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
8 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
9 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*. Modesto song  
10 sparrow is not a covered species under the BDCP. For the BDCP to have a less-than-significant  
11 impact on individuals, preconstruction surveys for noncovered avian species would be required to  
12 ensure that nests were detected and avoided. Implementation of Mitigation Measure BIO-75,  
13 *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would reduce  
14 this impact to a less-than-significant level.

### 15 **Late Long-Term Timeframe**

16 Alternative 4 as a whole would result in the permanent loss of and temporary effects on 3,544 acres  
17 (3,302 acres of permanent loss, 242 acres of temporary loss) of modeled Modesto song sparrow  
18 habitat during the term of the Plan. The locations of these losses are described above in the analyses  
19 of individual conservation measures. The Plan includes conservation commitments through *CM3*  
20 *Natural Communities Protection and Restoration*, *CM4 Tidal Natural Communities Restoration*, and  
21 *CM10 Nontidal Marsh Restoration* to protect 750 acres and restore 5,000 acres of the valley/foothill  
22 riparian natural community, restore 24,000 acres of tidal freshwater emergent wetland, restore 500  
23 acres of managed wetland, and restore 1,200 acres of nontidal marsh in the Plan Area (Table 3-4 in  
24 Chapter 3, *Description of Alternatives*). Additional acres of valley/foothill riparian habitat would be  
25 restored as a component of channel margin enhancement actions (CM6) along 20 miles of river and  
26 slough channels in the Delta, some of which would be expected to support nesting habitat for  
27 Modesto song sparrow. Of the 5,000 acres of restored riparian natural communities, a minimum of  
28 3,000 acres of valley/foothill riparian would be restored within the seasonally inundated floodplain,  
29 and 1,000 acres would be managed as dense early to mid-successional riparian forest (Objectives  
30 VFRNC1.1 and VFRNC1.2). Goals and objectives in the Plan for riparian restoration also include the  
31 maintenance and enhancement of structural heterogeneity (Objective VFRNC2.1) which would  
32 provide suitable nesting habitat for Modesto song sparrow.

33 The tidal freshwater emergent wetland would be restored in CZs 1, 2, 4, 5, 6, and/or 7 (Objective  
34 TFEWNC1.1) and would be restored in a way that creates topographic heterogeneity and in areas  
35 that increase connectivity among protected lands (Objective TFEWNC2.2). The nontidal marsh  
36 restoration would occur in CZs 2, 4, and/or 5, and the managed wetland restoration would occur in  
37 CZs 3, 4, 5, or 6. Both the nontidal marsh and managed wetland restoration are associated with  
38 CM10 and would provide nesting habitat for Modesto song sparrow.

39 The Plan includes commitments to protect patches of important wildlife habitat on cultivated lands  
40 such as trees and shrubs along borders and roadside, riparian corridors, and wetlands (Objective  
41 CLNC1.3). In addition, 20- to 30-foot-wide hedgerows would be established along field borders and  
42 roadsides, which would provide additional habitat for the species (Objective SH2.2). The  
43 management of protected grasslands to increase insect prey through techniques such as the  
44 avoidance of use of pesticides (Objectives ASWNC2.4, VPNC2.5, and GNC2.4) would provide further

1 benefits to foraging Modesto song sparrows. These Plan objectives represent performance  
2 standards for considering the effectiveness of conservation actions. The acres of restoration and  
3 protection contained in the near-term Plan goals and the additional detail in the biological objectives  
4 satisfy the typical mitigation that would be applied to the project-level effects of CM1 on Modesto  
5 song sparrow, as well as mitigate the near-term effects of the other conservation measures.

6 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
7 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
8 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
9 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
10 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
11 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
12 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*. Modesto song  
13 sparrow is not a covered species under the BDCP. For the BDCP to minimize direct mortality of  
14 individuals, preconstruction surveys for noncovered avian species would be required to ensure that  
15 nests are detected and avoided. Implementation of Mitigation Measure BIO-75, *Conduct*  
16 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would reduce this  
17 impact to a less-than-significant level.

18 Considering Alternative 4's protection and restoration provisions, which would provide acreages of  
19 new high-value or enhanced habitat in amounts suitable to compensate for habitats lost to  
20 construction and restoration activities, and with the implementation of AMM1-AMM7, and  
21 Mitigation Measure BIO-75, the loss of habitat or direct mortality through implementation of  
22 Alternative 4 would not result in a substantial adverse effect through habitat modifications and  
23 would not substantially reduce the number or restrict the range of either species. Therefore, the loss  
24 of habitat or potential mortality under this alternative would have a less-than-significant impact on  
25 Modesto song sparrow.

26 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**  
27 **Disturbance of Nesting Birds**

28 See Mitigation Measure BIO-75 under Impact BIO-75.

29 **Impact BIO-143: Effects on Modesto Song Sparrow Associated with Electrical Transmission**  
30 **Facilities**

31 New transmission lines would increase the risk for bird-power line strikes, which could result in  
32 injury or mortality of Modesto song sparrow. Existing lines currently pose this risk for Modesto song  
33 sparrow and the incremental increased risk from the construction of new transmission lines is not  
34 expected to adversely affect the population.

35 **NEPA Effects:** The incremental increased risk of bird-powerline strikes from the construction of new  
36 transmission lines would not adversely affect the Modesto song sparrow population.

37 **CEQA Conclusion:** The incremental increased risk of bird-powerline strikes from the construction of  
38 new transmission lines would have a less-than-significant impact on the Modesto song sparrow  
39 population.

1 **Impact BIO-144: Indirect Effects of Plan Implementation on Modesto Song Sparrow**

2 **Indirect construction- and operation-related effects:** Noise and visual disturbances associated  
3 with construction-related activities could result in temporary disturbances that affect Modesto song  
4 sparrow use of modeled habitat. Construction noise above background noise levels (greater than 50  
5 dBA) could extend 500 to 5,250 feet from the edge of construction activities (BDCP Appendix 5.J,  
6 Attachment 5J.D, *Indirect Effects of the Construction of the BDCP Conveyance Facility on Sandhill*  
7 *Crane*, Table 4), although there are no available data to determine the extent to which these noise  
8 levels could affect Modesto song sparrow. Indirect effects associated with construction include  
9 noise, dust, and visual disturbance caused by grading, filling, contouring, and other ground-  
10 disturbing operations. Construction-related noise and visual disturbances could disrupt nesting and  
11 foraging behaviors, and reduce the functions of suitable habitat which could result in an adverse  
12 effect on these species. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and*  
13 *Avoid Disturbance of Nesting Birds*, would be available to minimize adverse effects on active nests.  
14 The use of mechanical equipment during water conveyance construction could cause the accidental  
15 release of petroleum or other contaminants that could affect these species or their prey in the  
16 surrounding habitat. AMM1–AMM7 including *AMM2 Construction Best Management Practices and*  
17 *Monitoring* would minimize the likelihood of such spills from occurring. The inadvertent discharge  
18 of sediment or excessive dust adjacent to Modesto song sparrow could also have a negative effect on  
19 these species. AMM1–AMM7 would ensure that measures are in place to prevent runoff from the  
20 construction area and the negative effects of dust on wildlife adjacent to work areas.

21 **Methylmercury Exposure:** Marsh (tidal and nontidal) and floodplain restoration have the potential  
22 to increase exposure to methylmercury. Mercury is transformed into the more bioavailable form of  
23 methylmercury in aquatic systems, especially areas subjected to regular wetting and drying such as  
24 tidal marshes and flood plains (Alpers et al. 2008). Thus, BDCP restoration activities that create  
25 newly inundated areas could increase bioavailability of mercury (see BDCP Chapter 3, *Conservation*  
26 *Strategy*, for details of restoration). Species sensitivity to methylmercury differs widely and there is  
27 a large amount of uncertainty with respect to species-specific effects. Increased methylmercury  
28 associated with natural community and floodplain restoration could indirectly affect Modesto song  
29 sparrow, via uptake in lower trophic levels (as described in the BDCP, Appendix 5.D, *Contaminants*).

30 In addition, the potential mobilization or creation of methylmercury within the Plan Area varies  
31 with site-specific conditions and would need to be assessed at the project level. *CM12 Methylmercury*  
32 *Management* contains provisions for project-specific Mercury Management Plans. Site-specific  
33 restoration plans that address the creation and mobilization of mercury, as well as monitoring and  
34 adaptive management as described in CM12 would be available to address the uncertainty of  
35 methylmercury levels in restored tidal marsh and potential impacts on Modesto song sparrow.

36 **NEPA Effects:** Indirect effects on Modesto song sparrow as a result of constructing the Alternative 4  
37 water conveyance facilities could adversely affect individuals in the absence of other conservation  
38 actions. The incorporation of AMM1–AMM7 into the BDCP and the implementation of Mitigation  
39 Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting*  
40 *Birds*, would minimize this adverse effect. The implementation of tidal natural communities  
41 restoration or floodplain restoration could result in increased exposure of Modesto song sparrow to  
42 methylmercury. However, it is unknown what concentrations of methylmercury are harmful to the  
43 species and the potential for increased exposure varies substantially within the study area. Site-  
44 specific restoration plans that address the creation and mobilization of mercury, as well as  
45 monitoring and adaptive management as described in *CM12 Methylmercury Management* would

1 address the potential impacts of methylmercury levels in restored tidal marsh in the study area. The  
2 site-specific planning phase of marsh restoration would be the appropriate place to assess the  
3 potential for risk of methylmercury exposure for Modesto song sparrow, once site specific sampling  
4 and other information could be developed.

5 **CEQA Conclusion:** Indirect effects on Modesto song sparrow as a result of constructing the  
6 Alternative 4 water conveyance facilities could have a significant impact on the species. The  
7 incorporation of AMM1–AMM7 into the BDCP and the implementation of Mitigation Measure BIO-  
8 75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would  
9 reduce this impact to a less-than-significant level. The implementation of tidal natural communities  
10 restoration or floodplain restoration could result in increased exposure of Modesto song sparrow to  
11 methylmercury. However, it is unknown what concentrations of methylmercury are harmful to the  
12 species. Site-specific restoration plans that address the creation and mobilization of mercury, as well  
13 as monitoring and adaptive management as described in *CM12 Methylmercury Management*, would  
14 address the potential impacts of methylmercury levels in restored tidal marsh in the study area.

15 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**  
16 **Disturbance of Nesting Birds**

17 See Mitigation Measure BIO-75 under Impact BIO-75.

18 **Impact BIO-145: Periodic Effects of Inundation on Modesto Song Sparrow as a Result of**  
19 **Implementation of Conservation Components**

20 Flooding of the Yolo Bypass (CM2) would inundate 81–158 acres of modeled Modesto song sparrow  
21 habitat. However, inundation would occur during the nonbreeding season. Reduced foraging habitat  
22 availability would be expected during the fledgling period of the nesting season due to periodic  
23 inundation.

24 Based on hypothetical floodplain restoration, construction of setback levees from seasonally  
25 inundated floodplain restoration (CM5) could result in periodic inundation of up to approximately  
26 284 acres of Modesto song sparrow modeled habitat (Table 12-4-52).

27 The periodic inundation of the Yolo Bypass (CM2) and of seasonal floodplains (CM5) is expected to  
28 restore a more natural flood regime in support of wetland and riparian vegetation types that  
29 support Modesto song sparrow habitat, but may reduce the availability of nesting habitat during  
30 years when flooding extends into the nesting season (past March).

31 **NEPA Effects:** Periodic effects of inundation would not result in an adverse effect on Modesto song  
32 sparrow because increased frequency and duration of inundation would be expected to restore a  
33 more natural flood regime in support of wetland and riparian vegetation types that support Modesto  
34 song sparrow habitat.

35 **CEQA Conclusion:** Periodic effects of inundation would have a less-than-significant impact on  
36 Modesto song sparrow because increased frequency and duration of inundation would be expected  
37 to restore a more natural flood regime in support of wetland and riparian vegetation types that  
38 support Modesto song sparrow habitat.

1 **Bank Swallow**

2 This section describes the effects of Alternative 4, including construction and implementation of  
 3 other conservation components, on bank swallow. Bank swallows nest in colonies along rivers,  
 4 streams, or other water and require fine textured sandy soils in vertical banks to create their  
 5 burrows. There is little suitable habitat for bank swallow in the study area because most of the  
 6 erodible banks have been stabilized with of levee revetment. The placement of rock revetment  
 7 prevents the lateral migration of rivers, removing the natural river process that creates vertical  
 8 banks through erosion (Bank Swallow Technical Advisory Committee 2013, Stillwater Sciences  
 9 2007).An estimated 70-90% of the bank swallow population in California nests along the  
 10 Sacramento and Feather Rivers (Bank Swallow Technical Advisory Committee 2013) upstream of  
 11 the study area. However, there are three CNDDDB records of bank swallow colonies in the study area:  
 12 two in CZ 2 north of Fremont Weir, and one in CZ 5 on Brannan Island, just west of Twitchell Island.

13 Construction and restoration associated with Alternative 4 conservation measures would not result  
 14 in the direct loss of modeled habitat for bank swallow. However, indirect effects of noise and visual  
 15 disturbance from CM2 Yolo Bypass Fisheries Enhancements and *CM4 Tidal Natural Communities*  
 16 *Restoration* could impact bank swallow colonies if they were present near work areas. In addition,  
 17 there is uncertainty with respect to how water flows upstream of the study area would affect bank  
 18 swallow habitat.

19 As explained below, impacts on bank swallow under Alternative 4 would not be adverse for NEPA  
 20 purposes and would be less than significant for CEQA purposes with the implementation of  
 21 mitigation measures to monitor colonies and address the uncertainty of upstream operations on the  
 22 species.

23 **Table 12-4-53. Changes in Bank Swallow Modeled Habitat Associated with Alternative 4 (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	Yolo	Floodplain
CM1	Nesting	0	0	0	0	NA	NA
<b>Total Impacts CM1</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>NA</b>	<b>NA</b>
CM2-CM18	Nesting	0	0	0	0	0	0
<b>Total Impacts CM2-CM18</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>TOTAL IMPACTS</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

<sup>a</sup> See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only.

NT = near-term

LLT = late long-term

NA = not applicable

1 **Impact BIO-146: Indirect Effects of Implementation of Conservation Components on Bank**  
2 **Swallow**

3 Noise and visual disturbances during restoration activities from *CM2 Yolo Bypass Fisheries*  
4 *Enhancement*, and *CM4 Tidal Natural Communities Restoration* including operation of earthmoving  
5 equipment and human activities at work sites, could result in temporary disturbances that cause  
6 bank swallow to abandon active nest burrows adjacent to construction areas. Bank swallow colonies  
7 with occupied burrows have been recorded in CZ 2 and CZ 5 and construction-related disturbances  
8 could result in an adverse effect on individuals. Various activities related to *CM11 Natural*  
9 *Communities Enhancement and Management* could also have indirect impacts on bank swallow.

10 **NEPA Effects:** Construction activities associated with habitat restoration could adversely affect bank  
11 swallow colonies in the absence of other measures. Noise and visual disturbances could result in  
12 adverse effects on bank swallows if active colonies were present within 500 feet of work areas.  
13 Mitigation Measure BIO-146, *Active Bank Swallow Colonies Shall Be Avoided and Indirect Effects on*  
14 *Bank Swallow Will Be Minimized*, would be available to address this effect.

15 **CEQA Conclusion:** Construction activities associated with habitat restoration could result in a  
16 significant impact on bank swallow colonies in the absence of other measures. Noise and visual  
17 disturbances could result in significant impacts on bank swallows if active colonies were present  
18 within 500 feet of work areas. Implementation of Mitigation Measure BIO-146, *Active Bank Swallow*  
19 *Colonies Shall Be Avoided and Indirect Effects on Bank Swallow Will Be Minimized*, would reduce this  
20 impact to a less-than-significant level.

21 **Mitigation Measure BIO-146: Active Bank Swallow Colonies Shall Be Avoided and Indirect**  
22 **Effects on Bank Swallow Will Be Minimized**

23 To the extent practicable, BDCP proponents will not construct conservation components during  
24 the bank swallow nesting season (April 1 through August 31). If construction activities cannot  
25 be avoided during nesting season, a qualified biologist will conduct preconstruction surveys to  
26 determine if active bank swallow nesting colonies are present within 500 feet of work areas. If  
27 no active nesting colonies are present, no further mitigation is required.

28 If active colonies are detected, BDCP proponents will establish a nondisturbance buffer  
29 (determined in coordination with CDFW and the Bank Swallow Technical Advisory Committee)  
30 around the colony during the breeding season. In addition, a qualified biologist will monitor any  
31 active colony within 500 feet of construction to ensure that construction activities do not affect  
32 nest success.

33 **Impact BIO-147: Effects of Upstream Reservoir and Water Conveyance Facilities Operations**  
34 **on Bank Swallow**

35 Bank swallows are a riparian species that have evolved to deal with a dynamic system that changes  
36 with annual variation in variables such as rainfall, or late snowpack runoff. The primary threat to the  
37 species is loss of nesting habitat from the placement of rock revetment for levee stabilization.  
38 Because of this limited available habitat, and the reduction of natural river process, the species is  
39 highly sensitive to 1) reductions in winter flows which are necessary to erode banks for habitat  
40 creation, and 2) high flows during the breeding season. The potential impacts of changes in  
41 upstream flows during the breeding season on bank swallows are the flooding of active burrows and  
42 destruction of burrows from increased bank sloughing. Bank swallows arrive in California and begin

1 to excavate their burrows in March, and the peak egg-laying occurs during April and May (Bank  
2 Swallow Technical Advisory Committee 2013). Therefore, increases in flows after the March when  
3 the swallows have nested and laid eggs in the burrows could result in the loss of nests. On the  
4 Sacramento River, breeding season flows between 14,000 and 30,000 cfs have been associated with  
5 localized bank collapses that resulted in partial or complete colony failure (Stillwater Sciences  
6 2007).

7 The CALSIM II modeling results of mean monthly flow were analyzed for three flow gauge stations  
8 on the Sacramento River (Sacramento River at Keswick, Sacramento River upstream of Red Bluff,  
9 Sacramento River at Verona) and two flow gauge stations on the Feather River (Feather River high-  
10 flow channel at Thermalito Dam, and Feather River at the confluence with the Sacramento River).  
11 Flows were estimated for wet years, above normal years, below normal years, dry years, and critical  
12 years. An average also was estimated (see Chapter 5, Section 5.3.1, *Methods for Analysis*, for a  
13 description of the model).

14 On the Sacramento River at the Keswick and Red Bluff gauges, mean monthly flows under  
15 Alternative 4 would increase between April and August in below normal, dry, and critical years  
16 (Table 1 in Section 11C.4.1.1 and Table 3 in Section 11C.4.1.2 of Appendix 11C, *CALSIM II Model*  
17 *Results Utilized in the Fish Analysis*) which could lead to inundation of active colonies. However, the  
18 flows under Existing Conditions and the predicted flows in the late long-term without the project  
19 (NAA) also show increases in flows during the breeding season (April through August) in these  
20 water year types. Similar trends are shown for the Feather River (Table 15 in Section 11C.4.1.8 and  
21 Table 17 in Section 11C.4.1.9 of Appendix 11C, *CALSIM II Model Results Utilized in the Fish Analysis*).  
22 In addition, at the Verona flow gauge on the Sacramento River in average water years (Table 7 in  
23 Section 11C.4.1.4 of Appendix 11C, *CALSIM II Model Results Utilized in the Fish Analysis*) flows are  
24 predicted to be greater than 14,000 cfs during the breeding season (April through August,) which  
25 could lead to bank collapse. However, flows of this height are recorded under Existing Conditions at  
26 this flow gauge and are also predicted for the late long-term without the project (NAA).

27 **NEPA Effects:** High spring flows on the Sacramento and Feather Rivers may already be impacting  
28 bank swallow colonies during the breeding season, and predicted flows under Alternative 4 would  
29 not be substantially greater than under the No Action Alternative. However, because of the  
30 complexity of variables that dictate suitable habitat for the species, there is uncertainty regarding  
31 the potential for and magnitude of impacts on bank swallow from changes in upstream operations.  
32 Soil type, high winter flows, and low spring flows all contribute to successful nesting of bank  
33 swallow, and even moderate changes in seasonal flows could have an adverse effect on breeding  
34 success for the species. Mitigation Measure BIO-147, *Monitor Bank Swallow Colonies and Evaluate*  
35 *Winter and Spring Flows Upstream of the Study Area*, would be available to address the uncertainty of  
36 potential adverse effects of upstream operations on bank swallow.

37 **CEQA Conclusion:** High spring flows on the Sacramento and Feather Rivers may already be  
38 impacting bank swallow colonies during the breeding season, and predicted flows under Alternative  
39 4 would not be substantially greater than under the No Action Alternative. However, because of the  
40 complexity of variables that dictate suitable habitat for the species, there is uncertainty regarding  
41 the potential for and magnitude of impacts on bank swallow from changes in upstream operations.  
42 There are many variables that dictate suitable habitat for the species that cannot be clearly  
43 quantified, and seasonal changes in flow could increase or decrease suitable habitat for bank  
44 swallow depending on soil type and location of current colonies. Implementation of Mitigation  
45 Measure BIO-147, *Monitor Bank Swallow Colonies and Evaluate Winter and Spring Flows Upstream of*

1 *the Study Area*, would address this potential significant impact and further determine if additional  
2 mitigation is required for bank swallow.

3 **Mitigation Measure BIO-147: Monitor Bank Swallow Colonies and Evaluate Winter and**  
4 **Spring Flows Upstream of the Study Area**

5 To address the uncertainty of the impact of upstream spring flows on existing bank swallow  
6 habitat, DWR will monitor existing colonies upstream of the study area and collect habitat  
7 suitability data including soil type, number of active burrows per colony, and height of average  
8 burrows. In addition, to determine the degree to which reduced winter flows are contributing to  
9 habitat loss, DWR will quantify the winter flows required for river meander to create suitable  
10 habitat through lateral channel migration and bank resurfacing. If impacts of upstream flows on  
11 bank swallow are identified, further mitigation may be required after consultation with CDFW  
12 and the Bank Swallow Technical Advisory Committee. Recommended mitigation for changes in  
13 flow regimes associated with water conveyance includes conservation easements on currently  
14 occupied habitat or revetment removal projects to create habitat for bank swallow (Bank  
15 Swallow Technical Advisory Committee 2013).

16 **Yellow-Headed Blackbird**

17 This section describes the effects of Alternative 4, including water conveyance facilities construction  
18 and implementation of other conservation components, on yellow-headed blackbird. The habitat  
19 model used to assess impacts on yellow-headed blackbird includes nesting habitat and foraging  
20 habitat. Modeled nesting habitat includes tidal freshwater emergent wetland, other natural seasonal  
21 wetland, nontidal freshwater perennial emergent wetland, and managed wetland. Modeled foraging  
22 habitat for yellow-headed blackbird consists of cultivated lands and noncultivated land cover types  
23 known to support abundant insect populations, including corn, pasture, and feedlots.

24 Construction and restoration associated with Alternative 4 conservation measures would result in  
25 both temporary and permanent losses of yellow-headed blackbird modeled habitat as indicated in  
26 Table 12-4-54. Full implementation of Alternative 4 would include the following biological  
27 objectives over the term of the BDCP which would also benefit yellow-headed blackbird (BDCP  
28 Chapter 3, Section 3.3, *Biological Goals and Objectives*).

- 29 ● Restore or create at least 24,000 acres of tidal freshwater emergent wetland in CZs 1, 2, 4, 5, 6,  
30 and/or 7 (Objective TFEWNC1.1, associated with CM4).
- 31 ● Create at least 1,200 acres of nontidal marsh consisting of a mosaic of nontidal perennial aquatic  
32 and nontidal freshwater emergent wetland natural communities (Objective NFEW/NPANC1.1,  
33 associated with CM10).
- 34 ● Protect and enhance at least 8,100 acres of managed wetland, at least 1,500 acres of which are  
35 in the Grizzly Island Marsh Complex (Objective MWNC1.1, associated with CM3).
- 36 ● Protect at least 8,000 acres of grassland with at least 2,000 acres protected in CZ 1, at least 1,000  
37 acres protected in CZ 8, at least 2,000 acres protected in CZ 11, and the remainder distributed  
38 among CZs 1, 2, 4, 5, 7, 8, and 11 (Objective GNC1.1, associated with CM3).
- 39 ● Restore at least 2,000 acres of grasslands (Objective GNC1.2, associated with CM8).
- 40 ● Protect at least 150 acres of alkali seasonal wetland and at least 600 acres of existing vernal pool  
41 complex in CZs 1, 8, and/or 11 (Objective ASWNC1.1, Objective VPNC1.1, associated with CM3).

- 1 • Maintain and protect the small patches of important wildlife habitats associated with cultivated  
2 lands that occur in cultivated lands within the reserve system, including isolated valley oak  
3 trees, trees and shrubs along field borders and roadsides, remnant groves, riparian corridors,  
4 water conveyance channels, grasslands, ponds, and wetlands (Objective CLNC1.3, associated  
5 with CM3).
- 6 • Protect at least 11,050 acres of high- to very high-value breeding-foraging habitat (Table 12-4-  
7 54) in CZs 1, 2, 3, 4, 7, 8, or 11 (Objective TRBL1.3, associated with CM3).
- 8 • Maintain and protect the small patches of important wildlife habitats associated with cultivated  
9 lands that occur in cultivated lands within the reserve system, including isolated valley oak  
10 trees, trees and shrubs along field borders and roadsides, remnant groves, riparian corridors,  
11 water conveyance channels, grasslands, ponds, and wetlands (Objective CLNC1.3, associated  
12 with CM3).
- 13 • Increase prey abundance and accessibility for grassland-foraging species (Objective GNC2.4,  
14 associated with CM11)

15 As explained below, with the restoration or protection of these amounts of habitat, in addition to  
16 management activities to enhance habitats for the species and implementation of AMM1–AMM7,  
17 *AMM27 Selenium Management*, and Mitigation Measure BIO-75, impacts on yellow-headed blackbird  
18 would not be adverse for NEPA purposes and would be less than significant for CEQA purposes.

19 **Table 12-4-54. Changes in Yellow-Headed Blackbird Modeled Habitat Associated with**  
20 **Alternative 4**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	Nesting	15	15	43	43	NA	NA
	Foraging	1,994	1,994	642	642	NA	NA
<b>Total Impacts CM1</b>		<b>2,009</b>	<b>2,009</b>	<b>685</b>	<b>685</b>	<b>NA</b>	<b>NA</b>
CM2–CM18	Nesting	5,814	13,902	45	46	961–2,678	18
	Foraging	5,612	26,673	376	905	368–1,476	2,701
<b>Total Impacts CM2–CM18</b>		<b>11,426</b>	<b>40,575</b>	<b>421</b>	<b>951</b>	<b>1,495-4,394</b>	<b>2,719</b>
<b>Total Nesting</b>		<b>5,829</b>	<b>13,917</b>	<b>88</b>	<b>89</b>	961–2,678	18
<b>Total Foraging</b>		<b>7,606</b>	<b>28,667</b>	<b>1,018</b>	<b>1,547</b>	368–1,476	2,701
<b>TOTAL IMPACTS</b>		<b>13,435</b>	<b>42,584</b>	<b>1,106</b>	<b>1,636</b>	<b>1,495-4,394</b>	<b>2,719</b>

<sup>a</sup> See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

1 **Impact BIO-148: Loss of Habitat for and Direct Mortality of Yellow-Headed Blackbird**

2 Alternative 4 conservation measures would result in the combined permanent and temporary loss  
3 of up to 44,220 acres of modeled habitat (14,006 acres of nesting habitat and 30,214 acres of  
4 foraging habitat) for yellow-headed blackbird (Table 12-4-54). Conservation measures that would  
5 result in these losses are conveyance facilities and transmission line construction, and establishment  
6 and use of borrow and spoil areas (CM1), Yolo Bypass improvements (CM2), tidal habitat  
7 restoration (CM4), floodplain restoration (CM5), riparian restoration (CM7), grassland restoration  
8 (CM8), marsh restoration (CM10), and construction of conservation hatcheries (CM18). Habitat  
9 enhancement and management activities (CM11) which include ground disturbance or removal of  
10 nonnative vegetation could result in local adverse habitat effects. In addition, maintenance activities  
11 associated with the long-term operation of the water conveyance facilities and other BDCP physical  
12 facilities could degrade or eliminate yellow-headed blackbird suitable habitat. Each of these  
13 individual activities is described below. A summary statement of the combined impacts and NEPA  
14 effects, and a CEQA conclusion follow the individual conservation measure discussions.

- 15 • *CM1 Water Facilities and Operation:* Construction of Alternative 4 water conveyance facilities  
16 would result in the combined permanent and temporary loss of up to 58 acres of yellow-headed  
17 blackbird nesting habitat (15 acres of permanent loss and 43 acres of temporary loss). In  
18 addition, 2,636 acres of foraging habitat would be removed (1,994 acres of permanent loss, 642  
19 acres of temporary loss). Activities that would impact suitable Yellow-headed blackbird habitat  
20 consist of tunnel, forebay, and intake construction, temporary access roads, and construction of  
21 transmission lines. The largest losses of foraging habitat would occur from loss of corn. There  
22 are no occurrences of yellow-headed blackbird that overlap with the construction footprint for  
23 CM1. However, Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and*  
24 *Avoid Disturbance of Nesting Birds*, would be available to address adverse effects on nesting  
25 yellow-headed blackbirds. Impacts from CM1 would occur in the central delta in CZs 3–6, and CZ  
26 8. Refer to the Terrestrial Biology Map Book for a detailed view of Alternative 4 construction  
27 locations. Impacts from CM1 would occur within the first 10 years of Plan implementation.
- 28 • *CM2 Yolo Bypass Fisheries Enhancement:* Construction of the Yolo Bypass fisheries enhancement  
29 would result in the combined permanent and temporary loss of up to 100 acres of nesting  
30 habitat (55 acres of permanent loss, 45 acres of temporary loss) in the Yolo Bypass in CZ 2. In  
31 addition, 1,144 acres of foraging habitat would be removed (879 acres of permanent loss, 265  
32 acres of temporary loss). The loss is expected to occur during the first 10 years of Alternative 4  
33 implementation.
- 34 • *CM4 Tidal Natural Communities Restoration:* Site preparation and inundation from CM4 would  
35 permanently remove or convert an estimated 13,847 acres of nesting habitat, which would  
36 consist primarily of managed wetland. In addition, 20,029 acres of foraging habitat would be  
37 lost or converted as a result of tidal restoration, over half of which would be from the loss or  
38 conversion of alfalfa. However, the resulting 65,000 acres of tidal natural communities would  
39 also provide habitat for the species, 24,000 acres of which would be tidal freshwater natural  
40 communities providing breeding habitat for yellow-headed blackbird.
- 41 • *CM5 Seasonally Inundated Floodplain Restoration:* Construction of setback levees to restore  
42 seasonally inundated floodplain and riparian restoration actions would remove approximately 2  
43 acres of yellow-headed blackbird nesting habitat (1 acres of permanent loss, 1 acres of  
44 temporary loss) and 1,641 acres of foraging habitat (1,051 acres of permanent loss, 590 acres of

1 temporary loss). These losses would be expected after the first 10 years of Alternative 4  
2 implementation along the San Joaquin River and other major waterways in CZ 7.

- 3 • *CM7 Riparian Natural Community Restoration*: Riparian restoration would permanently remove  
4 approximately 509 acres of yellow-headed blackbird foraging habitat as part of tidal restoration  
5 and 2,033 acres as part of seasonal floodplain restoration through CM7.
- 6 • *CM8 Grassland Natural Community Restoration*: Restoration of grassland is expected to be  
7 implemented on agricultural lands and would result in the conversion of 926 acres of yellow-  
8 headed blackbird agricultural foraging habitat to grassland foraging habitat in CZs 1, 2, 4, 5, 7, 8,  
9 and 11. If agricultural lands supporting higher value foraging habitat than the restored  
10 grassland were removed, there would be a loss of white-tailed kite foraging habitat value. CM8  
11 would result in the restoration of 2,000 acres of grassland foraging habitat in the study area.
- 12 • *CM10 Nontidal Marsh Restoration*: Restoration and creation of nontidal freshwater marsh would  
13 result in the permanent conversion of 988 acres of cultivated lands foraging habitat to nontidal  
14 marsh in CZ 2 and CZ 4. Yellow-headed blackbird nesting habitat may develop along the margins  
15 of restored nontidal marsh and restoration would also provide foraging habitat for the species.
- 16 • *CM11 Natural Communities Enhancement and Management*: Habitat management- and  
17 enhancement-related activities could disturb yellow-headed blackbird nests if they were  
18 present near work sites. A variety of habitat management actions included in CM11 that are  
19 designed to enhance wildlife values in BDCP-protected habitats may result in localized ground  
20 disturbances that could temporarily remove small amounts of yellow-headed blackbird habitat  
21 and reduce the functions of habitat until restoration is complete. Ground-disturbing activities,  
22 such as removal of nonnative vegetation and road and other infrastructure maintenance, would  
23 be expected to have minor effects on available yellow-headed blackbird habitat. These effects  
24 cannot be quantified, but are expected to be minimal and would be avoided and minimized by  
25 the AMMs listed below. CM11 would also include the construction of recreational-related  
26 facilities, including trails, interpretive signs, and picnic tables (BDCP Chapter 4, *Covered*  
27 *Activities and Associated Federal Actions*). The construction of trailhead facilities, signs, staging  
28 areas, picnic areas, bathrooms, etc. would be placed on existing, disturbed areas when and  
29 where possible. However, approximately 50 acres of grassland foraging habitat would be lost  
30 from the construction of trails and facilities.
- 31 • *CM18 Conservation Hatcheries*: Implementation of CM18 would remove up to 35 acres of high-  
32 yellow-headed blackbird foraging habitat for the development of a delta and longfin smelt  
33 conservation hatchery in CZ 1. The loss is expected to occur during the first 10 years of Plan  
34 implementation.
- 35 • *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground  
36 water conveyance facilities and restoration infrastructure could result in ongoing but periodic  
37 disturbances that could affect yellow-headed blackbird use of the surrounding habitat.  
38 Maintenance activities would include vegetation management, levee and structure repair, and  
39 re-grading of roads and permanent work areas. These effects, however, would be reduced by  
40 AMMs and conservation actions as described below.
- 41 • *Injury and Direct Mortality*: Construction-related activities would not be expected to result in  
42 direct mortality of adult or fledged yellow-headed blackbird if they were present in the study  
43 area, because they would be expected to avoid contact with construction and other equipment. If  
44 yellow-headed blackbird were to nest in the construction area, construction-related activities,

1 including equipment operation, noise and visual disturbances could destroy nests or lead to  
2 their abandonment, resulting in mortality of eggs and nestlings. Mitigation Measure BIO-75,  
3 *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be  
4 available to address these adverse effects on yellow-headed blackbird.

5 The following paragraphs summarize the combined effects discussed above and describe other  
6 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also  
7 included.

### 8 ***Near-Term Timeframe***

9 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
10 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
11 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
12 effects of construction would not be adverse under NEPA. Alternative 4 would remove 5,917 acres  
13 (5,829 acres of permanent loss, 88 acres of temporary loss) of yellow-headed blackbird nesting  
14 habitat in the study area in the near-term. These effects would result from the construction of the  
15 water conveyance facilities (CM1, 58 acres), and implementing other conservation measures (CM2  
16 *Yolo Bypass Fisheries Enhancement*, CM4 *Tidal Natural Communities Restoration*, and CM5 *Seasonally*  
17 *Inundated Floodplain Restoration*—5,859 acres). In addition, 8,624 acres of yellow-headed blackbird  
18 foraging habitat would be removed or converted in the near-term (CM1, 2,636 acres; CM2 *Yolo*  
19 *Bypass Fisheries Enhancement*, CM4 *Tidal Natural Communities Restoration*, CM5 *Seasonally*  
20 *Inundated Floodplain Restoration*, CM7 *Riparian Natural Community Restoration*, CM8 *Grassland*  
21 *Natural Community Restoration*, CM10 *Nontidal Marsh Restoration*, and CM18 *Conservation*  
22 *Hatcheries*—5,988 acres).

23 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by  
24 CM1 would be 1:1 for restoration/creation and 1:1 protection of nesting habitat, and 1:1 protection  
25 of foraging habitat. Using these ratios would indicate that 58 acres of nesting habitat should be  
26 restored/created and 58 acres should be protected to compensate for the CM1 losses of yellow-  
27 headed blackbird nesting habitat. In addition, 2,636 acres of foraging habitat should be protected to  
28 compensate for the CM1 losses of yellow-headed blackbird foraging habitat. The near-term effects of  
29 other conservation actions would require 5,859 acres each of restoration and protection of breeding  
30 habitat and 5,988 acres of protection of foraging habitat using the same typical NEPA and CEQA  
31 ratios (1:1 for restoration and 1:1 for protection of nesting and 1: protection of foraging habitat).

32 The BDCP has committed to near-term goals of restoring 8,850 acres of tidal freshwater emergent  
33 wetland, protecting 4,800 acres of managed wetland, protecting 25 acres and restoring 900 acres of  
34 nontidal marsh, protecting 2,000 acres and restoring 1,140 acres of grassland natural community,  
35 protecting 400 acres of vernal pool complex, protecting 120 acres of alkali seasonal wetland  
36 complex, and protecting 15,600 acres of cultivated lands in the Plan Area (Table 3-4 in Chapter 3,  
37 *Description of Alternatives*). These conservation actions are associated with CM3, CM4, CM8, and  
38 CM10 and would occur in the same timeframe as the construction and early restoration losses.

39 The tidal freshwater emergent wetland would be restored in CZs 1, 2, 4, 5, 6, and/or 7 (Objective  
40 TFEWNC1.1 in BDCP Chapter 3, *Conservation Strategy*) and would be restored in a way that creates  
41 topographic heterogeneity and in areas that increase connectivity among protected lands (Objective  
42 TFEWNC2.2). The 4,800 acres of managed wetland would be protected and enhanced in CZ 11 and  
43 would benefit yellow-headed blackbird through the enhancement of degraded areas (such as areas  
44 of bare ground or marsh where the predominant vegetation consists of invasive species such as

1 perennial pepperweed) to vegetation such as pickleweed-alkali heath-American bulrush plant  
2 associations (Objective MWNC1.1). In addition, at least 900 acres of nontidal marsh would be  
3 created, some of which would provide nesting habitat for the species.

4 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1  
5 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali  
6 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous  
7 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would  
8 provide grassland foraging habitat for yellow-headed blackbird. Insect prey availability and  
9 abundance would also be increased on protected lands, enhancing the foraging value of these  
10 natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4). Foraging opportunities would  
11 also be improved by enhancing prey populations through the establishment of 20- to 30-foot-wide  
12 hedgerows along field borders and roadsides within protected cultivated lands (Objective  
13 SWHA2.2). Within the cultivated lands, important wildlife habitat such as grasslands, ponds, and  
14 wetlands would also be protected and maintained as part of the cultivated lands reserve system  
15 which would provide additional habitat for yellow-headed blackbird (Objective CLNC1.3).

16 At least 15,600 acres of cultivated lands that provide habitat for covered and other native wildlife  
17 species would be protected in the near-term time period (Objective CLNC1.1), much of which would  
18 provide foraging habitat for yellow-headed blackbird. The acres of restoration and protection  
19 contained in the near-term Plan goals and the additional detail in the biological objectives satisfy the  
20 typical mitigation that would be applied to the project-level effects of CM1 on yellow-headed  
21 blackbird habitat, as well as mitigate the near-term effects of the other conservation measures.

22 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
23 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
24 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
25 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
26 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
27 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
28 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

29 The yellow-headed blackbird is not a covered species under the BDCP. For the BDCP to avoid an  
30 adverse effect on individuals, preconstruction surveys for noncovered avian species would be  
31 required to ensure that nests are detected and avoided. Mitigation Measure BIO-75, *Conduct*  
32 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to  
33 address this adverse effect.

#### 34 **Late Long-Term Timeframe**

35 The study area supports approximately 82,005 acres of modeled nesting habitat and 333,956 acres  
36 of modeled foraging habitat for yellow-headed blackbird. Alternative 4 as a whole would result in  
37 the permanent loss of and temporary effects on 14,006 acres of potential nesting habitat (17% of the  
38 potential nesting habitat in the study area) and the loss or conversion of 30,214 acres of foraging  
39 habitat (9% of the foraging habitat in the study area). The locations of these losses are described  
40 above in the analyses of individual conservation measures.

41 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*  
42 *Restoration*, *CM4 Tidal Natural Communities Restoration*, *CM8 Grassland Natural Community*  
43 *Restoration*, and *CM10 Nontidal Marsh Restoration* to protect and enhance at least 8,100 acres of

1 managed wetland, restore or create at least 24,000 acres of tidal freshwater emergent wetland,  
2 create or restore at least 1,200 acres of nontidal marsh, protect 8,000 acres and restore 2,000 acres  
3 of grassland natural community, protect 600 acres of vernal pool complex, protect 150 acres of  
4 alkali seasonal wetland complex, and protect 48,625 acres of cultivated lands that provide suitable  
5 habitat for native wildlife species (Table 3-4 in Chapter 3, *Description of Alternatives*).

6 The tidal freshwater emergent wetland would be restored in CZs 1, 2, 4, 5, 6, and/or 7 (Objective  
7 TFEWNC1.1 in BDCP Chapter 3, *Conservation Strategy*) and would be restored in a way that creates  
8 topographic heterogeneity and in areas that increase connectivity among protected lands (Objective  
9 TFEWNC2.2). The managed wetland would be protected and enhanced in CZ 11 and would benefit  
10 yellow-headed blackbird through the enhancement of degraded areas (such as areas of bare ground  
11 or marsh where the predominant vegetation consists of invasive species such as perennial  
12 pepperweed) to vegetation such as pickleweed-alkali heath-American bulrush plant associations  
13 (Objective MWNC1.1). In addition, at least 1,200 acres of nontidal marsh would be created, some of  
14 which would provide nesting habitat for the species.

15 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1  
16 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali  
17 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous  
18 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would  
19 provide grassland foraging habitat for yellow-headed blackbird. Insect prey availability and  
20 abundance would also be increased on protected lands, enhancing the foraging value of these  
21 natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4). Foraging opportunities would  
22 also be improved by enhancing prey populations through the establishment of 20- to 30-foot-wide  
23 hedgerows along field borders and roadsides within protected cultivated lands (Objective  
24 SWHA2.2). Within the cultivated lands, important wildlife habitat such as grasslands, ponds, and  
25 wetlands would also be protected and maintained as part of the cultivated lands reserve system  
26 which would provide additional habitat for yellow-headed blackbird (Objective CLNC1.3). Of the  
27 48,625 acres of cultivated lands that would be protected and enhanced by the late long-term time  
28 period (Objective CLNC1.1), 26,300 acres would be managed in moderate to high-value crop types  
29 for tricolored blackbird (Table 3.3-6 in BDCP Chapter 3). These crop types include pasture,  
30 sunflower, alfalfa, and other crop types that would provide high-value foraging habitat for yellow-  
31 headed blackbird.

32 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
33 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
34 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
35 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
36 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
37 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
38 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

39 The yellow-headed blackbird is not a covered species under the BDCP. For the BDCP to avoid an  
40 adverse effect on individuals, preconstruction surveys for noncovered avian species would be  
41 required to ensure that nests are detected and avoided. Mitigation Measure BIO-75, *Conduct*  
42 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to  
43 address this effect.

44 **NEPA Effects:** The loss of yellow-headed blackbird habitat and potential direct mortality of this  
45 special-status species associated with Alternative 4 would represent an adverse effect in the

1 absence of other conservation actions. However, with habitat protection and restoration associated  
2 with CM3, CM4, CM8, CM10, and CM11, guided by biological goals and objectives and by AMM1–  
3 AMM7, which would be in place throughout the construction period, the effects of habitat loss would  
4 not be adverse under Alternative 4. The yellow-headed blackbird is not a covered species under the  
5 BDCP. For the BDCP to avoid an adverse effect on individuals, preconstruction surveys for  
6 noncovered avian species would be required to ensure that nests are detected and avoided.  
7 Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of*  
8 *Nesting Birds*, would be available to address this adverse effect.

9 **CEQA Conclusion:**

10 **Near-Term Timeframe**

11 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
12 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
13 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
14 effects of construction would be less than significant under CEQA. Alternative 4 would remove 5,917  
15 acres (5,829 acres of permanent loss, 88 acres of temporary loss) of yellow-headed blackbird  
16 nesting habitat in the study area in the near-term. These effects would result from the construction  
17 of the water conveyance facilities (CM1, 58 acres), and implementing other conservation measures  
18 (CM2 *Yolo Bypass Fisheries Enhancement*, CM4 *Tidal Natural Communities Restoration*, and CM5  
19 *Seasonally Inundated Floodplain Restoration*—5,859 acres). In addition, 8,624 acres of yellow-  
20 headed blackbird foraging habitat would be removed or converted in the near-term (CM1, 2,636  
21 acres; CM2 *Yolo Bypass Fisheries Enhancement*, CM4 *Tidal Natural Communities Restoration*, CM5  
22 *Seasonally Inundated Floodplain Restoration*, CM7 *Riparian Natural Community Restoration*, CM8  
23 *Grassland Natural Community Restoration*, CM10 *Nontidal Marsh Restoration*, and CM18 *Conservation*  
24 *Hatcheries*—5,988 acres).

25 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by  
26 CM1 would be 1:1 for restoration/creation and 1:1 protection of nesting habitat, and 1:1 protection  
27 of foraging habitat. Using these ratios would indicate that 58 acres of nesting habitat should be  
28 restored/created and 58 acres should be protected to compensate for the CM1 losses of yellow-  
29 headed blackbird nesting habitat. In addition, 2,636 acres of foraging habitat should be protected to  
30 compensate for the CM1 losses of yellow-headed blackbird foraging habitat. The near-term effects of  
31 other conservation actions would require 5,859 acres each of restoration and protection of breeding  
32 habitat and 5,988 acres of protection of foraging habitat using the same typical NEPA and CEQA  
33 ratios (1:1 for restoration and 1:1 for protection of nesting and 1: protection of foraging habitat).

34 The BDCP has committed to near-term goals of restoring 8,850 acres of tidal freshwater emergent  
35 wetland, protecting 4,800 acres of managed wetland, protecting 25 acres and restoring 900 acres of  
36 nontidal marsh, protecting 2,000 acres and restoring 1,140 acres of grassland natural community,  
37 protecting 400 acres of vernal pool complex, protecting 120 acres of alkali seasonal wetland  
38 complex, and protecting 15,600 acres of cultivated lands in the Plan Area (Table 3-4 in Chapter 3,  
39 *Description of Alternatives*). These conservation actions are associated with CM3, CM4, CM8, and  
40 CM10 and would occur in the same timeframe as the construction and early restoration losses.

41 The tidal freshwater emergent wetland would be restored in CZs 1, 2, 4, 5, 6, and/or 7 (Objective  
42 TFEWNC1.1 in BDCP Chapter 3, *Conservation Strategy*) and would be restored in a way that creates  
43 topographic heterogeneity and in areas that increase connectivity among protected lands (Objective  
44 TFEWNC2.2). The 4,800 acres of managed wetland would be protected and enhanced in CZ 11 and

1 would benefit yellow-headed blackbird through the enhancement of degraded areas (such as areas  
2 of bare ground or marsh where the predominant vegetation consists of invasive species such as  
3 perennial pepperweed) to vegetation such as pickleweed-alkali heath-American bulrush plant  
4 associations (Objective MWNC1.1). In addition, at least 900 acres of nontidal marsh would be  
5 created, some of which would provide nesting habitat for the species.

6 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1  
7 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali  
8 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous  
9 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would  
10 provide grassland foraging habitat for yellow-headed blackbird. Insect prey availability and  
11 abundance would also be increased on protected lands, enhancing the foraging value of these  
12 natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4). Foraging opportunities would  
13 also be improved by enhancing prey populations through the establishment of 20- to 30-foot-wide  
14 hedgerows along field borders and roadsides within protected cultivated lands (Objective  
15 SWHA2.2). Within the cultivated lands, important wildlife habitat such as grasslands, ponds, and  
16 wetlands would also be protected and maintained as part of the cultivated lands reserve system  
17 which would provide additional habitat for yellow-headed blackbird (Objective CLNC1.3).

18 At least 15,400 acres of cultivated lands that provide habitat for covered and other native wildlife  
19 species would be protected in the near-term time period (Objective CLNC1.1), much of which would  
20 provide foraging habitat for yellow-headed blackbird. The acres of restoration and protection  
21 contained in the near-term Plan goals and the additional detail in the biological objectives satisfy the  
22 typical mitigation that would be applied to the project-level effects of CM1 on yellow-headed  
23 blackbird habitat, as well as mitigate the near-term effects of the other conservation measures.

24 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
25 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
26 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
27 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
28 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
29 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
30 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

31 The yellow-headed blackbird is not a covered species under the BDCP. For the BDCP to avoid an  
32 adverse effect on individuals, preconstruction surveys for noncovered avian species would be  
33 required to ensure that nests are detected and avoided. The implementation of Mitigation Measure  
34 BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would  
35 reduce potential impacts on nesting yellow-headed blackbird to a less-than-significant level.

### 36 **Late Long-Term Timeframe**

37 The study area supports approximately 82,005 acres of modeled nesting habitat and 333,956 acres  
38 of modeled foraging habitat for yellow-headed blackbird. Alternative 4 as a whole would result in  
39 the permanent loss of and temporary effects on 14,006 acres of potential nesting habitat (17% of the  
40 potential nesting habitat in the study area) and the loss or conversion of 30,214 acres of foraging  
41 habitat (9% of the foraging habitat in the study area). The locations of these losses are described  
42 above in the analyses of individual conservation measures.

1 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*  
2 *Restoration, CM4 Tidal Natural Communities Restoration, CM8 Grassland Natural Community*  
3 *Restoration, and CM10 Nontidal Marsh Restoration* to protect and enhance at least 8,100 acres of  
4 managed wetland, restore or create at least 24,000 acres of tidal freshwater emergent wetland,  
5 create or restore at least 1,200 acres of nontidal marsh, protect 8,000 acres and restore 2,000 acres  
6 of grassland natural community, protect 600 acres of vernal pool complex, protect 150 acres of  
7 alkali seasonal wetland complex, and protect 48,625 acres of cultivated lands that provide suitable  
8 habitat for native wildlife species (Table 3-4 in Chapter 3, *Description of Alternatives*).

9 The tidal freshwater emergent wetland would be restored in CZs 1, 2, 4, 5, 6, and/or 7 (Objective  
10 TFEWNC1.1 in BDCP Chapter 3, *Conservation Strategy*) and would be restored in a way that creates  
11 topographic heterogeneity and in areas that increase connectivity among protected lands (Objective  
12 TFEWNC2.2). The managed wetland would be protected and enhanced in CZ 11 and would benefit  
13 yellow-headed blackbird through the enhancement of degraded areas (such as areas of bare ground  
14 or marsh where the predominant vegetation consists of invasive species such as perennial  
15 pepperweed) to vegetation such as pickleweed-alkali heath-American bulrush plant associations  
16 (Objective MWNC1.1). In addition, at least 1,200 acres of nontidal marsh would be created, some of  
17 which would provide nesting habitat for the species.

18 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1  
19 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali  
20 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous  
21 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would  
22 provide grassland foraging habitat for yellow-headed blackbird. Insect prey availability and  
23 abundance would also be increased on protected lands, enhancing the foraging value of these  
24 natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4). Foraging opportunities would  
25 also be improved by enhancing prey populations through the establishment of 20- to 30-foot-wide  
26 hedgerows along field borders and roadsides within protected cultivated lands (Objective  
27 SWHA2.2). Within the cultivated lands, important wildlife habitat such as grasslands, ponds, and  
28 wetlands would also be protected and maintained as part of the cultivated lands reserve system  
29 which would provide additional habitat for yellow-headed blackbird (Objective CLNC1.3). Of the  
30 48,625 acres of cultivated lands that would be protected and enhanced by the late long-term time  
31 period (Objective CLNC1.1), 26,300 acres would be managed in moderate to high-value crop types  
32 for tricolored blackbird (Table 3.3-6 in BDCP Chapter 3). These crop types include pasture,  
33 sunflower, alfalfa, and other crop types that would provide high-value foraging habitat for yellow-  
34 headed blackbird.

35 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*  
36 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*  
37 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
38 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
39 *Material, and AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
40 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
41 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

42 The yellow-headed blackbird is not a covered species under the BDCP. For the BDCP to avoid an  
43 adverse effect on individuals, preconstruction surveys for noncovered avian species would be  
44 required to ensure that nests are detected and avoided. Implementation of Mitigation Measure BIO-

1 75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would  
2 reduce this impact to a less-than-significant level.

3 Considering Alternative 4's protection and restoration provisions, which would provide acreages of  
4 new or enhanced habitat in amounts necessary to compensate for habitat lost to construction and  
5 restoration activities, and with the implementation of AMM1-AMM7 and Mitigation Measure BIO-  
6 75, the loss of habitat or direct mortality through implementation of Alternative 4 would not result  
7 in a substantial adverse effect through habitat modifications and would not substantially reduce the  
8 number or restrict the range of yellow-headed blackbird. Therefore, the loss of habitat or potential  
9 mortality under this alternative would have a less-than-significant impact on yellow-headed  
10 blackbird.

11 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**  
12 **Disturbance of Nesting Birds**

13 See Mitigation Measure BIO-75 under Impact BIO-75.

14 **Impact BIO-149: Effects on Yellow-Headed Blackbird Associated with Electrical Transmission**  
15 **Facilities**

16 New transmission lines would increase the risk for bird-power line strikes, which could result in  
17 injury or mortality of yellow-headed blackbirds. Transmission line poles and towers also provide  
18 perching substrate for raptors, which could result in increased predation pressure on yellow-headed  
19 blackbirds. The existing network of transmission lines in the study area currently poses this risk for  
20 yellow-headed blackbirds, and any incremental risk associated with the new transmission line  
21 corridors would be expected to be low. *AMM20 Greater Sandhill Crane* would further minimize the  
22 risk for bird-power line strikes with the installation of flight diverters on new and selected existing  
23 transmission lines.

24 **NEPA Effects:** New transmission lines would increase the risk for bird-power line strikes, which  
25 could result in injury or mortality of yellow-headed blackbird. Transmission line poles and towers  
26 also provide perching substrate for raptors, which could result in increased predation pressure on  
27 yellow-headed blackbirds. The existing network of transmission lines in the study area currently  
28 poses this risk for yellow-headed blackbirds, and any incremental risk associated with the new  
29 transmission line corridors would not be expected to have an adverse effect on yellow-headed  
30 blackbirds. Implementation of *AMM20 Greater Sandhill Crane* would further minimize the risk for  
31 bird-power line strikes.

32 **CEQA Conclusion:** New transmission lines would increase the risk for bird-power line strikes, which  
33 could result in injury or mortality of yellow-headed blackbird. Transmission line poles and towers  
34 also provide perching substrate for raptors, which could result in increased predation pressure on  
35 yellow-headed blackbirds. The existing network of transmission lines in the study area currently  
36 poses this risk for yellow-headed blackbirds, and any incremental risk associated with the new  
37 transmission line corridors would have a less-than-significant impact on yellow-headed blackbird.  
38 Implementation of *AMM20 Greater Sandhill Crane* would further minimize the risk for bird-power  
39 line strikes.

1 **Impact BIO-150: Indirect Effects of Plan Implementation on Yellow-Headed Blackbird**

2 **Indirect construction- and operation-related effects:** Noise and visual disturbances associated  
3 with construction-related activities could result in temporary disturbances that affect yellow-  
4 headed blackbird use of suitable habitat. Construction noise above background noise levels (greater  
5 than 50 dBA) could extend 500 to 5,250 feet from the edge of construction activities (BDCP  
6 Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of the BDCP Conveyance Facility on*  
7 *Sandhill Crane*, Table 4), although there are no available data to determine the extent to which these  
8 noise levels could affect yellow-headed blackbird. Indirect effects associated with construction  
9 include noise, dust, and visual disturbance caused by grading, filling, contouring, and other ground-  
10 disturbing operations. Construction-related noise and visual disturbances could disrupt nesting and  
11 foraging behaviors, and reduce the functions of suitable habitat which could result in an adverse  
12 effect on these species. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and*  
13 *Avoid Disturbance of Nesting Birds*, would be available to minimize adverse effects on active nests.  
14 The use of mechanical equipment during water conveyance construction could cause the accidental  
15 release of petroleum or other contaminants that could affect the species in the surrounding habitat.  
16 AMM1–AMM7, including *AMM2 Construction Best Management Practices and Monitoring*, would  
17 minimize the likelihood of such spills from occurring. The inadvertent discharge of sediment or  
18 excessive dust adjacent to yellow-headed blackbird habitat could also have a negative effect on the  
19 species. AMM1–AMM7 would ensure that measures are in place to prevent runoff from the  
20 construction area and the negative effects of dust on wildlife adjacent to work areas.

21 **Methylmercury Exposure:** Covered activities have the potential to exacerbate bioaccumulation of  
22 mercury in avian species, including yellow-headed blackbird. Marsh (tidal and nontidal) and  
23 floodplain restoration have the potential to increase exposure to methylmercury. Mercury is  
24 transformed into the more bioavailable form of methylmercury in aquatic systems, especially areas  
25 subjected to regular wetting and drying such as tidal marshes and flood plains (Alpers et al. 2008).  
26 Thus, BDCP restoration activities that create newly inundated areas could increase bioavailability of  
27 mercury (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Species sensitivity  
28 to methylmercury differs widely and there is a large amount of uncertainty with respect to species-  
29 specific effects. Increased methylmercury associated with natural community and floodplain  
30 restoration could indirectly affect yellow-headed blackbird, via uptake in lower trophic levels (as  
31 described in the BDCP, Appendix 5.D, *Contaminants*).

32 In addition, the potential mobilization or creation of methylmercury within the study area varies  
33 with site-specific conditions and would need to be assessed at the project level. *CM12 Methylmercury*  
34 *Management* contains provisions for project-specific Mercury Management Plans. Site-specific  
35 restoration plans that address the creation and mobilization of mercury, as well as monitoring and  
36 adaptive management as described in CM12 would be available to address the uncertainty of  
37 methylmercury levels in restored tidal marsh and potential impacts on yellow-headed blackbird.

38 **NEPA Effects:** Noise and visual disturbances from the construction of water conveyance facilities  
39 could reduce yellow-headed blackbird use of modeled habitat adjacent to work areas. Moreover,  
40 operation and maintenance of the water conveyance facilities, including the transmission facilities,  
41 could result in ongoing but periodic postconstruction disturbances that could affect yellow-headed  
42 blackbird use of the surrounding habitat. Mitigation Measure BIO-75, *Conduct Preconstruction*  
43 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to address adverse  
44 effects on nesting individuals in addition to AMM1–AMM7. The implementation of tidal natural  
45 communities restoration or floodplain restoration could result in increased exposure of yellow-

1 headed blackbird to methylmercury in restored tidal areas. However, it is unknown what  
2 concentrations of methylmercury are harmful to these species and the potential for increased  
3 exposure varies substantially within the study area. Site-specific restoration plans that address the  
4 creation and mobilization of mercury, as well as monitoring and adaptive management as described  
5 in CM12, would address the uncertainty of methylmercury levels in restored tidal marsh in the study  
6 area and better inform potential impacts on yellow-headed blackbird. The site-specific planning  
7 phase of marsh restoration would be the appropriate place to assess the potential for risk of  
8 methylmercury exposure for yellow-headed blackbird, once site specific sampling and other  
9 information could be developed.

10 **CEQA Conclusion:** Noise, the potential for hazardous spills, increased dust and sedimentation, and  
11 operations and maintenance of the water conveyance facilities under Alternative 4 would have a  
12 less-than-significant impact on yellow-headed blackbird with the implementation of Mitigation  
13 Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting*  
14 *Birds*, and AMM1–AMM7. The implementation of tidal natural communities restoration or floodplain  
15 restoration could result in increased exposure of yellow-headed blackbird to methylmercury.  
16 However, it is unknown what concentrations of methylmercury are harmful to this species. Site-  
17 specific restoration plans that address the creation and mobilization of mercury, as well as  
18 monitoring and adaptive management as described in CM12, would better inform potential impacts  
19 and address the uncertainty of methylmercury levels in restored tidal marsh in the study area.

20 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**  
21 **Disturbance of Nesting Birds**

22 See Mitigation Measure BIO-75 under Impact BIO-75.

23 **Impact BIO-151: Periodic Effects of Inundation of Yellow-Headed Blackbird Nesting Habitat**  
24 **as a Result of Implementation of Conservation Components**

25 Flooding of the Yolo Bypass (CM2) would inundate 961–2,678 acres of nesting habitat and 368–  
26 2,678 acres of foraging habitat (Table 12-4-54). Based on hypothetical floodplain restoration,  
27 construction of setback levees for *CM5 Seasonally Inundated Floodplain Restoration* could result in  
28 periodic inundation of approximately 18 acres of nesting habitat and 2,701 acres of nonbreeding  
29 habitat (Table 12-4-54) resulting in the temporary loss of these habitats. Foraging yellow-headed  
30 blackbirds would be expected to move to adjacent suitable foraging habitat when the bypass is  
31 inundated, as they do under the current flooding regime. However, this inundation could reduce the  
32 availability of nesting habitat during years when flooding extends into the nesting season (past  
33 March). The periodic inundation of the Yolo Bypass (CM2) and of other floodplains (CM5) is  
34 expected to restore a more natural flood regime in support of wetland and riparian vegetation types  
35 that support nesting habitat.

36 **NEPA Effects:** Implementation of CM2 and CM5 would result in periodic inundation of nesting and  
37 foraging habitat for yellow-headed blackbird. Periodic inundation would have a less-than-significant  
38 impact on yellow-headed blackbird because inundation is expected to take place outside of the  
39 breeding season, and although foraging habitat may be temporarily unavailable, birds would be  
40 expected to move to adjacent foraging habitat.

41 **CEQA Conclusion:** Implementation of CM2 and CM5 would result in periodic inundation of nesting  
42 and foraging habitat for yellow-headed blackbird. Periodic inundation would have a less-than-  
43 significant impact on yellow-headed blackbird because inundation is expected to take place outside

1 of the breeding season, and although foraging habitat would be temporarily unavailable, birds  
2 would be expected to move to adjacent foraging habitat.

### 3 **Riparian Brush Rabbit**

4 The habitat model used to assess effects on the riparian brush rabbit consists of 38 vegetation  
5 associations within the valley/foothill riparian natural community and adjacent grasslands. The  
6 vegetation associations were selected based on a review of understory and overstory composition  
7 from Hickson and Keeler-Wolf (2007) and species habitat requirements.

8 Just until recently, the only known naturally occurring populations of riparian brush rabbits were  
9 confined to Caswell Memorial State Park (MSP), a 258-acre park supporting riparian oak woodland  
10 on the Stanislaus River immediately southeast of the study area, and in the south Delta southwest of  
11 Lathrop, which is within the study area (Williams and Basey 1986; Williams et al. 2002) (Figure 12-  
12 46). On October 11, 2012 a single female riparian brush rabbit was captured near Durham Ferry  
13 Road in riparian habitat along the San Joaquin River between Caswell MSP and Lathrop (Bradbury  
14 pers. comm.). This is only the 2<sup>nd</sup> naturally occurring population documented outside of Caswell  
15 MSP. Factors considered in assessing the value of adversely affected habitat for riparian brush  
16 rabbit, to the extent information was available, included size and degree of isolation of habitat  
17 patches, proximity to recorded species occurrences, and adjacency to conserved lands.

18 Construction and restoration associated with Alternative 4 conservation measures would result in  
19 both temporary and permanent losses of riparian brush rabbit modeled habitat as indicated in Table  
20 12-4-55. Full implementation of Alternative 4 would also include biological objectives over the term  
21 of the BDCP to benefit the riparian brush rabbit (BDCP Chapter 3, *Conservation Strategy*). The  
22 conservation strategy for the riparian brush rabbit involves protecting, restoring or creating, and  
23 maintaining habitat and corridors near the largest remaining fragments of habitat and extant  
24 populations; providing high-water refugia from flooding; and managing feral predators (dogs and  
25 cats) in areas occupied by the species. The conservation measures that would be implemented to  
26 achieve the biological goals and objectives are summarized below.

- 27 • Provide a range of elevations in restored floodplains that transition from frequently flooded  
28 (e.g., every 1 to 2 years) to infrequently flooded (e.g., every 10 years or more) areas to provide a  
29 range of habitat conditions, upland habitat values, and refugia from flooding during most flood  
30 events (Objective L1.5, associated with CM3, CM5, and CM8).
- 31 • Increase the size and connectivity of the reserve system by acquiring lands adjacent to and  
32 between existing conservation lands (Objective L1.6, associated with CM3).
- 33 • Allow floods to promote fluvial processes, such that bare mineral soils are available for natural  
34 recolonization of vegetation, desirable natural community vegetation is regenerated, and  
35 structural diversity is promoted, or implement management actions that mimic those natural  
36 disturbances (Objective L2.1, associated with CM3, CM5, and CM11).
- 37 • Protect and improve habitat linkages that allow terrestrial covered and other native species to  
38 move between protected habitats within and adjacent to the Plan Area (Objective L3.1,  
39 associated with CM3–CM8, and CM11).
- 40 • Restore or create 5,000 acres of valley/foothill riparian natural community, with at least 3,000  
41 acres occurring on restored seasonally inundated floodplain (Objective VFRNC1.1, associated  
42 with CM3 and CM7).

- 1 • Protect 750 acres of existing valley/foothill riparian natural community in CZ 7 by year 10  
2 (Objective VFRNC1.2, associated with CM3).
- 3 • Maintain 1,000 acres of early- to mid-successional vegetation with a well-developed understory  
4 of dense shrubs on restored seasonally inundated floodplain (Objective VFRNC2.2, associated  
5 with CM5, CM7, and CM11).
- 6 • Of the 750 acres of protected valley/foothill riparian natural community protected under  
7 Objective VFRNC1.2, protect at least 200 acres of suitable riparian brush rabbit habitat (defined  
8 in CM7 Riparian Natural Community Restoration) that is occupied by the species or contiguous  
9 with occupied habitat (Objective RBR1.1, associated with 3).
- 10 • Of the 1,000 acres of early- to midsuccessional riparian habitat maintained under VFRNC2.2,  
11 maintain at least 800 acres within the range of the riparian brush rabbit (CZ 7), in areas that are  
12 adjacent to or that facilitate connectivity with occupied or potentially occupied habitat  
13 (Objective RBR1.2, associated with CM3, CM7, and CM11).
- 14 • Of the 5,000 acres of valley/foothill riparian natural community restored under Objective  
15 VFRNC1.1, restore/create and maintain at least 300 acres of early- to mid-successional riparian  
16 habitat that meets the ecological requirements of the riparian brush rabbit and that is within or  
17 adjacent to or that facilitates connectivity with existing occupied or potentially occupied habitat  
18 (Objective 1.3, associated with CM3, CM7, and CM11).
- 19 • Create and maintain high-water refugia in the 300 acres of restored riparian brush rabbit  
20 habitat and the 200 acres of protected riparian brush rabbit habitat, through the retention,  
21 construction and/or restoration of high-ground habitat on mounds, berms, or levees, so that  
22 refugia are no further apart than 66 feet (Objective RBR1.4, associated with CM7 and CM11).
- 23 • In protected riparian areas that are occupied by riparian brush rabbit, monitor for and control  
24 nonnative predators that are known to prey on riparian brush rabbit (Objective RBR1.5,  
25 associated with CM11).
- 26 • Of the 8,000 acres of grasslands protected under Objective GNC1.1 and the 2,000 acres of  
27 grasslands restored under Objective GNC1.2, protect or restore grasslands on the landward side  
28 of levees adjacent to restored floodplain to provide flood refugia and foraging habitat for  
29 riparian brush rabbit (Objective RBR1.6m associated with CM3 and CM8).

30 As explained below, with the restoration and protection of these amounts of habitat, in addition to  
31 the AMMs to reduce potential effects, impacts on riparian brush rabbit would not be adverse for  
32 NEPA purposes and would be less than significant for CEQA purposes.

1  
2

**Table 12-4-55. Changes in Riparian Brush Rabbit Modeled Habitat Associated with Alternative 4 (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT	NT	LLT	CM2	CM5
CM1	Riparian	3	3	1	1	NA	NA
	Grassland	124	124	54	54	NA	NA
<b>Total Impacts CM1</b>		<b>127</b>	<b>127</b>	<b>55</b>	<b>55</b>	<b>NA</b>	<b>NA</b>
CM2-CM18	Riparian	0	62	0	35	0	264
	Grassland	0	44	0	20	0	423
<b>Total Impacts CM2-CM18</b>		<b>0</b>	<b>106</b>	<b>0</b>	<b>55</b>	<b>0</b>	<b>687</b>
<b>TOTAL IMPACTS</b>		<b>127</b>	<b>233</b>	<b>55</b>	<b>110</b>	<b>0</b>	<b>687</b>

<sup>a</sup> See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only.

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-152: Loss or Conversion of Habitat for and Direct Mortality of Riparian Brush**  
5 **Rabbit**

6 Alternative 4 conservation measures would result in the permanent and temporary loss of up to 101  
7 acres of riparian habitat and 242 acres of associated grassland habitat for the riparian brush rabbit  
8 in the study area (Table 12-4-55). The hypothetical footprint for levee construction under CM5,  
9 overlaps with one occurrence record for riparian brush rabbit, south of the Interstate 5/Interstate  
10 205 interchange. Conservation measures resulting in permanent habitat loss include conveyance  
11 facilities construction (CM1), tidal natural communities restoration (CM4), and floodplain  
12 restoration (CM5). Each of these individual activities is described below. A summary statement of  
13 the combined impacts and NEPA effects and a CEQA conclusion follow the individual conservation  
14 measure discussions.

- 15 • *CM1 Water Facilities and Operation*: Development of Alternative 4 water conveyance facilities  
16 would result in the permanent removal of approximately 3 acres of riparian habitat and  
17 124 acres of associated grassland habitat and in the temporary removal of 1 acre of riparian  
18 habitat and 54 acres of grassland habitat for riparian brush rabbit in CZ 8 (Table 12-4-55). The  
19 riparian habitat that would be removed is of low value for the riparian brush rabbit as it consists  
20 of several small, isolated patches surrounded by agricultural lands northeast of Clifton Court  
21 Forebay. The associated grasslands are also of low value for the species: They consist of long,  
22 linear strips that abut riparian habitat, but extend several miles from the riparian habitat and,  
23 therefore, provide few if any opportunities for adjacent cover. Trapping efforts conducted for  
24 the riparian brush rabbit in this area were negative (BDCP Appendix 3.E, *Conservation Principles*)

1 *for the Riparian Brush Rabbit and Riparian Woodrat*). Refer to the Terrestrial Biology Map Book  
2 for a detailed view of Alternative 4 construction locations.

- 3 ● *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and  
4 inundation would permanently remove approximately 19 acres of riparian habitat and 18 acres  
5 of associated grassland habitat for the riparian brush rabbit in CZ 7 in the late long-term. The  
6 riparian habitat that would be removed consists of relatively small and isolated patches along  
7 canals and irrigation ditches surrounded by agricultural lands in the Union Island and Roberts  
8 Island areas, and several small patches along the San Joaquin River. The habitat that would be  
9 removed is not adjacent to any existing conserved lands, and is several miles north and  
10 northeast of the northernmost riparian brush rabbit record located northeast of Paradise Cut  
11 (Williams et al. 2002). Although the final footprint for tidal natural communities restoration  
12 would differ from the hypothetical footprint, compliance monitoring would be implemented to  
13 ensure that acreage limits are not exceeded and the measures described in *AMM25 Riparian*  
14 *Woodrat and Riparian Brush Rabbit* require that tidal natural communities restoration avoid  
15 removal of any habitat occupied by the riparian brush rabbit.
- 16 ● *CM5 Seasonally Inundated Floodplain Restoration*: Levee construction associated with floodplain  
17 restoration would result in the permanent removal of approximately 43 acres of riparian habitat  
18 and 26 acres of associated grassland habitat for the riparian brush rabbit in CZ 7 in the late  
19 longterm. Levee construction would also result in the temporary removal of 35 acre riparian  
20 habitat and 20 acres of grassland habitat for the riparian brush rabbit. Although the effects are  
21 considered temporary, five years to several decades may be required for ecological succession  
22 to occur and for restored riparian habitat to replace the function of habitat that has been  
23 affected. The value of this habitat for riparian brush rabbit is high: although it consists of small  
24 patches and narrow bands of riparian vegetation, these areas are in proximity to, or contiguous  
25 with, habitat with recorded occurrences of riparian brush rabbit. The hypothetical footprint for  
26 levee construction overlaps with one occurrence record for riparian brush rabbit, south of the  
27 Interstate 5/Interstate 205 interchange.

28 Although the final floodplain restoration design would differ from the hypothetical footprint  
29 used for this effects analysis, restoration of the river floodplain in CZ 7 would be targeted in the  
30 general area of the riparian brush rabbit population. Implementation of adaptive management  
31 described in *AMM25* would ensure that riparian brush rabbit habitat permanently removed as a  
32 result of floodplain restoration does not exceed the maximum allowable habitat loss for this  
33 species.

- 34 ● *CM11 Natural Communities Enhancement and Management*: A variety of habitat management  
35 actions included in *CM11* that are designed to enhance wildlife values in *BDCP* protected  
36 habitats may result in localized ground disturbances that could temporarily remove small  
37 amounts of riparian brush rabbit habitat. Enhancement and management actions in riparian  
38 brush rabbit habitat within the reserve system may include invasive plant removal, planting and  
39 maintaining vegetation to improve and sustain habitat characteristics for the species, and  
40 creating and maintaining flood refugia. These activities are expected to have minor adverse  
41 effects on available riparian brush rabbit habitat and are expected to result in overall  
42 improvements to and maintenance of riparian brush rabbit habitat values over the term of the  
43 *BDCP*. These effects cannot be quantified, but are expected to be minimal and would be avoided  
44 and minimized through the *AMMs* listed below.

1 Passive recreation in the reserve system could result in disturbance of individual riparian brush  
2 rabbits foraging in the ecotone between riparian and adjacent open habitats. However, *AMM37*  
3 *Recreation* limits trail development adjacent to riparian corridors within the range of the  
4 riparian brush rabbit. With this minimization measure in place, recreation related effects on the  
5 riparian brush rabbit are expected to be minimal.

- 6 ● Operations and maintenance: Ongoing maintenance of BDCP facilities are not expected to  
7 adversely affect the riparian brush rabbit because the species is not expected to occur in the  
8 vicinity of proposed facilities.
- 9 ● Injury and direct mortality: Water conveyance facility construction is not is not likely to result in  
10 injury or mortality of individual riparian brush rabbit because the species is not likely to be  
11 present in the areas that would be affected by this activity, based on live trapping results (BDCP  
12 Appendix 3.E, *Conservation Principles for the Riparian Brush Rabbit and Riparian Woodrat*). Tidal  
13 natural communities restoration would not result in injury or mortality of the riparian brush  
14 rabbit because tidal natural communities restoration projects would be designed to avoid  
15 occupied riparian brush rabbit habitat and, if that is not possible, rabbits would be trapped and  
16 relocated as described in AMM25 (see BDCP Appendix 3.C). Activities associated with  
17 construction of setback levees for floodplain restoration could result in injury or mortality of  
18 riparian brush rabbits: however, preconstruction surveys, construction monitoring, and other  
19 measures would be implemented to avoid and minimize injury or mortality of this species  
20 during construction (AMM25).

21 The following paragraphs summarize the combined effects discussed above and describe other  
22 BDCP conservation actions that offset or avoid these effects. NEPA effects and a CEQA conclusion are  
23 also included.

#### 24 ***Near-Term Timeframe***

25 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
26 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
27 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
28 effects of construction would not be adverse under NEPA. Alternative 4 would result in permanent  
29 and temporary effects combined on 4 acres of riparian habitat and 178 acres of grassland habitat for  
30 riparian brush rabbit in the near-term as a result of construction of the water conveyance facilities  
31 (CM1). The habitat would be lost in the valley/foothill riparian and grassland natural communities.  
32 Most of the near-term loss of riparian brush rabbit habitat would be in an area unlikely to be  
33 occupied by the species in CZ 8. Habitat loss in CZ 7, in areas known or likely to be occupied, would  
34 occur during the early long-term and late long-term timeframes. Riparian restoration would be  
35 phased to minimize temporal habitat loss. There would be no near-term losses resulting from CM2–  
36 CM18.

37 Typical NEPA project-level mitigation ratios for those natural communities that would be affected  
38 and that are identified in the biological goals and objectives for riparian brush rabbit in Chapter 3 of  
39 the BDCP would be 1:1 for restoration and protection of the valley/foothill riparian natural  
40 community, and 2:1 for protection of grassland. Using these ratios would indicate that 4 acres of  
41 riparian habitat should be restored, 4 acres of riparian habitat should protected, and 356 acres of  
42 grassland should be protected for riparian brush rabbit to mitigate near-term losses.

1 The BDCP has committed to near-term restoration of 800 acres of riparian (Objective VFRNC1.1 and  
2 an unknown number of associated acres of grassland and protection of 750 acres of riparian  
3 (Objective VFRNC1.2) with an unknown number of associated acres of grassland (Table 3-4 in  
4 Chapter 3). In addition, the species-specific biological goals and objectives (RBR1.1–RBR1.6) would  
5 inform the near-term protection and restoration efforts. The natural community restoration and  
6 protection activities are expected to be concluded during the first 10 years of plan implementation,  
7 which is close enough in time to the occurrence of impacts to constitute adequate mitigation for  
8 NEPA purposes. These commitments are more than sufficient to support the conclusion that the  
9 near-term effects of Alternative 4 would be not be adverse under NEPA, because the number of  
10 acres required to meet the typical ratios described above would be only 4 acres of riparian habitat  
11 restored, 4 acres protected, and 356 acres of grassland protected.

12 The plan also contains commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
13 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
14 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
15 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
16 *Material*, *AMM7 Barge Operations Plan*, *AMM10 Restoration of Temporarily Affected Natural*  
17 *Communities*, *AMM25 Riparian Woodrat and Riparian Brush Rabbit*, and *AMM37 Recreation*. These  
18 AMMs contain elements that avoid or minimize the risk of BDCP activities affecting habitats and  
19 species adjacent to work areas and storage sites. The AMMs are described in detail in BDCP  
20 Appendix 3.C, *Avoidance and Minimization Measures*.

### 21 **Late Long-Term Timeframe**

22 There are 6,012 acres of modeled riparian brush rabbit habitat in the Plan Area, consisting of  
23 2,909 acres of riparian habitat and 3,103 acres of associated grassland habitat. Alternative 4 would  
24 result in permanent and temporary effects combined on 101 acres of modeled riparian habitat and  
25 243 acres of modeled grassland habitat for riparian brush rabbit, representing 4% and 8% of the  
26 riparian and grassland modeled habitat in CZ 6, CZ 7, and CZ 8. Habitat lost in CZ 6 and CZ 8 is  
27 fragmented, isolated, and unlikely to support the species. Habitat would also be lost in areas in CZ 7  
28 that provide high-value habitat for the species.

29 The BDCP would restore 5,000 acres and protect 750 acres of valley/foothill riparian natural  
30 community, a portion of which is expected to consist of suitable riparian brush rabbit habitat  
31 (Objectives VFRNC1.1 and VFRNC1.2). Objective RBR1.2 requires that at least 800 acres of early- to  
32 midsuccessional riparian natural community be conserved in CZ 7, in areas that are adjacent to or  
33 that facilitate connectivity with existing occupied or potentially occupied habitat. This would consist  
34 of 200 acres of protected habitat (Objective RBR1.1) and 600 acres of restored habitat. The 800  
35 acres to be conserved would consist of early successional riparian vegetation suitable for riparian  
36 brush rabbit. The conserved habitat would also be part of a larger, more contiguous, and less patchy  
37 area of protected and restored riparian natural community than what currently exists in CZ 7 and  
38 would be contiguous with existing modeled riparian brush rabbit habitat. The species-specific  
39 objectives further require that the 200 acres of protected riparian habitat (Objective RBR1.4) and at  
40 least 300 acres of the restored riparian habitat (Objective RBR1.3) meet more specific ecological  
41 requirements of riparian brush rabbit, including large patches of dense riparian brush; ecotonal  
42 edges that transition from brush species to grasses and forbs, scaffolding plants to support vines  
43 that grow above flood levels; a tree canopy that is open, if present; and high-ground refugia from  
44 flooding. In protected riparian areas that are occupied by riparian brush rabbit, nonnative predators  
45 that are known to prey on riparian brush rabbit would be monitored and controlled (RBR1.5).

1 In addition to restoration and protection of riparian habitat for the riparian brush rabbit, the Plan  
2 would protect, and, if necessary, create or restore grasslands adjacent to suitable riparian vegetation  
3 in areas outside the floodplain levees (Objective RBR1.6). These grasslands are expected to provide  
4 additional foraging opportunities for the riparian brush rabbit and upland refugia during flood  
5 events. The actual acreage of grassland to be restored or protected for riparian brush rabbit would  
6 depend on site-specific needs adjacent to restored and protected riparian habitat (CM3). Grasslands  
7 on the landward side of levees adjacent to restored floodplain will be restored or protected as  
8 needed to provide flood refugia and foraging habitat for riparian brush rabbit (Objective RBR1.6).

9 In addition to grasslands protected and restored outside the levees for riparian brush rabbit as  
10 needed, the floodplains will transition from areas that flood frequently (e.g., every 1 to 2 years) to  
11 areas that flood infrequently (e.g., every 10 years or more) (Objective L1.5): these infrequently  
12 flooded areas will provide refuge for the riparian brush rabbit during most years. The Plan would  
13 also create and maintain mounds, levee sections, or other high areas in restored and protected  
14 riparian areas (Objective RBR1.4) that are designed specifically to provide flood refugia for the  
15 riparian brush rabbit (BDCP Appendix 3.F, *Conservation Principles for the Riparian Brush Rabbit and*  
16 *Riparian Woodrat*). Additionally, nonnative predators that are known to prey on riparian brush  
17 rabbit (e.g., feral dogs and cats) would be monitored in protected and restored riparian areas that  
18 are occupied by riparian brush rabbit (Objective RBR1.5), and controlled as needed (CM11).

19 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6) estimates that the restoration  
20 and protection actions discussed above, as well as the restoration of valley/foothill riparian and  
21 grassland that could overlap with the species model, would result in the restoration of 800 acres of  
22 riparian and 79 acres of grassland modeled habitat for riparian brush rabbit. In addition, protection  
23 of valley/foothill riparian and grassland could overlap with the species model and would result in  
24 the protection of 200 acres of riparian and 317 acres of grassland riparian brush rabbit modeled  
25 habitat.

26 **NEPA Effects:** In the near-term, the loss of riparian brush rabbit habitat and potential mortality  
27 under Alternative 4 would not be an adverse effect because there is little likelihood of riparian brush  
28 rabbits being present and because the BDCP has committed to protecting and restoring the acreage  
29 required to meet the typical mitigation ratios described above. In the late long-term, the losses of  
30 riparian brush rabbit riparian and grassland habitat associated with Alternative 4, in the absence of  
31 other conservation actions, would represent an adverse effect as a result of habitat modification and  
32 potential direct mortality of a special-status species. However, with habitat protection and  
33 restoration associated with the conservation components, guided by landscape-scale goals and  
34 objectives and by AMM1–AMM6, AMM10, AMM25, and AMM37, the effects of Alternative 4 as a  
35 whole on riparian brush rabbit would not be adverse.

### 36 **CEQA Conclusion:**

#### 37 **Near-Term Timeframe**

38 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
39 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
40 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
41 effects of construction would not be significant under CEQA.

42 Alternative 4 would result in permanent and temporary effects combined on 4 acres of riparian  
43 habitat and 178 acres of grassland habitat for riparian brush rabbit in the near-term as a result of

1 construction of the water conveyance facilities (CM1). The habitat would be lost in the  
2 valley/foothill riparian and grassland natural communities. Most of the near-term loss of riparian  
3 brush rabbit habitat would be in an area unlikely to be occupied by the species in CZ 8. Habitat loss  
4 in CZ 7, in areas known or likely to be occupied, would occur during the early long-term and late  
5 long-term timeframes. Riparian restoration would be phased to minimize temporal habitat loss.  
6 There would be no near-term losses resulting from CM2–CM18.

7 Typical CEQA project-level mitigation ratios for those natural communities that would be affected  
8 and that are identified in the biological goals and objectives for riparian brush rabbit in Chapter 3 of  
9 the BDCP would be 1:1 for restoration and protection of the valley/foothill riparian natural  
10 community, and 2:1 for protection of grassland. Using these ratios would indicate that 4 acres of  
11 riparian habitat should be restored, 4 acres of riparian habitat should protected, and 356 acres of  
12 grassland should be protected for riparian brush rabbit to mitigate CM1 losses.

13 The BDCP has committed to near-term restoration of 800 acres of riparian (Objective VFRNC1.1 and  
14 an unknown number of associated acres of grassland and protection of 750 acres of riparian  
15 (Objective VFRNC1.2) with an unknown number of associated acres of grassland (Table 3-4 in  
16 Chapter 3). In addition, the species-specific biological goals and objectives (RBR1.1–RBR1.6) would  
17 inform the near-term protection and restoration efforts. The natural community restoration and  
18 protection activities are expected to be concluded during the first 10 years of plan implementation,  
19 which is close enough in time to the occurrence of impacts to constitute adequate mitigation for  
20 CEQA purposes. These commitments are more than sufficient to support the conclusion that the  
21 near-term effects of Alternative 4 would be less than significant under CEQA, because the number of  
22 acres required to meet the typical ratios described above would be only 4 acres of riparian habitat  
23 restored, 4 acres protected, and 356 acres of grassland protected.

24 The plan also contains commitments to implement AMM1–AMM7, AMM10, AMM25, and AMM37.  
25 These AMMs contain elements that avoid or minimize the risk of BDCP activities affecting habitats  
26 and species adjacent to work areas. The AMMs are described in detail in BDCP Appendix 3.C,  
27 *Avoidance and Minimization Measures*.

### 28 ***Late Long-Term Timeframe***

29 There are 6,012 acres of modeled riparian brush rabbit habitat in the Plan Area, consisting of  
30 2,909 acres of riparian habitat and 3,103 acres of associated grassland habitat. Alternative 4 would  
31 result in permanent and temporary effects combined on 101 acres of modeled riparian habitat and  
32 243 acres of modeled grassland habitat for riparian brush rabbit, representing 4% and 8% of the  
33 riparian and grassland modeled habitat.

34 The BDCP would restore 5,000 acres and protect 750 acres of valley/foothill riparian natural  
35 community, a portion of which is expected to consist of suitable riparian brush rabbit habitat  
36 (Objectives VFRNC1.1 and VFRNC1.2). Objective RBR1.2 requires that at least 800 acres of early- to  
37 midsuccessional riparian natural community be conserved in CZ 7, in areas that are adjacent to or  
38 that facilitate connectivity with existing occupied or potentially occupied habitat. This would consist  
39 of 200 acres of protected habitat (Objective RBR1.1) and 600 acres of restored habitat. The 800  
40 acres to be conserved would consist of early successional riparian vegetation suitable for riparian  
41 brush rabbit. The conserved habitat would also be part of a larger, more contiguous, and less patchy  
42 area of protected and restored riparian natural community than what currently exists in CZ 7 and  
43 would be contiguous with existing modeled riparian brush rabbit habitat. The species-specific  
44 objectives further require that the 200 acres of protected riparian habitat (Objective RBR1.4) and at

1 least 300 acres of the restored riparian habitat (Objective RBR1.3) meet more specific ecological  
2 requirements of riparian brush rabbit, including large patches of dense riparian brush; ecotonal  
3 edges that transition from brush species to grasses and forbs, scaffolding plants to support vines  
4 that grow above flood levels; a tree canopy that is open, if present; and high-ground refugia from  
5 flooding. In protected riparian areas that are occupied by riparian brush rabbit, nonnative predators  
6 that are known to prey on riparian brush rabbit would be monitored and controlled (RBR1.5).

7 In addition to restoration and protection of riparian habitat for the riparian brush rabbit, the Plan  
8 would protect, and, if necessary, create or restore grasslands adjacent to suitable riparian vegetation  
9 in areas outside the floodplain levees (Objective RBR1.6). These grasslands are expected to provide  
10 additional foraging opportunities for the riparian brush rabbit and upland refugia during flood  
11 events. The actual acreage of grassland to be restored or protected for riparian brush rabbit would  
12 depend on site-specific needs adjacent to restored and protected riparian habitat (CM3). Grasslands  
13 on the landward side of levees adjacent to restored floodplain would be restored or protected as  
14 needed to provide flood refugia and foraging habitat for riparian brush rabbit (Objective RBR1.6).

15 In addition to grasslands protected and restored outside the levees for riparian brush rabbit as  
16 needed, the floodplains would transition from areas that flood frequently (e.g., every 1 to 2 years) to  
17 areas that flood infrequently (e.g., every 10 years or more) (Objective L1.5): these infrequently  
18 flooded areas would provide refuge for the riparian brush rabbit during most years. The Plan would  
19 also create and maintain mounds, levee sections, or other high areas in restored and protected  
20 riparian areas (Objective RBR1.4) that are designed specifically to provide flood refugia for the  
21 riparian brush rabbit (BDCP Appendix 3.E, *Conservation Principles for the Riparian Brush Rabbit and*  
22 *Riparian Woodrat*). Additionally, nonnative predators that are known to prey on riparian brush  
23 rabbit (e.g., feral dogs and cats) would be monitored in protected and restored riparian areas that  
24 are occupied by riparian brush rabbit (Objective RBR1.5), and controlled as needed (CM11).

25 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6) estimates that the restoration  
26 and protection actions discussed above, as well as the restoration of valley/foothill riparian and  
27 grassland that could overlap with the species model, would result in the restoration of 800 acres of  
28 riparian and 79 acres of grassland modeled habitat for riparian brush rabbit. In addition, protection  
29 of valley/foothill riparian and grassland could overlap with the species model and would result in  
30 the protection of 200 acres of riparian and 317 acres of grassland riparian brush rabbit modeled  
31 habitat.

32 Only a small proportion of the habitat losses would be considered occupied and of high-value.  
33 Alternative 4 conservation measures provide for large acreages of riparian brush rabbit riparian and  
34 grassland habitat to be protected and restored, and the BDCP includes AMM1-AMM7, AMM10,  
35 AMM25, and AMM37, which are directed at minimizing or avoiding potential effects during  
36 construction and operation of the conservation measures. Overall, the BDCP would provide a  
37 substantial net benefit to the riparian brush rabbit through the increase in available habitat and  
38 habitat in protected status.

39 Considering the habitat restoration and protection associated with CM3,-CM7, CM8, and CM11,  
40 guided by species-specific goals and objectives and by AMM1-AMM7, AMM10, AMM25, and AMM37,  
41 the temporary and permanent losses of riparian and grassland habitat and potential direct mortality  
42 of riparian brush rabbit as a result of implementing Alternative 4 would not represent a substantial  
43 adverse effect through habitat modifications and would not substantially reduce the number or

1 restrict the range of the species. The loss of habitat and potential mortality of riparian brush rabbits  
2 would be a less-than-significant impact under CEQA.

### 3 **Impact BIO-153: Indirect Effects of Plan Implementation on Riparian Brush Rabbit**

4 Noise and visual disturbance adjacent to construction activities could indirectly affect the use of  
5 modeled riparian brush rabbit riparian habitat and of associated grassland habitat in the study area.  
6 These construction activities would include water conveyance (including transmission line)  
7 construction in CZ 8, tidal natural communities restoration construction, and construction of  
8 setback levees. Water conveyance construction would potentially affect acres of adjacent riparian  
9 habitat and of associated grassland habitat: this construction would occur in CZ 8 where there is  
10 suitable habitat for the species but surveys by ESRP did not indicate the species is present in this  
11 area; therefore, the potential for adverse noise and visual effects from conveyance facility  
12 construction would be minimal. Tidal natural communities restoration construction would also  
13 potentially affect adjacent riparian habitat and associated grassland habitat for this species:  
14 however, adverse effects on the species are unlikely because tidal natural communities restoration  
15 projects would be sited to avoid areas occupied by riparian brush rabbit. The activity most likely to  
16 result in noise and visual disturbance to riparian brush rabbit is the construction of setback levees  
17 for floodplain restoration, which would take place in CZ 7, where the species is known to occur. The  
18 use of mechanical equipment during construction might cause the accidental release of petroleum or  
19 other contaminants that would affect the riparian brush rabbit in adjacent habitat, if the species is  
20 present.

21 **NEPA Effects:** Implementation of the AMMs listed above as part of implementing BDCP Alternative 4  
22 would avoid the potential for substantial adverse effects on riparian brush rabbits, either indirectly  
23 or through habitat modifications or result in a substantial reduction in numbers or a restriction in  
24 the range of riparian brush rabbits. Therefore, indirect effects of Alternative 4 would not have an  
25 adverse effect on riparian brush rabbit.

26 **CEQA Conclusion:** Indirect effects from conservation measure operations and maintenance as well  
27 as construction-related noise and visual disturbances could affect riparian brush rabbit in riparian  
28 and grassland habitats. The use of mechanical equipment during construction could cause the  
29 accidental release of petroleum or other contaminants that could affect riparian brush rabbit. The  
30 inadvertent discharge of sediment or excessive dust adjacent to riparian brush rabbit habitat could  
31 also have a negative effect on the species. With implementation of AMM1-AMM7, AMM10, AMM25,  
32 and AMM37 as part of Alternative 4, the BDCP would avoid the potential for substantial adverse  
33 effects on riparian brush rabbits, either indirectly or through habitat modifications and would not  
34 result in a substantial reduction in numbers or a restriction in the range of riparian brush rabbits.  
35 Indirect effects of Alternative 4 would have a less-than-significant impact on riparian brush rabbit.

### 36 **Impact BIO-154: Periodic Effects of Inundation of Riparian Brush Rabbit Habitat as a Result of** 37 **Implementation of Conservation Components**

38 *CM5 Seasonally inundated floodplain restoration* is the only covered activity expected to result in  
39 periodic inundation of riparian brush rabbit habitat. This activity would periodically inundate  
40 approximately 264 acres of riparian habitat (9% of riparian habitat in the Plan Area) and 423 acres  
41 of associated grassland habitat (14% of associated grassland habitat in the Plan Area) for the  
42 riparian brush rabbit. The area between existing levees that would be breached and the newly  
43 constructed setback levees would be inundated through seasonal flooding. The potentially

1 inundated areas consist of high-value habitat for the species: although they consist of small patches  
2 and narrow bands of riparian vegetation, many of these areas are in proximity to, or contiguous  
3 with, habitat with recorded occurrences of riparian brush rabbit. The restored floodplain would  
4 include a range of elevations from lower lying areas that flood frequently (e.g., every 1 to 2 years) to  
5 higher elevation areas that flood infrequently (e.g., every 10 years or more).

6 Seasonal flooding in restored floodplains can result in injury or mortality of individuals if riparian  
7 brush rabbits occupy these areas and cannot escape flood waters. One recorded occurrence of  
8 riparian brush rabbit (Williams et al. 2002), just west of Stewart Road in Mossdale, is in the area that  
9 would be seasonally flooded based on the hypothetical restoration footprint.

10 **NEPA Effects:** Floodplain restoration under CM5 would periodically affect only a small proportion of  
11 the modeled riparian brush rabbit habitat in the study area. The adverse effects of periodic  
12 inundation on the riparian brush rabbit would be minimized through construction and maintenance  
13 of flood refugia to allow riparian brush rabbits to escape inundation. Therefore, implementing  
14 Alternative 4, including AMM1–AMM7, AMM10, AMM25, and AMM37, would not be expected to  
15 result in substantial adverse effects on riparian brush rabbit, either directly or through habitat  
16 modifications and would not result in a substantial reduction in numbers or a restriction in the  
17 range of riparian brush rabbits. Therefore, Alternative 4 would not adversely affect the species.

18 **CEQA Conclusion:** Floodplain restoration under CM5 would periodically affect only a small  
19 proportion of the modeled riparian brush rabbit habitat in the study area. The overall effect of  
20 seasonal inundation on existing riparian natural communities may instead be beneficial. Historically,  
21 flooding was the main natural disturbance regulating ecological processes in riparian areas, and  
22 flooding promotes the germination and establishment of many native riparian plants. In the late  
23 long-term, seasonal inundation in areas currently occupied by riparian vegetation may contribute to  
24 the establishment of high-value habitat for covered riparian species, such as the riparian brush  
25 rabbit. Long-term management of riparian areas would ensure that refugia also exist along the  
26 edges of seasonally inundated habitat.

27 The adverse effects of periodic inundation on the riparian brush rabbit would be minimized through  
28 construction and maintenance of flood refugia to allow riparian brush rabbits to escape inundation.  
29 Therefore, implementing Alternative 4, including AMM1–AMM7, AMM10, AMM25, and AMM37,  
30 would not be expected to result in substantial adverse effects on riparian brush rabbit, either  
31 directly or through habitat modifications and would not result in a substantial reduction in numbers  
32 or a restriction in the range of riparian brush rabbits. Periodic inundation of riparian and grassland  
33 habitat for riparian brush rabbit under Alternative 4 would have a less-than-significant impact on  
34 the species.

### 35 **Riparian Woodrat**

36 The habitat model used to assess effects for the riparian woodrat consists of selected plant alliances  
37 from the valley/foothill riparian natural community, geographically constrained to the south Delta  
38 portion of the BDCP area in CZ 7, south of State Route 4 and Old River Pipeline along the Stanislaus,  
39 San Joaquin, Old, and Middle Rivers. Valley/foothill riparian areas along smaller drainages (Paradise  
40 Cut, Tom Paine Slough), and some larger streams in the northern portion of CZ 7 were excluded  
41 from the riparian woodrat habitat model due to a lack of trees or riparian corridors that were too  
42 narrow. Factors considered in assessing the value of affected habitat for the riparian woodrat, to the  
43 extent that information is available, include habitat patch size and connectivity.

1 The riparian woodrat is not known to occur in the study area. The only verified extant population of  
2 riparian woodrats rangewide is 2 miles east of the southern end of the study area in Caswell  
3 Memorial State Park along the Stanislaus River (Williams 1986:1–112; Williams 1993). Riparian  
4 woodrat may occur in small patches of valley oak riparian forest along the San Joaquin River from  
5 the southern tip of the study area north to approximately the Interstate 5 overcrossing near Lathrop  
6 (Figure 12-47).

7 Construction and restoration associated with Alternative 4 conservation measures would result in  
8 both temporary and permanent losses of riparian woodrat modeled habitat as indicated in Table 12-  
9 4-56. Tidal habitat restoration, floodplain restoration, and protection and management of natural  
10 communities could affect modeled riparian woodrat habitat. However, because the species is not  
11 known to occur in the study area it is not expected to be affected by BDCP actions unless the species  
12 were to establish in the study area over the term of the BDCP. Full implementation of Alternative 4  
13 would also include biological objectives over the term of the BDCP to benefit the riparian woodrat  
14 (BDCP Chapter 3, *Conservation Strategy*). The conservation strategy for the riparian woodrat  
15 involves providing opportunities for population expansion into the Plan Area from adjacent lands to  
16 the south and southeast. The strategy focuses on restoring and maintaining suitable habitat at the  
17 southernmost end of CZ 7, providing connectivity with existing populations to the south and  
18 southeast, and creating and maintaining flood refugia. This conservation approach is consistent with  
19 the recovery plan (U.S. Fish and Wildlife Service 1998) and conservation principles (BDCP Appendix  
20 3.E). The conservation measures that would be implemented to achieve the biological goals and  
21 objectives are summarized below.

- 22 • Provide a range of elevations in restored floodplains that transition from frequently flooded  
23 (e.g., every 1 to 2 years) to infrequently flooded (e.g., every 10 years or more) areas to provide a  
24 range of habitat conditions, upland habitat values, and refugia from flooding during most flood  
25 events (Objective L1.5, associated with CM3, CM5, and CM8).
- 26 • Increase the size and connectivity of the reserve system by acquiring lands adjacent to and  
27 between existing conservation lands (Objective L1.6, associated with CM3).
- 28 • Protect and improve habitat linkages that allow terrestrial covered and other native species to  
29 move between protected habitats within and adjacent to the Plan Area (Objective L3.1,  
30 associated with CM3-CM8, and CM11).
- 31 • Restore or create 5,000 acres of valley/foothill riparian natural community, with 3,000 acres  
32 occurring on restored seasonally inundated floodplain (Objective VFRNC1.1, associated with  
33 CM3 and CM7).
- 34 • Protect 750 acres of existing valley/foothill riparian natural community in CZ 7 by year 10  
35 (Objective VFRNC1.2, associated with CM3).
- 36 • Restore, maintain and enhance structural heterogeneity with adequate vertical and horizontal  
37 overlap among vegetation components and over adjacent riverine channels, freshwater  
38 emergent wetlands, and grasslands (Objective VFRNC2.1, associated with CM5, CM7, and CM11).
- 39 • Of the 5,000 acres of valley/foothill riparian natural community restored under Objective  
40 VFRNC1.1, restore/create and maintain 300 acres riparian habitat in CZ 7 that meets the  
41 ecological requirements of the riparian woodrat (i.e., dense willow understory and oak  
42 overstory) and that is adjacent to or facilitates connectivity with existing occupied or potentially  
43 occupied habitat (Objective RW1.1, associated with CM3, CM7, CM11).

- Provide and maintain high-water refugia in the 300 acres of riparian woodrat habitat restored under Objective RW1.1 through the retention, construction, and/or restoration of high-ground habitat on mounds, berms, or levees, so that refugia are no further apart than 67 feet (Objective RW1.2, associated with CM7 and CM11).

As explained below, with the restoration and protection of these amounts of habitat, in addition to implementation of the AMMs to reduce potential effects, impacts on riparian woodrat would not be adverse for NEPA purposes and would be less than significant for CEQA purposes.

**Table 12-4-56. Changes in Riparian Woodrat Modeled Habitat Associated with Alternative 4 (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT	NT	LLT	CM2	CM5
CM1	Riparian	0	0	0	0	NA	NA
<b>Total Impacts CM1</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>NA</b>	<b>NA</b>
CM2–CM18	Riparian	0	51	0	33	0	203
<b>Total Impacts CM2–CM18</b>		<b>0</b>	<b>51</b>	<b>0</b>	<b>33</b>	<b>0</b>	<b>203</b>
<b>TOTAL IMPACTS</b>		<b>0</b>	<b>51</b>	<b>0</b>	<b>33</b>	<b>0</b>	<b>203</b>

<sup>a</sup> See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only.

NT = near-term

LLT = late long-term

NA = not applicable

### Impact BIO-155: Loss or Conversion of Habitat for and Direct Mortality of Riparian Woodrat

Alternative 4 conservation measures would result in the permanent loss of up to 51 acres of habitat and temporary loss of up to 33 acres of modeled habitat for riparian woodrat (Table 12-4-56). Construction of Alternative 4 water conveyance facilities (CM1) would not affect modeled habitat; however, tidal natural communities restoration (CM4) and seasonally inundated floodplain restoration (CM5) would remove habitat. Each of these individual activities is described below. A summary statement of the combined impacts and NEPA effects and a CEQA conclusion follow the individual conservation measure discussions.

- *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and inundation would permanently remove approximately 10 acres of modeled habitat for the riparian woodrat in CZ 7. This habitat is of low value, consisting of a small, isolated patch surrounded by agricultural lands, and the species has a relatively low likelihood of being present in these areas. The measures described in *AMM25 Riparian Woodrat and Riparian Brush Rabbit* require that tidal natural communities restoration avoid removal of any habitat occupied by the riparian woodrat as determined by presence/absence surveys. Because the estimates of habitat

1 loss due to tidal inundation are based on projections of where restoration may occur, actual  
2 habitat loss is expected to be lower because sites would be selected to minimize effects on  
3 riparian woodrat.

- 4 • *CM5 Seasonally Inundated Floodplain Restoration*: Levee construction associated with floodplain  
5 restoration would result in the permanent removal of approximately 41 acres of modeled  
6 habitat for the riparian woodrat in CZ 7. The value of this habitat for riparian woodrat is  
7 moderate. Although the habitat consists of small patches and narrow bands of riparian  
8 vegetation and no riparian woodrats have been detected in CZ 7, the riparian patches are in  
9 proximity to each other along the San Joaquin River. There are two species occurrences  
10 immediately south of CZ 7, one of which is less than 1.5 mile from the southernmost patch of  
11 riparian habitat potentially affected by levee construction.

12 The final floodplain restoration design would differ from the hypothetical footprint used for this  
13 effects analysis. However, monitoring and adaptive management described in *CM11 Natural*  
14 *Communities Enhancement and Management*. And AMM25 would ensure that riparian woodrat  
15 habitat permanently removed does not exceed the amount estimated based on the hypothetical  
16 footprint. Habitat loss is expected to be lower than 41 acres because sites would be selected and  
17 restoration designed to minimize effects on the riparian woodrat. If natural flooding is  
18 insufficient to maintain appropriate riparian woodrat vegetation structure, the vegetation  
19 would be actively managed to provide suitable habitat structure as described in *CM11 Natural*  
20 *Communities Enhancement and Management*.

21 Levee construction would also result in the temporary removal of 33 acres of modeled habitat  
22 for the riparian woodrat. Although the effects are considered temporary, 5 years to several  
23 decades may be required for ecological succession to occur and for restored riparian habitat to  
24 replace the function of habitat that has been affected.

- 25 • *CM11 Natural Communities Enhancement and Management*: A variety of habitat management  
26 actions included in CM11 that are designed to enhance wildlife values in BDCP protected  
27 habitats may result in localized ground disturbances that could temporarily remove small  
28 amounts of riparian woodrat habitat. Enhancement and management actions in riparian  
29 woodrat habitat within the reserve system may include invasive plant removal, planting and  
30 maintaining vegetation to improve and sustain habitat characteristics for the species, and  
31 creating and maintaining flood refugia. These activities are expected to have minor adverse  
32 effects on available riparian woodrat habitat and are expected to result in overall improvements  
33 to and maintenance of riparian woodrat habitat values over the term of the BDCP. These effects  
34 cannot be quantified, but are expected to be minimal and would be avoided and minimized  
35 through the AMMs listed below.
- 36 • *Operations and maintenance*: The only ongoing effects on the riparian woodrat are those  
37 potentially resulting from habitat enhancement and management activities. Enhancement and  
38 management actions in riparian woodrat habitat within the reserve system may include invasive  
39 plant removal, planting and maintaining vegetation to improve and sustain habitat  
40 characteristics for the species, and creating and maintaining flood refugia. These activities may  
41 result in harassment of riparian woodrats through noise and visual disturbance which would be  
42 minimized with implementation of AMM1–AMM7, AMM10, and AMM25.
- 43 • *Injury and direct mortality*: Water conveyance facility construction is not likely to result in  
44 injury or mortality of individual riparian woodrats because the species is not likely to be present  
45 in the areas that would be affected by this activity, based on live trapping results (BDCP

1 *Appendix 3.E, Conservation Principles for the Riparian Woodrat and Riparian Brush Rabbit*). Tidal  
2 natural communities restoration would not result in injury or mortality of riparian woodrats  
3 because, under AMM25, tidal natural communities restoration projects would be designed to  
4 avoid occupied riparian woodrat habitat and if that is not possible to trap and relocate the  
5 species. Activities associated with construction of setback levees for floodplain restoration could  
6 result in injury or mortality of riparian woodrats; however, preconstruction surveys,  
7 construction monitoring, and other measures would be implemented under AMM25 to avoid  
8 and minimize injury or mortality of this species during construction, as described in BDCP  
9 Appendix 3.C. If occupied riparian woodrat habitat cannot be avoided, mortality would be  
10 avoided through implementation of a trapping and relocation program. The program would be  
11 developed in coordination with USFWS, and relocation would be to a site approved by USFWS  
12 prior to construction activities.

13 The following paragraphs summarize the combined effects discussed above and describe other  
14 BDCP conservation actions that offset or avoid these effects. NEPA effects and a CEQA conclusion are  
15 also included.

### 16 ***Near-Term Timeframe***

17 Because water conveyance facilities construction is being evaluated at the project level, the near-  
18 term BDCP strategy has been analyzed to determine whether it would provide sufficient habitat  
19 protection or restoration in an appropriate timeframe to ensure that the construction effects would  
20 not be adverse under NEPA.

21 No riparian woodrat habitat would be lost in the near-term timeframe. Implementation of CM11  
22 could have minor adverse effects on available riparian woodrat habitat, and activities associated  
23 with construction of setback levees for floodplain restoration could result in injury or mortality of  
24 riparian woodrats.

25 The BDCP has committed to near-term restoration of 800 acres of riparian (Objective VFRNC1.1) and  
26 protection of 750 acres of riparian (Objective VFRNC1.2) (Table 3-4 in Chapter 3). In addition, the  
27 species-specific biological goals and objectives (RW1.1 and RW1.2) would inform the near-term  
28 protection and restoration efforts. The natural community restoration and protection activities are  
29 expected to be concluded during the first 10 years of plan implementation, which is close enough in  
30 time to the occurrence of impacts to constitute adequate mitigation for NEPA purposes. These  
31 commitments are more than sufficient to support the conclusion that the near-term effects of  
32 Alternative 4 would be not be adverse under NEPA, because no riparian woodrat habitat would be  
33 lost and there is only limited potential for minor adverse effects on woodrats or its habitat from  
34 implementation of CM11.

35 These effects cannot be quantified, but are expected to be minimal and would be avoided and  
36 minimized through the BDCP's commitment to *AMM1 Worker Awareness Training, AMM2*  
37 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*  
38 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
39 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
40 *Material, AMM7 Barge Operations Plan, AMM10 Restoration of Temporarily Affected Natural*  
41 *Communities, and AMM25 Riparian Woodrat and Riparian Brush Rabbit*. The AMMs are described in  
42 detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

1 **Late Long-Term Timeframe**

2 The study area supports approximately 2,166 acres of modeled riparian woodrat habitat.  
3 Alternative 4 as a whole would result in the permanent loss and temporary removal of 84 acres of  
4 modeled habitat for riparian woodrat habitat during the late long-term. None of this habitat is  
5 considered occupied.

6 Objective RW1.1 requires at least 300 acres of riparian habitat that meets the ecological  
7 requirements of the riparian woodrat (e.g., dense willow understory and oak overstory) and that is  
8 adjacent to or facilitates connectivity with existing occupied or potentially occupied habitat to be  
9 restored in CZ 7. The conserved habitat would also be part of a larger, more contiguous, and less  
10 patchy area of protected and restored riparian natural community than what currently exists in CZ 7  
11 and would be contiguous with existing modeled riparian woodrat habitat. The species-specific  
12 objective further requires that the 300 acres of restored riparian habitat meet more specific  
13 ecological requirements of riparian woodrat (e.g., dense willow understory and oak overstory).  
14 Additionally, assuming the protected riparian natural community would provide riparian woodrat  
15 habitat proportional to the amount of modeled habitat in this natural community in the Plan Area  
16 (12% of the riparian natural community in the Plan Area is modeled riparian woodrat habitat), the  
17 protection of 750 acres of riparian natural community (CM3) would provide an estimated 90 acres  
18 of protected riparian woodrat habitat that is comparable to or of higher value than existing modeled  
19 grassland habitat. All riparian protection would occur during the near-term period to offset early  
20 riparian losses.

21 The Plan would also create and maintain mounds, levee sections, or other high areas in restored and  
22 protected riparian areas (Objective RW1.2) that are designed specifically to provide flood refugia for  
23 the riparian woodrat (BDCP Appendix 3.E, *Conservation Principles for the Riparian Brush Rabbit and*  
24 *Riparian Woodrat*). In addition, the restored floodplains would transition from areas that flood  
25 frequently (e.g., every 1 to 2 years) to areas that flood infrequently (e.g., every 10 years or more)  
26 (Objective L1.5): these infrequently flooded areas would provide refuge for the riparian woodrat  
27 during most years.

28 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6) estimates that the restoration  
29 and protection actions discussed above, as well as the restoration of valley/foothill riparian that  
30 could overlap with the species model, would result in the restoration of 300 acres of modeled  
31 habitat for riparian woodrat. In addition, protection of valley/foothill riparian could overlap with  
32 the species model and would result in the protection of 90 acres riparian woodrat modeled habitat.

33 Although there are no records of occurrences of the riparian woodrat in the study area, habitat  
34 restoration in CZ 7, in the vicinity of occurrences south of the study area, would increase  
35 opportunities for northward expansion of the species into the study area. Implementation of  
36 Alternative 4 conservation measures is not expected to adversely affect the riparian woodrat for the  
37 following reasons.

- 38
- 39 ● There are no riparian woodrat occurrences in the Plan Area.
  - 40 ● The habitat that would be removed consists of small patches that are of moderate value for the species.
  - 41 ● The habitat that would be removed permanently is a small proportion of the total habitat in the
  - 42 Plan Area (2%).

- 1 • Avoidance and minimization measures would be implemented to avoid injury or mortality of  
2 riparian woodrats, and to minimize loss of occupied habitat.
- 3 • Floodplain restoration would be designed to provide flood refugia so that flooding would not  
4 adversely affect any riparian woodrats that occupy restored floodplains.

5 **NEPA Effects:** Alternative 4 would provide a substantial benefit to the riparian woodrat through the  
6 net increase in available habitat and a net increase of habitat in protected status. These protected  
7 areas would be managed and monitored to support the species. The affected habitat is currently  
8 unoccupied and habitat removal is not expected to result in a discernible change in the abundance  
9 or distribution of riparian woodrat should they occupy study area habitats. Should the species be  
10 detected in the study area, implementation of AMM1–AMM7, AMM10, and AMM25 would avoid and  
11 minimize the effects of conservation component construction and implementation. Therefore, the  
12 loss of habitat and potential mortality of individuals would not have an adverse effect on riparian  
13 woodrat under Alternative 4.

14 **CEQA Conclusion:**

15 **Near-Term Timeframe**

16 Because water conveyance facilities construction is being evaluated at the project level, the near-  
17 term BDCP strategy has been analyzed to determine whether it would provide sufficient habitat  
18 protection or restoration in an appropriate timeframe to ensure that the construction effects would  
19 be less than significant for CEQA purposes.

20 No riparian woodrat habitat would be lost in the near-term timeframe. Implementation of CM11  
21 could have minor adverse effects on available riparian woodrat habitat, and activities associated  
22 with construction of setback levees for floodplain restoration could result in injury or mortality of  
23 riparian woodrats.

24 The BDCP has committed to near-term restoration of 800 acres of riparian habitat (Objective  
25 VFRNC1.1) and protection of 750 acres of riparian habitat (Objective VFRNC1.2) (Table 3-4 in  
26 Chapter 3). In addition, the species-specific biological goals and objectives (RW1.1 and RW1.2)  
27 would inform the near-term protection and restoration efforts. The natural community restoration  
28 and protection activities are expected to be concluded during the first 10 years of plan  
29 implementation, which is close enough in time to the occurrence of impacts to constitute adequate  
30 mitigation for CEQA purposes. The Plan also contains commitments to implement AMM1–AMM7,  
31 AMM10, and AMM25, which include elements that avoid or minimize the risk of affected habitats  
32 and species adjacent to work areas. The AMMs are described in detail in BDCP Appendix 3.C,  
33 *Avoidance and Minimization Measures*.

34 These commitments are more than sufficient to support the conclusion that the near-term effects of  
35 Alternative 4 would be less than significant under CEQA, because no riparian woodrat habitat would  
36 be lost and there is only limited potential for minor adverse effects on woodrats or its habitat from  
37 implementation of CM11.

38 **Late Long-Term Timeframe**

39 The study area supports approximately 2,166 acres of modeled riparian woodrat habitat.  
40 Alternative 4 as a whole would result in the permanent loss and temporary removal of 84 acres of  
41 modeled habitat for riparian woodrat habitat during the late long-term. None of this habitat is  
42 considered occupied.

1 Objective RW1.1 requires at least 300 acres of riparian habitat that meets the ecological  
2 requirements of the riparian woodrat (e.g., dense willow understory and oak overstory) and that is  
3 adjacent to or facilitates connectivity with existing occupied or potentially occupied habitat to be  
4 restored in CZ 7. The conserved habitat would also be part of a larger, more contiguous, and less  
5 patchy area of protected and restored riparian natural community than what currently exists in CZ 7  
6 and would be contiguous with existing modeled riparian woodrat habitat. The species-specific  
7 objective further requires that the 300 acres of restored riparian habitat meet more specific  
8 ecological requirements of riparian woodrat (e.g., dense willow understory and oak overstory).  
9 Additionally, assuming the protected riparian natural community would provide riparian woodrat  
10 habitat proportional to the amount of modeled habitat in this natural community in the Plan Area  
11 (12% of the riparian natural community in the Plan Area is modeled riparian woodrat habitat), the  
12 protection of 750 acres of riparian natural community (CM3) would provide an estimated 90 acres  
13 of protected riparian woodrat habitat that is comparable to or of higher value than existing modeled  
14 grassland habitat. All riparian protection would occur during the near-term period, to offset early  
15 riparian losses.

16 The Plan would also create and maintain mounds, levee sections, or other high areas in restored and  
17 protected riparian areas (Objective RW1.2) that are designed specifically to provide flood refugia for  
18 the riparian woodrat (BDCP Appendix 3.E, *Conservation Principles for the Riparian Brush Rabbit and*  
19 *Riparian Woodrat*). In addition, the restored floodplains would transition from areas that flood  
20 frequently (e.g., every 1 to 2 years) to areas that flood infrequently (e.g., every 10 years or more)  
21 (Objective L1.5): these infrequently flooded areas would provide refuge for the riparian woodrat  
22 during most years.

23 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6) estimates that the restoration  
24 and protection actions discussed above, as well as the restoration of valley/foothill riparian that  
25 could overlap with the species model, would result in the restoration of 300 acres of modeled  
26 habitat for riparian woodrat. In addition, protection of valley/foothill riparian could overlap with  
27 the species model and would result in the protection of 90 acres riparian woodrat modeled habitat.

28 Although there are no records of occurrences of the riparian woodrat in the study area, habitat  
29 restoration in CZ 7, in the vicinity of occurrences south of the study area, would increase  
30 opportunities for northward expansion of the species into the study area. Implementation of  
31 Alternative 4 conservation measures is not expected to adversely affect the riparian woodrat for the  
32 following reasons.

- 33 ● There are no riparian woodrat occurrences in the Plan Area.
- 34 ● The habitat that would be removed consists of small patches that are of moderate value for the  
35 species.
- 36 ● The habitat that would be removed permanently is a small proportion of the total habitat in the  
37 Plan Area (2%).
- 38 ● Avoidance and minimization measures would be implemented to avoid injury or mortality of  
39 riparian woodrats, and to minimize loss of occupied habitat.
- 40 ● Floodplain restoration would be designed to provide flood refugia so that flooding would not  
41 adversely affect any riparian woodrats that occupy restored floodplains.

42 Alternative 4 would provide a substantial benefit to the riparian woodrat through the net increase in  
43 available habitat and a net increase of habitat in protected status. These protected areas would be

1 managed and monitored to support the species. The affected habitat is currently unoccupied and  
2 habitat removal is not expected to result in a discernible change in the abundance or distribution of  
3 riparian woodrat should they occupy study area habitats. Should the species be detected in the  
4 study area, implementation of AMM1–AMM7, AMM10, and AMM25 would avoid and minimize the  
5 effects of conservation component construction and implementation. Therefore, the loss of habitat  
6 and potential mortality of individuals under Alternative 4 would not have a significant impact on  
7 riparian woodrat.

#### 8 **Impact BIO-156: Indirect Effects of Plan Implementation on Riparian Woodrat**

9 Noise and visual disturbance adjacent to construction activities could indirectly affect the use of  
10 modeled habitat for riparian woodrat. These effects are related construction activities associated  
11 with tidal natural communities restoration construction and construction of setback levees. Indirect  
12 effects on the species from construction associated with tidal natural communities restoration are  
13 unlikely because, under AMM25, tidal natural communities restoration projects would be sited to  
14 avoid areas occupied by riparian woodrat. The activity most likely to result in noise and visual  
15 disturbance to riparian woodrat would be the construction of setback levees. These adverse effects  
16 would be minimized through implementation of AMM1–AMM7, AMM10, and AMM25.

17 **NEPA Effects:** Implementation of the AMMs listed above as part of implementing BDCP Alternative 4  
18 would avoid the potential for substantial adverse effects on riparian woodrats, either indirectly or  
19 through habitat modifications or result in a substantial reduction in numbers or a restriction in the  
20 range of riparian woodrats. Therefore, indirect effects of Alternative 4 would not have an adverse  
21 effect on riparian woodrat.

22 **CEQA Conclusion:** Should the species be detected in the study area, indirect effects of conservation  
23 measure construction and implementation could impact riparian woodrat and its habitat. AMM1–  
24 AMM7, AMM10, and AMM25 implemented under Alternative 1A would avoid and minimize the  
25 impact and result in a less-than-significant impact.

#### 26 **Impact BIO-157: Periodic Effects of Inundation of Riparian Woodrat Habitat as a Result of** 27 **Implementation of Conservation Components**

28 *CM5 Seasonally inundated floodplain restoration* is the only covered activity expected to result in  
29 periodic inundation of riparian woodrat habitat. Floodplain restoration would result in periodic  
30 inundation of up to 203 acres of riparian woodrat habitat (9% of the riparian woodrat habitat in the  
31 Plan Area). The area between existing levees that would be breached and the newly constructed  
32 setback levees would be inundated through seasonal flooding. The potentially inundated areas  
33 consist of moderate-value habitat for the species. Although the habitat consists of small patches and  
34 narrow bands of riparian vegetation and no riparian woodrats have detected in CZ 7, the riparian  
35 patches are in proximity to each other along the San Joaquin River and there are two species  
36 occurrences immediately south of CZ 7, one of which is less than 1 mile from the southernmost  
37 patch of riparian habitat potentially affected by levee construction. The restored floodplains would  
38 transition from areas that flood frequently (e.g., every 1 to 2 years) to areas that flood infrequently  
39 (e.g., every 10 years or more).

40 **NEPA Effects:** Alternative 4's period inundation of 203 acres of riparian habitat for riparian woodrat  
41 is Alternative 4 not expected to result in substantial adverse effects on riparian woodrat, either  
42 directly or through habitat modifications and would not result in a substantial reduction in numbers  
43 or a restriction in the range of riparian woodrat. The effects of periodic inundation on the riparian

1 woodrat would be minimized through construction and maintenance of flood refugia to allow  
2 riparian woodrats to escape inundation. Therefore, the periodic inundation of riparian woodrat  
3 habitat would not adversely affect the species under Alternative 4.

4 **CEQA Conclusion:** Floodplain restoration under CM5 would periodically affect a total of 203 acres of  
5 riparian habitat for riparian woodrat, representing 9% of the 2,166 acres of modeled riparian  
6 woodrat habitat in the study area. The impact of periodic inundation on the riparian woodrat would  
7 be minimized through construction and maintenance of flood refugia to allow riparian woodrats to  
8 escape inundation, as described in AMM25. Implementation of CM5 would not be expected to result  
9 in significant impacts on riparian woodrat, either directly or through habitat modifications, and  
10 would not result in a substantial reduction in numbers or a restriction in the range of riparian  
11 woodrats. Periodic inundation of riparian woodrat habitat under Alternative 4 would have a less-  
12 than-significant impact.

### 13 **Salt Marsh Harvest Mouse**

14 The habitat model used to assess effects for the salt marsh harvest mouse includes six habitat types:  
15 primary tidal marsh habitat, secondary tidal marsh habitat (low marsh), secondary upland habitat  
16 adjacent to tidal marsh habitat, primary habitat within managed wetlands, secondary habitat within  
17 managed wetlands (dominated by plants characteristic of low marsh), and upland habitats within  
18 managed wetland boundaries. The tidal and managed wetland habitats were discriminated  
19 recognizing that regardless of habitat value, managed wetlands are at high risk of catastrophic  
20 flooding and have lower long-term conservation value than tidal wetlands.

21 Construction and restoration associated with Alternative 4 conservation measures would result in  
22 effects on modeled salt marsh harvest mouse habitat, which would include permanent losses and  
23 habitat conversions (i.e., existing habitat converted to greater or lesser valued habitat for the species  
24 post-restoration) as indicated in Table 12-4-57. All of the effects on the species would take place  
25 over an extended period of time as tidal marsh is restored in the Plan Area. Full implementation of  
26 Alternative 4 would also include the following conservation actions over the term of the BDCP to  
27 benefit salt marsh harvest mouse (BDCP Chapter 3, *Conservation Strategy*).

- 28 ● Restore or create 6,000 acres of tidal brackish emergent wetland in CZ 11 to be consistent with  
29 the final Recovery Plan for Tidal Marsh Ecosystems of Northern and Central California  
30 (Objective TBEWNC1.1, associated with CM4).
- 31 ● Within the 6,000 acres of tidal brackish emergent wetland restored or created, distribute 1,500  
32 acres of middle and high marsh (primary salt marsh harvest mouse habitat) to contribute to  
33 total (existing and restored) acreage targets for each complex as specified in the final Recovery  
34 Plan for Tidal Marsh Ecosystems of Northern and Central California (Objective TBEWNC1.2,  
35 associated with CM4).
- 36 ● Limit perennial pepperweed to no more than 10% cover in the tidal brackish emergent wetland  
37 natural community within the reserve system (Objective TBEWNC2.1).
- 38 ● Protect and enhance at least 1,500 acres of managed wetland in Grizzly Island Marsh Complex  
39 for the benefit of salt marsh harvest mouse (Objective MWNC1.1, associated with CM3).
- 40 ● Protect or restore grasslands adjacent to restored tidal brackish emergent wetlands to provide  
41 at least 200 feet of adjacent grasslands beyond the sea level rise accommodation area (Objective  
42 GNC1.4, associated with CM3 and CM8).

- Provide viable habitat areas for salt marsh harvest mouse within the 1,500 acres of restored or created middle and high marsh as defined in the final Recovery Plan for Tidal Marsh Ecosystems of Northern and Central California (Objective SMHM1.1).
- Provide viable habitat areas for salt marsh harvest mouse within the 1,500 acres of managed wetland protected and enhanced in the Grizzly Island Marsh Complex as defined in the final Recovery Plan for Tidal Marsh Ecosystems of Northern and Central California, and increase population levels above the current baseline (Objective SMHM1.2).

As explained below, with the restoration and protection of these amounts of habitat, in addition to implementation of AMMs to minimize potential effects, impacts on the salt marsh harvest mouse would not be adverse for NEPA purposes and would be less than significant for CEQA purposes.

**Table 12-4-57. Changes in Salt Marsh Harvest Mouse Modeled Habitat Associated with Alternative 4 (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	(CM1 Outside of species range)	0	0	0	0	NA	NA
<b>Total Impacts CM1</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>		
CM2–CM18	<i>TBEW Primary</i>	64	67	0	0	0	0
	<i>TBEW Secondary</i>	0	0	0	0	0	0
	<i>Upland Secondary</i>	8	9	0	0	0	0
	<i>MW Wetland Primary</i>	1,913	5,323	0	0	0	0
	<i>MW Wetland Secondary</i>	315	807	0	0	0	0
	<i>MW Upland</i>	165	762	0	0	0	0
<b>Total Impacts CM2–CM18</b>		<b>2,465</b>	<b>6,968</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>TOTAL IMPACTS</b>		<b>2,645</b>	<b>6,968</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

<sup>a</sup> See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only. Yolo periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

TBEW = tidal brackish emergent wetland

NT = near-term

LLT = late long-term

NA = not applicable

1 **Impact BIO-158: Loss or Conversion of Habitat for and Direct Mortality of Salt Marsh Harvest**  
2 **Mouse**

3 BDCP tidal restoration (CM4) would be the only conservation measure resulting in effects on salt  
4 marsh harvest mouse habitat. Habitat enhancement and management activities (CM11), which  
5 include ground disturbance or removal of nonnative vegetation, could result in local adverse habitat  
6 effects. Each of these activities is described in detail below. A summary statement of the combined  
7 impacts and NEPA and CEQA conclusions follows the individual conservation measure discussions.

- 8 • *CM4 Tidal Natural Communities Restoration* would result in effects on 6,968 acres of salt marsh  
9 harvest mouse modeled habitat, which would include 5,376 acres of permanent losses and 1,592  
10 acres of habitat conversions. Salt marsh harvest mouse may be displaced temporarily from areas  
11 of converted habitat but these areas would ultimately provide suitable habitat for the species.  
12 However, 1,058 of these acres would be downgraded from primary habitat (67 acres of primary  
13 tidal brackish emergent wetland and 991 acres of primary managed wetland) to secondary tidal  
14 brackish emergent wetland. The hypothetical restoration footprints in Suisun Marsh overlap  
15 with 13 CNDDDB records for salt marsh harvest mouse (California Department of Fish and  
16 Wildlife 2013); however, the BDCP's conservation actions assume that all suitable habitat in  
17 Suisun Marsh is occupied by the species.
- 18 • *CM11 Natural Communities Enhancement and Management*: As described in the BDCP, the  
19 restoration of at least 1,500 acres of tidal brackish emergent wetland would be managed to  
20 provide viable habitat for salt marsh harvest mouse and the protection of 1,500 acres of  
21 managed wetland specifically to be managed for salt marsh harvest mouse. A variety of habitat  
22 management actions included in *CM11 Natural Communities Enhancement and Management* that  
23 are designed to enhance and manage these areas for salt marsh harvest mouse and may result in  
24 localized ground disturbances that could temporarily remove small amounts of salt marsh  
25 harvest mouse habitat. The restoration of tidal brackish emergent wetlands, the protection  
26 managed wetlands, and the protection and/or restoration of grasslands within 200 feet of  
27 restored salt marsh harvest mouse habitat would also have enhancement and management  
28 actions that would include invasive species control, nonnative wildlife control, and vegetation  
29 management. Ground-disturbing activities, such as removal of nonnative vegetation are  
30 expected to have minor effects on habitat and are expected to result in overall improvements to  
31 and maintenance of salt marsh harvest mouse habitat values over the term of the BDCP. These  
32 effects cannot be quantified, but are expected to be minimal and would be avoided and  
33 minimized by the AMMs listed below.
- 34 • *Injury and Direct Mortality*: The use of heavy equipment and handtools may result in injury or  
35 mortality to salt marsh harvest mouse during restoration, enhancement, and management  
36 activities. However, preconstruction surveys, construction monitoring, and other measures  
37 would be implemented to avoid and minimize injury or mortality of this species during these  
38 activities, as required by the AMM listed below.

39 The following paragraphs summarize the combined effects discussed above and describe other  
40 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA impact conclusions are  
41 also included.

42 ***Near-Term Timeframe***

43 The near-term BDCP conservation strategy has been evaluated to determine whether it would  
44 provide sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that

1 the effects of near-term covered activities would not be adverse under NEPA. The Plan would affect  
2 2,465 acres of salt marsh harvest mouse modeled habitat in the study area in the near-term. These  
3 effects include 1,517 acres of permanent loss and 948 acres of converted habitat. Most of the habitat  
4 converted would be from primary habitats (599 acres consisting of 64 acres of tidal brackish  
5 emergent wetland and 534 acres of managed wetland) to secondary tidal brackish emergent  
6 wetland.

7 The BDCP has committed to near-term goals of restoring 2,000 acres of tidal brackish emergent  
8 wetland, the protection and/or restoration of grasslands within 200 feet of restored tidal wetlands,  
9 and the protection and enhancement of 1,500 acres of managed wetlands for salt marsh harvest  
10 mouse. Though there would be a net loss of modeled habitat, nearly all of these losses (97%) are to  
11 managed wetlands, which according to the U.S. Fish and Wildlife Service are at high risk of  
12 catastrophic flooding (U.S. Fish and Wildlife Service 2010) and have lower long-term conservation  
13 value than tidal wetlands. The species-specific biological goals and objectives would inform the  
14 near-term protection and restoration efforts. These Plan goals represent performance standards for  
15 considering the effectiveness of restoration actions. The acres of protection and restoration  
16 contained in the near-term Plan goals would keep pace with the loss of habitat and effects on salt  
17 marsh harvest mouse.

18 Other factors relevant to effects on salt marsh harvest mouse are listed below.

- 19 ● Tidal restoration actions would not immediately displace salt marsh harvest mouse in managed  
20 wetlands, as noted in the specie's draft recovery plan, because the conversion of managed  
21 wetland to tidal marsh would be gradual. Tidal marsh restoration is often accomplished by  
22 breaching levees and converting diked nontidal marsh currently occupied by salt marsh harvest  
23 mouse populations to tidal wetlands, their historic condition. Conversion of these subsided  
24 areas requires sedimentation and accretion over time to restore marsh plains, resulting in a  
25 prolonged period (sometimes a decade or more) in which resident mice populations are  
26 displaced by uninhabitable aquatic areas (U.S. Fish and Wildlife Service 2010). Despite these  
27 temporary adverse effects, the draft recovery plan and Suisun Marsh Plan advocate strongly for  
28 restoration of tidal wetlands through the conversion of managed wetlands. These plans are  
29 based on the premise that managed wetlands are at high risk of loss of salt marsh harvest mouse  
30 habitat from a variety of factors, including flooding from levee failure and cessation of active  
31 management (which is often necessary to maintain habitat values in managed wetlands).  
32 Therefore, the temporary effects under Alternative 4 would be consistent with those deemed  
33 acceptable in the draft recovery plan for salt marsh harvest mouse and the Suisun Marsh Plan.
- 34 ● Restoration in Suisun Marsh would be carefully phased over time to offset adverse effects of  
35 restoration as it occurs. This phasing would ensure that temporal loss as a result of tidal natural  
36 communities restoration does not adversely affect the salt marsh harvest mouse population,  
37 ensure that short-term population loss is relatively small and incremental, and maintain local  
38 source populations to recolonize newly restored areas. The tidal restoration projects in Suisun  
39 Marsh would be implemented in 150-acre or greater patches that provide viable habitat areas  
40 for the salt marsh harvest mouse habitat consistent with the draft tidal marsh recovery plan  
41 (U.S. Fish and Wildlife Service 2010).
- 42 ● The salt marsh harvest mouse population would be monitored during the phasing process (see  
43 BDCP Chapter 3, Section 3.4.4.3.4.), and adaptive management would be applied to ensure  
44 maintenance of the population as described in the BDCP (BDCP Chapter 3, Section 3.4.4.4 and  
45 Section 3.6).

- The BDCP commits to manage reserve areas so that perennial pepperweed cover is no more than 10% in tidal brackish emergent wetlands (Objective TBEWNC2.1), which would benefit pickleweed production in the marsh. Salt marsh harvest mouse depends on pickleweed for forage and cover.

Because there would be no project-level effects on salt marsh harvest mouse resulting from CM1, the analysis of the effects of conservation actions does not include a comparison with standard ratios used for NEPA analyses.

The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2 Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and Countermeasure Plan*, and *AMM26 Salt Marsh Harvest Mouse and Suisun Shrew*. All of these AMMs include elements that avoid or minimize the risk of affecting habitats and species adjacent to work areas. The AMMs are described in detail in BDCP Appendix 3.C.

#### **Late Long-Term Timeframe**

The study area supports approximately 35,588 acres of salt marsh harvest mouse modeled habitat. Alternative 4 as a whole would result in effects on 6,968 acres of saltmarsh harvest mouse modeled habitat over the term of the Plan, which would include 5,376 acres of permanent losses and 1,592 acres of habitat conversions. This loss and conversion would affect 20% of the modeled habitat in the study area. Most of these effects (99%) would be on managed wetlands, which, though are known to be occupied by salt marsh harvest mouse, are at high risk of catastrophic flooding and have a lower long-term conservation value than tidal wetlands (U.S. Fish and Wildlife Service 2010). Effects on up to 20% of the species' habitat in the Plan Area may diminish the salt marsh harvest mouse population in the Plan Area and result in reduced genetic diversity, thereby putting the local population at risk of local extirpation due to random environmental fluctuations or catastrophic events. This effect is expected to be greatest if large amounts of habitat are removed at one time in Suisun Marsh and are not effectively restored for many years, and if there are no adjacent lands with salt marsh harvest mouse populations to recolonize restored areas.

The Plan includes a commitment to restore or create 6,000 acres of tidal brackish emergent wetland, 1,500 acres of which would target middle and high marsh habitat (primary habitat for salt marsh harvest mouse) (TBEWNC1.1, TBEWNC1.2, SMHM1.1, associated with CM4); the protection of 6,500 acres of managed wetlands, 1,500 acres of which would be specifically managed for salt marsh harvest mouse (SMHM1.2 and MWNC1.1, associated with CM3), and the protection and/or restoration of grassland adjacent to tidal restoration (areas within 200 feet of tidal restoration) to provide upland refugia for salt marsh harvest mouse (GNC1.4, associated with CM3 and CM8). Other factors relevant to effects on salt marsh harvest mouse include:

- Tidal restoration actions would not immediately displace salt marsh harvest mouse in managed wetlands as noted in the draft recovery plan for salt marsh harvest mouse because the conversion of managed wetland to tidal marsh would be gradual. Tidal marsh restoration is often accomplished by breaching levees and converting diked nontidal marsh currently occupied by salt marsh harvest mouse to tidal wetlands, their historic condition. Conversion of these subsided areas requires sedimentation and accretion over time to restore marsh plains, resulting in a prolonged period (sometimes a decade or more) in which resident mice populations are displaced by uninhabitable aquatic areas (U.S. Fish and Wildlife Service 2010). Despite these temporary adverse effects, the draft recovery plan and Suisun Marsh Plan

1 advocate strongly for restoration of tidal wetlands through the conversion of managed wetlands.  
2 These plans are based on the premise that managed wetlands are at high risk of loss of salt  
3 marsh harvest mouse habitat from a variety of factors, including flooding from levee failure and  
4 cessation of active management (which is often necessary to maintain habitat values in managed  
5 wetlands). Therefore, the temporary effects under BDCP are consistent with those deemed  
6 acceptable in the draft recovery plan for salt marsh harvest mouse and the Suisun Marsh Plan.

- 7 ● In order to ensure that temporal loss as a result of tidal natural communities restoration does  
8 not adversely affect the salt marsh harvest mouse population, restoration in Suisun Marsh  
9 would be carefully phased over time to offset adverse effects of restoration as it occurs, ensure  
10 that short-term population loss is relatively small and incremental, and maintain local source  
11 populations to recolonize newly restored areas. The tidal restoration projects in Suisun Marsh  
12 would be implemented in 150-acre or greater patches that provide viable habitat areas for the  
13 salt marsh harvest mouse habitat consistent with the draft tidal marsh recovery plan (U.S. Fish  
14 and Wildlife Service 2010).
- 15 ● The salt marsh harvest mouse population would be monitored during the phasing process (see  
16 BDCP Chapter 3, Section 3.4.4.3.4.), and adaptive management would be applied to ensure  
17 maintenance of the population as described in the BDCP (BDCP Chapter 3, Section 3.4.4.4 and  
18 Section 3.6).
- 19 ● The BDCP commits to manage reserve areas so that perennial pepperweed cover is no more  
20 than 10% in tidal brackish emergent wetlands (Objective TBEWNC2.1), which would benefit  
21 pickleweed production in the marsh. Salt marsh harvest mouse depends on pickleweed for  
22 forage and cover.
- 23 ● The habitat that would be restored and protected would consist of large blocks of contiguous  
24 tidal brackish emergent wetland that has a large proportion of pickleweed-dominated  
25 vegetation suitable for the species. This would provide greater habitat connectivity and greater  
26 habitat value, which is expected to accommodate larger populations and to therefore increase  
27 population resilience to random environmental events and climate change.

28 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6) estimates that the restoration  
29 and protection actions discussed above could result in the restoration of 6,046 acres and the  
30 protection of 1,550 acres of modeled habitat for salt marsh harvest mouse.

31 **NEPA Effects:** In the absence of other conservation actions, the effects on salt marsh harvest mouse  
32 habitat from Alternative 4 would represent an adverse effect as a result of habitat modification and  
33 potential direct mortality of a special-status species. However, the BDCP has committed to habitat  
34 protection, restoration, management, and enhancement associated with CM3, CM4, CM8, and CM11.  
35 This habitat protection, restoration, management, and enhancement would be guided by species-  
36 specific goals and objectives and by AMM1–AMM5 and AMM26, which would be in place during  
37 construction activity. Considering these commitments, losses and conversions of salt marsh harvest  
38 mouse habitat and potential mortality of individuals in the near-term and late long-term under  
39 Alternative 4 would not be an adverse effect.

#### 40 **CEQA Conclusion:**

#### 41 **Near-Term Timeframe**

42 The near-term BDCP conservation strategy has been evaluated to determine whether it would  
43 provide sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that

1 the effects of near-term covered activities would be less than significant under CEQA. The Plan  
2 would affect 2,465 acres of salt marsh harvest mouse modeled habitat in the study area in the near-  
3 term. These effects include 1,517 acres of permanent loss and 948 acres of converted habitat. Most  
4 of the habitat converted would be to primary habitats (599 acres consisting of 64 acres of tidal  
5 brackish emergent wetland and 534 acres of managed wetland) to secondary tidal brackish  
6 emergent wetland.

7 The BDCP has committed to near-term goals of restoring 2,000 acres of tidal brackish emergent  
8 wetland, the protection and/or restoration of grasslands within 200 feet of restored tidal wetlands,  
9 and the protection and enhancement of 1,500 acres of managed wetlands for salt marsh harvest  
10 mouse). Though there would be a net loss of modeled habitat, nearly all of these losses (97%) are to  
11 managed wetlands, which according to the U.S. Fish and Wildlife Service are at high risk of  
12 catastrophic flooding (U.S. Fish and Wildlife Service 2010) and have lower long-term conservation  
13 value than tidal wetlands. The species-specific biological goals and objectives would inform the  
14 near-term protection and restoration efforts. These Plan goals represent performance standards for  
15 considering the effectiveness of restoration actions. The acres of protection and restoration  
16 contained in the near-term Plan goals would keep pace with the loss of habitat and effects on salt  
17 marsh harvest mouse habitat.

18 Other factors relevant to effects on salt marsh harvest mouse are listed below.

- 19 ● Tidal restoration actions would not immediately displace salt marsh harvest mouse in managed  
20 wetlands as noted in the specie's draft recovery plan because the conversion of managed  
21 wetland to tidal marsh would be gradual. Tidal marsh restoration is often accomplished by  
22 breaching levees and converting diked nontidal marsh currently occupied by salt marsh harvest  
23 mouse populations to tidal wetlands, their historic condition. Conversion of these subsided  
24 areas requires sedimentation and accretion over time to restore marsh plains, resulting in a  
25 prolonged period (sometimes a decade or more) in which resident mice populations are  
26 displaced by uninhabitable aquatic areas (U.S. Fish and Wildlife Service 2010). Despite these  
27 temporary adverse effects, the draft recovery plan and Suisun Marsh Plan advocate strongly for  
28 restoration of tidal wetlands through the conversion of managed wetlands. These plans are  
29 based on the premise that managed wetlands are at high risk of loss of salt marsh harvest mouse  
30 habitat from a variety of factors, including flooding from levee failure and cessation of active  
31 management (which is often necessary to maintain habitat values in managed wetlands).  
32 Therefore, the temporary impacts under Alternative 4 would be consistent with those deemed  
33 acceptable in the draft recovery plan for salt marsh harvest mouse and the Suisun Marsh Plan.
- 34 ● To ensure that temporal loss as a result of tidal natural communities restoration does not  
35 adversely affect the salt marsh harvest mouse population, restoration in Suisun Marsh would be  
36 carefully phased over time to offset adverse effects of restoration as it occurs, ensure that short-  
37 term population loss is relatively small and incremental, and maintain local source populations  
38 to recolonize newly restored areas. The tidal restoration projects in Suisun Marsh would be  
39 implemented in 150-acre or greater patches that provide viable habitat areas for the salt marsh  
40 harvest mouse habitat consistent with the draft tidal marsh recovery plan (U.S. Fish and Wildlife  
41 Service 2010).
- 42 ● The salt marsh harvest mouse population would be monitored during the phasing process (see  
43 BDCP Chapter 3, Section 3.4.4.3.4.), and adaptive management would be applied to ensure  
44 maintenance of the population as described in the BDCP (BDCP Chapter 3, Section 3.4.4.4 and  
45 Section 3.6).

- The BDCP commits to manage reserve areas so that perennial pepperweed cover is no more than 10% in tidal brackish emergent wetlands (Objective TBEWNC2.1), which would benefit pickleweed production in the marsh. Salt marsh harvest mouse depends on pickleweed for forage and cover.

Because there would be no project-level impacts on salt marsh harvest mouse resulting from CM1, the analysis of the impacts of conservation actions does not include a comparison with standard ratios used for project-level CEQA analyses.

The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2 Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and Countermeasure Plan*, and *AMM26 Salt Marsh Harvest Mouse and Suisun Shrew*. All of these AMMs include elements that avoid or minimize the risk of affecting habitats and species adjacent to work areas. The AMMs are described in detail in BDCP Appendix 3.C.

These commitments are more than sufficient to support the conclusion that the near-term effects of Alternative 4 would be less than significant under CEQA.

#### **Late Long-Term Timeframe**

The study area supports approximately 35,588 acres of salt marsh harvest mouse modeled habitat. Alternative 4 as a whole would result in effects on 6,968 acres of saltmarsh harvest mouse modeled habitat over the term of the Plan, which would include 5,376 acres of permanent losses and 1,592 acres of habitat conversions. The Plan includes a commitment to restore or create 6,000 acres of tidal brackish emergent wetland, 1,500 acres of which would target middle and high marsh habitat (primary habitat for salt marsh harvest mouse) (Objectives TBEWNC1.1, TBEWNC1.2, SMHM1.1, associated with CM4); the protection of 6,500 acres of managed wetlands, 1,500 acres of which would be specifically managed for salt marsh harvest mouse (Objectives SMHM1.2 and MWNC1.1, associated with CM3), and the protection and/or restoration of grassland adjacent to tidal restoration (areas within 200 feet of tidal restoration) to provide upland refugia for salt marsh harvest mouse (Objective GNC1.4, associated with CM3 and CM8). Other factors relevant to effects on salt marsh harvest mouse include:

- Tidal restoration actions would not immediately displace salt marsh harvest mouse in managed wetlands as noted in the draft recovery plan for salt marsh harvest mouse because the conversion of managed wetland to tidal marsh would be gradual. Tidal marsh restoration is often accomplished by breaching levees and converting diked nontidal marsh currently occupied by salt marsh harvest mouse populations to tidal wetlands, their historic condition. Conversion of these subsided areas requires sedimentation and accretion over time to restore marsh plains, resulting in a prolonged period (sometimes a decade or more) in which resident mice populations are displaced by uninhabitable aquatic areas (U.S. Fish and Wildlife Service 2010). Despite these temporary adverse effects, the draft recovery plan and Suisun Marsh Plan advocate strongly for restoration of tidal wetlands through the conversion of managed wetlands. These plans are based on the premise that managed wetlands are at high risk of loss of salt marsh harvest mouse habitat from a variety of factors, including flooding from levee failure and cessation of active management (which is often necessary to maintain habitat values in managed wetlands). Therefore, the temporary effects under BDCP are consistent with those deemed acceptable in the draft recovery plan for salt marsh harvest mouse and the Suisun Marsh Plan.

- 1 • In order to ensure that temporal loss as a result of tidal natural communities restoration does  
2 not adversely affect the salt marsh harvest mouse population, restoration in Suisun Marsh  
3 would be carefully phased over time to offset adverse effects of restoration as it occurs, ensure  
4 that short-term population loss is relatively small and incremental, and maintain local source  
5 populations to recolonize newly restored areas. The tidal restoration projects in Suisun Marsh  
6 would be implemented in 150-acre or greater patches that provide viable habitat areas for the  
7 salt marsh harvest mouse habitat consistent with the draft tidal marsh recovery plan (U.S. Fish  
8 and Wildlife Service 2010).
- 9 • The salt marsh harvest mouse population would be monitored during the phasing process (see  
10 BDCP Chapter 3, Section 3.4.4.3.4.), and adaptive management would be applied to ensure  
11 maintenance of the population as described in the BDCP (BDCP Chapter 3, Section 3.4.4.4 and  
12 Section 3.6).
- 13 • The BDCP commits to manage reserve areas so that perennial pepperweed cover is no more  
14 than 10% in tidal brackish emergent wetlands (Objective TBEWNC2.1), which would benefit  
15 pickleweed production in the marsh. Salt marsh harvest mouse depends on pickleweed for  
16 forage and cover.
- 17 • The habitat that would be restored and protected would consist of large blocks of contiguous  
18 tidal brackish emergent wetland that has a large proportion of pickleweed-dominated  
19 vegetation suitable for the species. This would provide greater habitat connectivity and greater  
20 habitat value, which is expected to accommodate larger populations and to therefore increase  
21 population resilience to random environmental events and climate change.

22 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6) estimates that the restoration  
23 and protection actions discussed above could result in the restoration of 6,046 acres and the  
24 protection of 1,550 acres of modeled habitat for salt marsh harvest mouse.

25 Alternative 4 would result in substantial modifications to salt marsh harvest mouse habitat in the  
26 absence of other conservation actions. However, with habitat protection, restoration, management,  
27 and enhancement associated with CM3, CM4, CM8, and CM11, guided by species-specific goals and  
28 objectives and by AMM1–AMM5 and AMM26, which would be in place throughout the construction  
29 period, Alternative 4 over the term of the BDCP would not result in a substantial adverse effect  
30 through habitat modifications and would not substantially reduce the number or restrict the range  
31 of the species. Therefore, the alternative would have a less-than-significant impact on salt marsh  
32 harvest mouse.

### 33 **Impact BIO-159: Indirect Effects of Plan Implementation on Salt Marsh Harvest Mouse**

34 Construction/disturbance activities associated tidal restoration (CM4), grassland restoration (CM8),  
35 and management and enhancement activities (CM11) could result in temporary noise and visual  
36 disturbances to salt marsh harvest mouse occurring within 100 feet of these areas over the term of  
37 the BDCP. These potential effects would be minimized or avoided through AMM1–AMM5, and  
38 AMM26, which would be in effect throughout the term of the Plan.

39 The use of mechanical equipment during the implementation of the conservation measures could  
40 cause the accidental release of petroleum or other contaminants that could affect salt marsh harvest  
41 mouse and its habitat. The inadvertent discharge of sediment could also have a negative effect on  
42 the species and its habitat. AMM1–AMM5 would minimize the likelihood of such spills and would

1 ensure measures are in place to prevent runoff from the construction area and potential effects of  
2 sediment on salt marsh harvest mouse.

3 Tidal marsh restoration has the potential to increase salt marsh harvest mouse's exposure to  
4 mercury. Mercury is transformed into the more bioavailable form of methylmercury under  
5 anaerobic conditions, which in the environment typically occurs in sediments subjected to regular  
6 wetting and drying such as tidal marshes and flood plains. Thus, BDCP restoration activities that  
7 create newly inundated areas could increase bioavailability of mercury. In general, the highest  
8 methylation rates are associated with high tidal marshes that experience intermittent wetting and  
9 drying and associated anoxic conditions (Alpers et al. 2008). High tidal marsh is considered to be  
10 primary habitat for salt marsh harvest mouse and thus the species could be exposed to methyl  
11 mercury in tidal restoration areas. Salt marsh harvest mouse may be exposed to elemental mercury  
12 by feeding on pickleweed, which is found concentrated in the distal tips of pickleweed leaves (Yee et  
13 al., 2008). Though elemental mercury is less bioavailable than methylmercury, studies have shown  
14 that mercury can become methylated in the anaerobic portions of the intestinal tract (Rudd et al.  
15 1980, Rieder et al. 2013) and could thus become a pathway for salt marsh harvest exposure to  
16 methylmercury. A study of small mammals residing in pickleweed around the San Francisco Bay  
17 showed an absence of salt marsh harvest mouse where mercury concentrations measured in house  
18 mice (*Mus musculus*) livers were  $\geq 0.19 \mu\text{g/g}$  (dry weight) (Clark et al. 1992). Clark et al (1992) also  
19 report that the lack of salt marsh harvest mouse at these locations are not the result of undetected  
20 habitat differences or are by chance. Clarke et al (1992) suggest that the absence of salt marsh  
21 harvest mouse at certain locations may be associated with higher amounts of mercury and  
22 polychlorinated biphenyls (PCBs); however, because their study didn't analyze contaminants in salt  
23 marsh harvest mouse and because (at that time) there was no data in the literature on contaminants  
24 in harvest mice, they could not make conclusions on these associations. Currently, it is unknown  
25 what the exact exposure pathways are or what tissue concentrations are harmful to the salt marsh  
26 harvest mouse.

27 The Suisun Marsh Plan (Bureau of Reclamation et al. 2010) anticipates that tidal wetlands restored  
28 under the plan would generate less methylmercury than the existing managed wetlands. The  
29 potential for salt marsh harvest mouse exposure to methyl mercury in Suisun Marsh may decrease  
30 in the long term because the creation of tidal brackish emergent wetland would predominantly  
31 result from the conversion of managed wetlands. *CM12 Methylmercury Management* includes  
32 provisions for project-specific Mercury Management Plans. Along with avoidance and minimization  
33 measures and adaptive management and monitoring, CM12 could reduce the effects of  
34 methylmercury on salt marsh harvest mouse resulting from BDCP tidal restoration.

35 **NEPA Effects:** Implementation of the AMMs listed above as part of implementing BDCP Alternative 4  
36 would avoid and minimize indirect effects on salt marsh harvest mouse. These AMMs would also  
37 avoid and minimize effects that could substantially reduce the number of salt marsh harvest mouse,  
38 or restrict the species' range. Therefore, the indirect effects of Alternative 4 would not have an  
39 adverse effect on salt marsh harvest mouse.

40 **CEQA Conclusion:** Indirect effects from construction-related noise and visual disturbances could  
41 impact salt marsh harvest mouse within 100 feet of these disturbances. The use of mechanical  
42 equipment during construction could cause the accidental release of petroleum or other  
43 contaminants that could impact salt marsh harvest mouse and its habitat. The inadvertent discharge  
44 of sediment adjacent to salt marsh harvest mouse habitat could also impact the species. With  
45 implementation of AMM1-AMM5 and AMM26 as part of Alternative 4 construction, operation and

1 maintenance, the BDCP would avoid the potential for substantial adverse effects on salt marsh  
2 harvest mouse, either indirectly or through habitat modifications, in that the BDCP would not result  
3 in a substantial reduction in numbers or a restriction in the range of salt marsh harvest mouse. The  
4 indirect effects of BDCP Alternative 4 would have a less-than-significant impact on salt marsh  
5 harvest mouse.

6 Salt marsh harvest mouse could experience indirect effects from increased exposure to  
7 methylmercury as a result of tidal habitat restoration (CM4). With implementation of CM12, the  
8 potential indirect effects of methylmercury would not result in a substantial reduction in numbers  
9 or a restriction in the range of salt marsh harvest mouse, and, therefore, would have a less-than-  
10 significant impact on the species.

### 11 **Suisun Shrew**

12 This section describes the effects of Alternative 4, including water conveyance facilities construction  
13 and implementation of other conservation components, on the Suisun shrew. Primary Suisun shrew  
14 habitat consists of all *Salicornia*-dominated natural seasonal wetlands and certain *Scirpus* and *Typha*  
15 communities found within Suisun Marsh only. Low marsh dominated by *Schoenoplectus acutus* and  
16 *S. californicus* and upland transitional zones within 150 feet of the tidal wetland edge were classified  
17 separately as secondary habitat because they are used seasonally (Hays and Lidicker 2000). All  
18 managed wetlands were excluded from the habitat model.

19 Construction and restoration associated with Alternative 4 conservation measures would result in  
20 effects on modeled Suisun shrew habitat, which would include permanent losses and habitat  
21 conversions (i.e., existing habitat converted to greater or lesser valued habitat for the species post-  
22 restoration) as indicated in Table 12-4-58. All of the effects on the species would take place over an  
23 extended period of time as tidal marsh is restored in the Plan Area. Full implementation of  
24 Alternative 4 would also include the following conservation actions over the term of the BDCP to  
25 benefit Suisun shrew (BDCP Chapter 3, *Conservation Strategy*).

- 26 ● Restore or create 6,000 acres of tidal brackish emergent wetland in CZ 11 to be consistent with  
27 the final Recovery Plan for Tidal Marsh Ecosystems of Northern and Central California  
28 (TBEWNC1.1, associated with CM4)
- 29 ● Within the 6,000 acres of tidal brackish emergent wetland restored or created, distribute 1,500  
30 acres of middle and high marsh (primary Suisun shrew habitat) to contribute to total (existing  
31 and restored) acreage targets for each complex as specified in the final Recovery Plan for Tidal  
32 Marsh Ecosystems of Northern and Central California (TBEWNC1.2, associated with CM4).
- 33 ● Limit perennial pepperweed to no more than 10% cover in the tidal brackish emergent wetland  
34 natural community within the reserve system (TBEWNC2.1).
- 35 ● Protect or restore grasslands adjacent to restored tidal brackish emergent wetlands to provide at  
36 least 200 feet of adjacent grasslands beyond the sea level rise accommodation area, which  
37 provides refugia during high tides (GNC1.4, associated with CM3 and CM8).

38 As explained below, with the restoration and protection of these amounts of habitat, impacts on the  
39 Suisun shrew would not be adverse for NEPA purposes and would be less than significant for CEQA  
40 purposes under Alternative 4.

1 **Table 12-4-58. Changes in Suisun Shrew Modeled Habitat Associated with Alternative 4 (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	(CM1 Outside of species range)	0	0	0	0	NA	NA
<b>Total Impacts CM1</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>		
CM2–CM18	Primary	58	60	0	0	0	0
	Secondary	47	342	0	0	0	0
<b>Total Impacts CM2–CM18</b>		<b>105</b>	<b>401</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>TOTAL IMPACTS</b>		<b>105</b>	<b>401</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

<sup>a</sup> See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only.

NT = near-term

LLT = late long-term

NA = not applicable

2

3 **Impact BIO-160: Loss or Conversion of Habitat for and Direct Mortality of Suisun Shrew**

4 BDCP tidal restoration (CM4) would be the only conservation measure resulting in loss of habitat to  
5 Suisun shrew. Habitat enhancement and management activities (CM11), which include ground  
6 disturbance or removal of nonnative vegetation, could result in local adverse habitat effects. Each of  
7 these activities is described in detail below. A summary statement of the combined impacts and  
8 NEPA and CEQA conclusions follows the individual conservation measure discussions.

- 9 • *CM4 Tidal Natural Communities Restoration* would result in effects on 401 acres of Suisun shrew  
10 modeled habitat, which would include 377 acres of permanent losses and 24 acres of habitat  
11 conversions. Suisun shrew may be displaced temporarily from areas of converted habitat but  
12 would ultimately provide suitable habitat for the species. However, all 24 acres would be  
13 converted from secondary to primary habitat and therefore over would be a net benefit to the  
14 species. The hypothetical restoration footprints overlap with two CNDDDB records for Suisun  
15 shrew (California Department of Fish and Wildlife 2013).
- 16 • *CM11 Natural Communities Enhancement and Management*: As described in the BDCP, the  
17 restoration of at least 6,000 acres of tidal brackish emergent wetland would be managed to  
18 provide habitat for covered species, including Suisun shrew. A variety of habitat management  
19 actions included in *CM11 Natural Communities Enhancement and Management* that are designed  
20 to enhance and manage these areas may result in localized ground disturbances that could  
21 temporarily remove small amounts of Suisun shrew habitat. The areas of grasslands that would  
22 be protected and/or restored within 200 feet of restored tidal marsh would also have

1 enhancement and management actions that would include invasive species control, nonnative  
2 wildlife control, and vegetation management. Ground-disturbing activities, such as removal of  
3 nonnative vegetation are expected to have minor effects on habitat and are expected to result in  
4 overall improvements to and maintenance of Suisun shrew habitat values over the term of the  
5 BDCP. These effects cannot be quantified, but are expected to be minimal and would be avoided  
6 and minimized by the AMMs listed below.

- 7 • Injury and Direct Mortality: The use of heavy equipment and handtools may result in injury or  
8 mortality to Suisun shrew during restoration, enhancement, and management activities.  
9 However, preconstruction surveys, construction monitoring, and other measures would be  
10 implemented to avoid and minimize injury or mortality of this species during these activities, as  
11 required by the AMM listed below.

12 The following paragraphs summarize the combined effects discussed above and describe other  
13 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA impact conclusions are  
14 also included.

### 15 ***Near-Term Timeframe***

16 The near-term BDCP conservation strategy has been evaluated to determine whether it would  
17 provide sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that  
18 the effects of near-term covered activities would not be adverse under NEPA. The Plan would affect  
19 105 acres of Suisun shrew modeled habitat in the study area in the near-term. These effects include  
20 90 acres of permanent loss and 15 acres of converted habitat, which is all secondary habitat being  
21 converted to primary habitat.

22 The BDCP has committed to near-term goals of restoring 2,000 acres of tidal brackish emergent  
23 wetland and the protection and/or restoration of grasslands within 200 feet of restored tidal  
24 wetlands, of which approximately 150 feet of this area would benefit the species. These Plan goals  
25 represent performance standards for considering the effectiveness of restoration actions. The acres  
26 of tidal restoration and the commitment to protection of adjacent uplands contained in the near-  
27 term Plan goals would keep pace with the loss of habitat and effects on Suisun shrew.

28 Other factors relevant to effects on Suisun shrew are listed here.

- 29 • Restoration would be sequenced and oriented in a manner that minimizes any temporary, initial  
30 loss of habitat and habitat fragmentation.
- 31 • The habitat that would be restored and protected would consist of large blocks of contiguous  
32 tidal brackish emergent wetland that has a large proportion of pickleweed-dominated  
33 vegetation suitable for the species. This would provide greater habitat connectivity and greater  
34 habitat value and quantity, with is expected to accommodate larger populations and to therefore  
35 increase population resilience to random environmental events and climate change.
- 36 • The amount of tidal habitat restored in the near-term (2,000 acres) would greatly exceed the  
37 amount permanently lost (105 acres).

38 Because there would be no project-level effects on Suisun shrew resulting from CM1, the analysis of  
39 the effects of conservation actions does not include a comparison with standard ratios used for  
40 project-level NEPA analyses.

1 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*  
2 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*  
3 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
4 *Countermeasure Plan, and AMM26 Salt Marsh Harvest Mouse and Suisun Shrew*. All of these AMMs  
5 include elements that avoid or minimize the risk of affecting habitats and species adjacent to work  
6 areas. The AMMs are described in detail in BDCP Appendix 3.C.

### 7 **Late Long-Term Timeframe**

8 The study area supports approximately 7,515 acres of Suisun shrew modeled habitat. Alternative 4  
9 as a whole would result in effects on 401 acres of Suisun shrew modeled habitat over the term of the  
10 Plan, which would include 377 acres of permanent losses and 24 acres of habitat conversions  
11 (roughly 5% of the habitat in the study area).

12 The Plan contains a commitment to restore or create 6,000 acres of tidal brackish emergent  
13 wetland, 1,500 acres of which would target middle and high marsh habitat (primary habitat for  
14 Suisun shrew) (Objectives TBEWNC1.1, TBEWNC1.2, SMHM1.1, associated with CM4) and the  
15 protection and/or restoration of grassland adjacent to tidal restoration (areas within 200 feet of  
16 tidal restoration, of which approximately 150 feet would likely benefit the species) to provide  
17 upland refugia for Suisun shrew (Objective GNC1.4, associated with CM3 and CM8). Other factors  
18 relevant to effects on Suisun shrew include:

- 19 ● Restoration would be sequenced and oriented in a manner that minimizes any temporary, initial  
20 loss of habitat and habitat fragmentation.
- 21 ● The habitat that would be restored and protected would consist of large blocks of contiguous  
22 tidal brackish emergent wetland that has a large proportion of pickleweed-dominated  
23 vegetation suitable for the species. This would provide greater habitat connectivity and greater  
24 habitat value and quantity, with is expected to accommodate larger populations and to therefore  
25 increase population resilience to random environmental events and climate change.
- 26 ● The amount of tidal habitat restored (6,000 acres) greatly exceeds the amount permanently lost  
27 and converted (401 acres).

28 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6) estimates that the restoration  
29 and protection actions discussed above could result in the restoration of 6,006 acres and the  
30 protection of 232 acres of modeled habitat for Suisun shrew.

31 **NEPA Effects:** In the absence of other conservation actions, the effects on Suisun shrew habitat from  
32 Alternative 4 would represent an adverse effect as a result of habitat modification and potential  
33 direct mortality of a special-status species. However, the BDCP has committed to habitat protection,  
34 restoration, management, and enhancement with CM3, CM4, CM8, and CM11. This habitat  
35 protection, restoration, management, and enhancement would be guided by species-specific goals  
36 and objectives and by AMM1–AMM5 and AMM26, which would be in place throughout the  
37 construction period. Considering these commitments, losses and conversions of Suisun shrew  
38 habitat and potential mortality of individuals under Alternative 4 would not be an adverse effect.

1 **CEQA Conclusion:**

2 **Near-Term Timeframe**

3 The near-term BDCP conservation strategy has been evaluated to determine whether it would  
4 provide sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that  
5 the effects of near-term covered activities would be less than significant under CEQA. The Plan  
6 would affect 105 acres of Suisun shrew modeled habitat in the study area in the near-term. These  
7 effects include 90 acres of permanent loss and 15 acres of converted habitat, which is all secondary  
8 habitat being converted to primary habitat.

9 The BDCP has committed to near-term goals of restoring 2,000 acres of tidal brackish emergent  
10 wetland and the protection and/or restoration of grasslands within 200 feet of restored tidal  
11 wetlands, of which approximately 150 feet would likely benefit the species. These Plan goals  
12 represent performance standards for considering the effectiveness of restoration actions. The acres  
13 of tidal restoration and the commitment to protection of adjacent uplands contained in the near-  
14 term Plan goals would keep pace with the loss of habitat and effects on Suisun shrew.

15 Other factors relevant to impacts on Suisun shrew are listed below.

- 16 ● Restoration would be sequenced and oriented in a manner that minimizes any temporary, initial  
17 loss of habitat and habitat fragmentation.
- 18 ● The habitat that would be restored and protected would consist of large blocks of contiguous  
19 tidal brackish emergent wetland that has a large proportion of pickleweed-dominated  
20 vegetation suitable for the species. This would provide greater habitat connectivity and greater  
21 habitat value and quantity, with is expected to accommodate larger populations and to therefore  
22 increase population resilience to random environmental events and climate change.
- 23 ● The amount of tidal habitat restored in the near term (2,000 acres) would greatly exceed the  
24 amount permanently lost (105 acres).

25 Because there would be no project-level impacts on Suisun shrew resulting from CM1, the analysis  
26 of the impacts of conservation actions does not include a comparison with standard ratios used for  
27 project-level CEQA analyses.

28 The Plan also includes commitments to implement AMM1–AMM5 and AMM26. All of these AMMs  
29 include elements that avoid or minimize the risk of affecting habitats and species adjacent to work  
30 areas. The AMMs are described in detail in BDCP Appendix 3.C.

31 These commitments are more than sufficient to support the conclusion that the near-term effects of  
32 Alternative 4 would be less than significant under CEQA.

33 **Late Long-Term Timeframe**

34 The study area supports approximately 7,515 acres of Suisun shrew modeled habitat. Alternative 4  
35 as a whole would result in effects on 401 acres of Suisun shrew modeled habitat over the term of the  
36 Plan, which would include 377 acres of permanent losses and 24 acres of habitat conversions  
37 (roughly 5% of the habitat in the study area). The Plan contains a commitment to restore or create  
38 6,000 acres of tidal brackish emergent wetland, 1,500 acres of which would target middle and high  
39 marsh habitat (primary habitat for Suisun shrew) (Objective TBEWNC1.1, TBEWNC1.2, SMHM1.1,  
40 associated with CM4) and the protection and/or restoration of grassland adjacent to tidal  
41 restoration (areas within 200 feet of tidal restoration, of which approximately 150 feet would likely

1 benefit the species) to provide upland refugia for Suisun shrew (Objective GNC1.4, associated with  
2 CM3 and CM8). Other factors relevant to effects on Suisun shrew include:

- 3 • Restoration would be sequenced and oriented in a manner that minimizes any temporary, initial  
4 loss of habitat and habitat fragmentation.
- 5 • The habitat that would be restored and protected would consist of large blocks of contiguous  
6 tidal brackish emergent wetland that has a large proportion of pickleweed-dominated  
7 vegetation suitable for the species. This would provide greater habitat connectivity and greater  
8 habitat value and quantity, with is expected to accommodate larger populations and to therefore  
9 increase population resilience to random environmental events and climate change.
- 10 • The amount of tidal habitat restored (6,000 acres) greatly exceeds the amount permanently lost  
11 and converted (401 acres).

12 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6) estimates that the restoration  
13 and protection actions discussed above could result in the restoration of 6,006 acres and the  
14 protection of 232 acres of modeled habitat for Suisun shrew.

15 Alternative 4 would result in substantial modifications to Suisun shrew habitat in the absence of  
16 other conservation actions. However, with habitat protection, restoration, management, and  
17 enhancement associated with CM3, CM4, CM8, and CM11, guided by species-specific goals and  
18 objectives and by AMM1–AMM5 and AMM26, which would be in place throughout the construction  
19 period, Alternative 4 over the term of the BDCP would not result in a substantial adverse effect  
20 through habitat modifications and would not substantially reduce the number or restrict the range  
21 of the species. Therefore, the alternative would have a less-than-significant impact on Suisun shrew.

### 22 **Impact BIO-161: Indirect Effects of Plan Implementation on Suisun Shrew**

23 Construction/disturbance activities associated tidal restoration (CM4), grassland restoration (CM8),  
24 and management and enhancement activities (CM11) could result in temporary noise and visual  
25 disturbances to Suisun shrew occurring within 100 feet of these areas over the term of the BDCP.  
26 These potential effects would be minimized or avoided through AMM1–AMM5, and AMM26, which  
27 would be in effect throughout the term of the Plan.

28 The use of mechanical equipment during the implementation of the conservation measures could  
29 cause the accidental release of petroleum or other contaminants that could affect Suisun shrew and  
30 its habitat. The inadvertent discharge of sediment could also have a negative effect on the species  
31 and its habitat. AMM1–AMM5 would minimize the likelihood of such spills and would ensure  
32 measures are in place to prevent runoff from the construction area and potential effects of sediment  
33 on Suisun shrew.

34 Tidal marsh restoration has the potential to increase Suisun shrew's exposure to mercury. Mercury  
35 is transformed into the more bioavailable form of methylmercury under anaerobic conditions,  
36 which in the environment typically occurs in sediments subjected to regular wetting and drying  
37 such as tidal marshes and flood plains. Thus, BDCP restoration activities that create newly  
38 inundated areas could increase bioavailability of mercury. In general, the highest methylation rates  
39 are associated with high tidal marshes that experience intermittent wetting and drying and  
40 associated anoxic conditions (Alpers et al. 2008). High and mid tidal marsh is considered to be  
41 primary habitat for Suisun shrew and thus the species could be exposed to methylmercury in tidal  
42 restoration areas. Suisun shrew could be exposed to methylmercury by feeding on marsh

1 invertebrates that may bioaccumulate methylmercury from marsh sediments. Toxic concentrations  
2 of methylmercury have been found in the kidneys of shrews that inhabit contaminated sites and  
3 forage on earthworms and other prey that live within contaminated sediments (Talmage and  
4 Walton 1993; Hinton and Veiga 2002).

5 The Suisun Marsh Plan (Bureau of Reclamation et al. 2010) anticipates that tidal wetlands restored  
6 under the plan would generate less methylmercury than the existing managed wetlands. The  
7 potential for Suisun shrew exposure to methyl mercury in Suisun Marsh may decrease in the long  
8 term because the creation of tidal brackish emergent wetland would predominantly result from the  
9 conversion of managed wetlands. *CM12 Methylmercury Management* includes provisions for project-  
10 specific Mercury Management Plans. Along with avoidance and minimization measures and adaptive  
11 management and monitoring, CM12 could reduce the effects of methylmercury on Suisun shrew  
12 resulting from BDCP tidal restoration.

13 **NEPA Effects:** Implementation of the AMMs listed above as part of implementing Alternative 4  
14 would avoid and minimize the potential for substantial adverse effects on Suisun shrew, either  
15 indirectly or through habitat modifications. These AMMs would also avoid and minimize effects that  
16 could substantially reduce the number of Suisun shrew, or restrict the species' range. Therefore, the  
17 indirect effects of Alternative 4 would not have an adverse effect on Suisun shrew.

18 **CEQA Conclusion:** Indirect effects from construction-related noise and visual disturbances could  
19 impact Suisun shrew within 100 feet of these disturbances. The use of mechanical equipment during  
20 construction could cause the accidental release of petroleum or other contaminants that could  
21 impact Suisun shrew and its habitat. The inadvertent discharge of sediment adjacent to Suisun  
22 shrew habitat could also impact the species. With implementation of AMM1-AMM5, and AMM26 as  
23 part of Alternative 4 construction, operation and maintenance, the BDCP would avoid the potential  
24 for substantial adverse effects on Suisun shrew, either indirectly or through habitat modifications, in  
25 that the BDCP would not result in a substantial reduction in numbers or a restriction in the range of  
26 Suisun shrew. The indirect effects of BDCP Alternative 4 would have a less-than-significant impact  
27 on Suisun shrew.

28 Suisun shrew could experience indirect effects from increased exposure to methylmercury as a  
29 result of tidal habitat restoration (CM4). With implementation of CM12, the potential indirect effects  
30 of methylmercury would not result in a substantial reduction in numbers or a restriction in the  
31 range of Suisun shrew, and, therefore, would have a less-than significant impact on the species.

### 32 **San Joaquin Kit Fox and American Badger**

33 Within the study area, the modeled habitat for the San Joaquin kit fox and potential habitat for the  
34 American badger is restricted to 5,327 acres of grassland habitat west of Clifton Court Forebay along  
35 the study area's southwestern edge, in CZ 7-CZ 10. The study area represents the extreme  
36 northeastern corner of the species' range in California, which extends westward and southward  
37 from the study area border. The northern range of the San Joaquin kit fox (including the study area)  
38 was most likely marginal habitat historically and has been further degraded due to development  
39 pressures, habitat loss, and fragmentation (Clark et al. 2007). CNDDDB ((California Department of  
40 Fish and Wildlife 2013) reports twelve occurrences of San Joaquin kit foxes along the extreme  
41 western edge of the Plan Area within CZ 8, south of Brentwood (Figure 12-49). However, Clark et al.  
42 (2007) provide evidence that a number of CNDDDB occurrences in the northern portion of the  
43 species' range may be coyote pups misidentified as San Joaquin kit foxes. Smith et al. (2006) suggest  
44 that the northern range may possibly be a population sink for the San Joaquin kit fox.

1 Construction and restoration associated with Alternative 4 conservation measures would result in  
2 both temporary and permanent losses of San Joaquin kit and American badger habitat (Table 12-4-  
3 59). Grassland restoration, and protection and management of natural communities could affect  
4 modeled San Joaquin San Joaquin kit fox habitat and potential American badger habitat. Full  
5 implementation of Alternative 4 would also include biological objectives over the term of the BDCP  
6 to benefit the San Joaquin kit fox which would also benefit American badger which uses similar  
7 habitat (BDCP Chapter 3, *Conservation Strategy*). The conservation strategy for the San Joaquin kit  
8 fox involves protecting and enhancing habitat in the northern extent of the species' range to  
9 increase the likelihood that San Joaquin kit fox may reside and breed in the Plan Area; and providing  
10 connectivity to habitat outside the Plan Area. The conservation measures that would be  
11 implemented to achieve the biological goals and objectives are summarized below.

- 12 • Protect and improve habitat linkages that allow terrestrial covered and other native species to  
13 move between protected habitats within and adjacent to the Plan Area (Objective L3.1,  
14 associated with CM3–CM8, and CM11).
- 15 • Protect 150 acres of alkali seasonal wetland in CZ 1, CZ 8, and/or CZ 11 among a mosaic of  
16 protected grasslands and vernal pool complex (Objective ASWNC1.1, associated with CM3).
- 17 • Restore or create alkali seasonal wetlands in CZ 1, CZ 8, and/or CZ 11 (up to 72 acres of alkali  
18 seasonal wetland complex restoration) (Objective ASWNC1.2, associated with CM3 and CM9).
- 19 • Protect 600 acres of existing vernal pool complex in CZ 1, CZ 8, and/or CZ 11, primarily in core  
20 vernal pool recovery areas identified in the Recovery Plan for Vernal Pool Ecosystems of  
21 California and Southern Oregon (U.S. Fish and Wildlife Service 2005) (Objective VPNC1.1,  
22 associated with CM3).
- 23 • Restore vernal pool complex CZ 1, CZ 8, and/or CZ 11 to achieve no net loss of vernal pool  
24 acreage (up to 67 acres of vernal pool complex restoration) (Objective VPNC1.2, associated with  
25 CM3 and CM9).
- 26 • Protect 8,000 acres of grassland (Objective GNC1.1, associated with CM3).
- 27 • Restore 2,000 acres of grasslands to connect fragmented patches of protected grassland  
28 (Objective GNC1.2, associated with CM3 and CM8).
- 29 • Increase burrow availability for burrow-dependent species in grasslands surrounding alkali  
30 seasonal wetlands within restored and protected alkali seasonal wetland complex (Objective  
31 ASWNC2.3, associated with CM11).
- 32 • Increase prey, especially small mammals and insects, for grassland-foraging species in  
33 grasslands surrounding alkali seasonal wetlands within restored and protected alkali seasonal  
34 wetland complex (Objective ASWNC2.4, associated with CM11).
- 35 • Increase burrow availability for burrow-dependent species in grasslands surrounding vernal  
36 pools within restored and protected vernal pool complex (Objective VPNC2.4, associated with  
37 CM11).
- 38 • Increase prey, especially small mammals and insects, for grassland-foraging species in  
39 grasslands surrounding vernal pools within restored and protected vernal pool complex  
40 (Objective VPNC2.5, associated with CM11).
- 41 • Increase burrow availability for burrow-dependent species (Objective GNC2.3, associated with  
42 CM11).

- 1 • Increase prey abundance and accessibility, especially small mammals and insects, for grassland-  
2 foraging species (Objective GNC2.4, associated with CM11).

3 As explained below, with the restoration and protection of these amounts of habitat, in addition to  
4 the AMMs to reduce potential effects, impacts on San Joaquin kit fox and American badger would not  
5 be adverse for NEPA purposes and would be less than significant for CEQA purposes.

6 **Table 12-4-59. Changes in San Joaquin Kit Fox Modeled Habitat Associated with Alternative 4**  
7 **(acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT	NT	LLT	CM2	CM5
CM1	Grassland	207	207	103	103	NA	NA
<b>Total Impacts CM1</b>		<b>207</b>	<b>207</b>	<b>103</b>	<b>103</b>	<b>NA</b>	<b>NA</b>
CM2-CM18	Grassland	3	8	0	0	0	0
<b>Total Impacts CM2-CM18</b>		<b>3</b>	<b>8</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>TOTAL IMPACTS</b>		<b>210</b>	<b>215</b>	<b>103</b>	<b>103</b>	<b>0</b>	<b>0</b>

<sup>a</sup> See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only.

NT = near-term

LLT = late long-term

NA = not applicable

8

9 **Impact BIO-162: Loss or Conversion of Habitat for and Direct Mortality of San Joaquin Kit Fox**  
10 **and American Badger**

11 Alternative 4 conservation measures would result in the permanent and temporary loss combined  
12 of 318 acres of modeled habitat for the San Joaquin kit fox (Table 12-4-59). Because American  
13 badger uses grasslands for denning and foraging and shares the same geographic locations as the  
14 San Joaquin kit fox, effects are anticipated to be the same as those described for San Joaquin kit fox.  
15 There are 3 San Joaquin kit fox and no American badger occurrences that overlap with the Plan  
16 footprint. Construction of Alternative 4 water conveyance facilities (CM1) and recreation facilities  
17 (CM11) would remove habitat. Habitat enhancement and management activities (CM11) could  
18 result in local adverse effects on species. In addition, construction vehicle activity could cause injury  
19 or mortality of San Joaquin kit foxes and badgers. Each of these individual activities is described  
20 below. A summary statement of the combined impacts and NEPA effects and a CEQA conclusion  
21 follow the individual conservation measure discussions.

- 22 • *CM1 Water Facilities and Operation*: Construction of the conveyance facilities would result in the  
23 permanent loss of approximately 207 acres and the temporary loss of 103 acres of modeled San  
24 Joaquin kit fox and American badger habitat. This habitat is located in areas of naturalized

1 grassland in a highly disturbed or modified setting on lands immediately adjacent to Clifton  
2 Court Forebay, in CZ 8.

- 3 • *CM11 Natural Communities Enhancement and Management*: The creation of recreational trails  
4 and recreational staging areas would result in the permanent removal of 8 acres of San Joaquin  
5 kit fox modeled habitat. *AMM24 San Joaquin Kit Fox*, would be implemented to ensure that San  
6 Joaquin kit fox dens are avoided, as described in BDCP Appendix 3.C, *Avoidance and*  
7 *Minimization Measures*. Passive recreation in the reserve system could result in disturbance of  
8 San Joaquin kit foxes at their den site. Natal and pupping dens would be particularly vulnerable  
9 to human disturbance. Additionally, disease could be transmitted from domestic dogs that enter  
10 the reserve system with recreational users. However, *AMM37 Recreation* would prohibit  
11 construction of new trails within 250 feet of active San Joaquin kit fox dens. Existing trails would  
12 be closed within 250 feet of active natal/pupping dens until young have vacated, and within 50  
13 feet of other active dens. No dogs would be allowed on reserve units with active San Joaquin kit  
14 fox populations. Rodent control would be prohibited even on grazed or equestrian access areas  
15 with San Joaquin kit fox populations. With these restrictions, recreation-related effects on San  
16 Joaquin kit fox are expected to be minimal.

17 The BDCP would require the enhancement and management of these protected existing  
18 grasslands and restored grasslands to improve their function as a natural community of plants  
19 and wildlife and for associated covered species, including San Joaquin kit fox. The BDCP also  
20 includes actions to improve rodent prey availability.

21 However, management activities could result in injury or mortality of San Joaquin kit fox or  
22 American badger if individuals were present in work sites or if dens were located in the vicinity  
23 of habitat management work sites. A variety of habitat management actions included in *CM11*  
24 that are designed to enhance wildlife values on protected lands may result in localized ground  
25 disturbances that could temporarily remove small amounts of San Joaquin kit fox and American  
26 badger habitat near Clifton Court Forebay, in CZ 8. Ground-disturbing activities, such as removal  
27 of nonnative vegetation and road and other infrastructure maintenance activities, are expected  
28 to have minor effects on available habitat and are expected to result in overall improvements to  
29 and maintenance of San Joaquin kit fox and badger habitat values over the term of the BDCP.  
30 These effects cannot be quantified, but are expected to be minimal and would be avoided and  
31 minimized through the AMMs listed below. These AMMs would remain in effect throughout the  
32 BDCP's construction phase.

- 33 • *Operations and maintenance*: Ongoing maintenance of BDCP facilities would be expected to have  
34 little if any adverse effect on San Joaquin kit fox or American badger. Postconstruction  
35 operations and maintenance of the above-ground water conveyance facilities and restoration  
36 infrastructure could result in ongoing but periodic disturbances that could affect either species'  
37 use of the surrounding habitat near Clifton Court Forebay, in CZ 8. Maintenance activities would  
38 include vegetation management, levee and structure repair, and regrading of roads and  
39 permanent work areas. These effects, however, would be minimized with implementation of  
40 *AMM1-AMM6, AMM10, and AMM24* and with preconstruction surveys for the American badger,  
41 as required by Mitigation Measure BIO-162, *Conduct Preconstruction Survey for American*  
42 *Badger*.
- 43 • *Injury and direct mortality*: Construction vehicle activity may cause injury to or mortality of  
44 either species. If San Joaquin kit fox or American badger reside where activities take place (most  
45 likely in the vicinity of Clifton Court Forebay, in CZ 8), the operation of equipment for land

1 clearing, construction, operations and maintenance, and restoration, enhancement, and  
2 management activities could result in injury to or mortality of either species. Measures would be  
3 implemented to avoid and minimize injury to or mortality of these species as described in  
4 AMM1–AMM6, AMM10, AMM24, and AMM37 (see BDCP Appendix 3.C) and Mitigation Measure  
5 BIO-162.

6 The following paragraphs summarize the combined effects discussed above and describe other  
7 BDCP conservation actions that offset or avoid these effects. NEPA effects and a CEQA conclusion are  
8 also included.

### 9 ***Near-Term Timeframe***

10 Because water conveyance facilities construction is being evaluated at the project level, the near-  
11 term BDCP strategy has been analyzed to determine whether it would provide sufficient habitat  
12 protection or restoration in an appropriate timeframe to ensure that the construction effects would  
13 not be adverse under NEPA.

14 Under Alternative 4 there would be a loss of 313 acres of San Joaquin kit fox modeled habitat and  
15 American badger habitat from CM1 (310 acres) and CM11 (3 acres).

16 Typical NEPA project-level mitigation ratio for the natural community that would be affected and  
17 that is identified in the biological goals and objectives for San Joaquin kit fox in Chapter 3 of the  
18 BDCP would be 2:1 for protection of grassland. Using this ratio would indicate that 626 acres of  
19 grassland should be protected for San Joaquin kit fox to mitigate near-term losses.

20 The BDCP has committed to near-term restoration of 58 acres of alkali seasonal wetland (Objective  
21 ASWNC1.2), 40 acres of vernal pool complex (Objective VPNC1.2), and 1,140 acres of grassland  
22 (Objective GNC1.2). In addition, there would be near-term protection of 120 acres of alkali seasonal  
23 wetland (Objective ASWNC1.1), 400 acres of vernal pool complex (Objective VPNC1.1), and 2,000  
24 acres of grassland (Objective GNC1.1). The natural community restoration and protection activities  
25 are expected to be concluded during the first 10 years of Plan implementation, which is close  
26 enough in time to the occurrence of impacts to constitute adequate mitigation for NEPA purposes.  
27 These commitments are more than sufficient to support the conclusion that the near-term effects of  
28 Alternative 4 would be not be adverse under NEPA, because the number of acres required to meet  
29 the typical ratios described above would be only 626 acres of grassland protected.

30 In the absence of other conservation actions, the effects on San Joaquin kit fox and American badger  
31 habitat from Alternative 4 would represent an adverse effect as a result of habitat modification and  
32 potential direct mortality of special-status species. However, the effects of Alternative 4 would not  
33 be adverse with habitat protection, restoration, management, and enhancement in addition to  
34 implementation of *AMM1 Worker Awareness Training*, *AMM2 Construction Best Management  
35 Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention Plan*, *AMM4 Erosion and Sediment  
36 Control Plan*, *AMM5 Spill Prevention, Containment, and Countermeasure Plan*, *AMM6 Disposal and  
37 Reuse of Spoils, Reusable Tunnel Material, and Dredged Material*, *AMM10 Restoration of Temporarily  
38 Affected Natural Communities*, *AMM24 San Joaquin Kit Fox*, and *AMM37 Recreation*. AMMs contain  
39 elements that avoid or minimize the risk of construction activity affecting habitat and species  
40 adjacent to work areas. BDCP Appendix 3.C describes the AMMs in detail. Remaining effects would  
41 be addressed by implementation of Mitigation Measure BIO-162.

1 **Late Long-Term Timeframe**

2 There are 5,327 acres of modeled San Joaquin kit fox habitat in the study area. Alternative 4 as a  
3 whole would result in the permanent loss of and temporary effects on 318 acres of modeled habitat  
4 for San Joaquin kit fox and potential habitat for American badger, representing 6% of the modeled  
5 habitat.

6 With full implementation of Alternative 4, at least 1,000 acres of grassland would be protected in CZ  
7 8, where the San Joaquin kit fox is most likely to occur if present in the study area. Additionally, a  
8 portion of the 2,000 acres of grassland restoration would likely occur in CZ 8. Assuming the restored  
9 grasslands would provide suitable San Joaquin kit fox habitat proportional to the amount of  
10 modeled habitat in this natural community in the Plan Area (6.8% of the grasslands in the Plan Area  
11 consist of modeled San Joaquin kit fox habitat), an estimated 132 acres of restored grasslands would  
12 be suitable for the species.

13 Because San Joaquin kit fox home ranges are large (varying from approximately 1 to 12 square  
14 miles; see BDCP Appendix 2.A, *Covered Species Accounts*), habitat connectivity is key to the  
15 conservation of the species. Grasslands would be acquired for protection in locations that provide  
16 connectivity to existing protected breeding habitats in CZ 8 (Objective L3.1) and to other adjoining  
17 San Joaquin kit fox habitat within and adjacent to the Plan Area. Connectivity to occupied habitat  
18 adjacent to the Plan Area would help ensure the movement of San Joaquin kit foxes, if present, to  
19 larger habitat patches outside of the Plan Area in Contra Costa County. Grassland protection would  
20 focus in particular on acquiring the largest remaining contiguous patches of unprotected grassland  
21 habitat, which are located south of SR 4 in CZ 8 (BDCP Appendix 2.A, *Covered Species Accounts*). This  
22 area connects to more than 620 acres of existing habitat that was protected under the East Contra  
23 Costa County HCP/NCCP.

24 Grasslands in CZ 8 would also be managed and enhanced to increase prey availability and to  
25 increase mammal burrows, which could benefit the San Joaquin kit fox by increasing potential den  
26 sites, which are a limiting factor for the San Joaquin kit fox in the northern portion of its range  
27 (Objectives ASWNC2.3, ASWNC2.4, VPNC2.4, Objective VPNC2.5, Objective GNC2.3, Objective  
28 GNC2.4). These management and enhancement actions are expected to benefit the San Joaquin kit  
29 fox as well as the American badger by increasing the habitat value of the protected and restoration  
30 grasslands.

31 CZ 8 supports 74% of the modeled San Joaquin kit fox grassland habitat in the study area, and the  
32 remainder of habitat consists of fragmented, isolated patches that are unlikely to support this  
33 species. The BDCP's commitment to protect the largest remaining contiguous habitat patches  
34 (including grasslands and the grassland component of alkali seasonal wetland and vernal pool  
35 complexes) in CZ 8 and to maintain connectivity with the remainder of the satellite population in  
36 Contra Costa County would sufficiently offset the impacts resulting from water conveyance facilities  
37 construction.

38 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6) estimates that the restoration  
39 and protection actions discussed above, as well as the restoration of grassland and vernal pool that  
40 could overlap with the species model, would result in the restoration of 131 acres of modeled  
41 habitat for San Joaquin kit fox. In addition, protection of grassland and vernal pool complex could  
42 overlap with the species model and would result in the protection of 1,011 acres of modeled habitat  
43 for San Joaquin kit fox.

1 **NEPA Effects:** In the absence of other conservation actions, the effects on San Joaquin kit fox and  
2 American badger habitat from Alternative 4 would represent an adverse effect as a result of habitat  
3 modification and potential direct mortality of special-status species. However, with habitat  
4 protection, restoration, management, and enhancement associated with CM3, CM8, and CM11 and  
5 guided by AMM1–AMM6, AMM10, AMM25, and AMM37, which would be in place throughout the  
6 construction period, and with implementation of Mitigation Measure BIO-162, the effects of  
7 Alternative 4 as a whole on San Joaquin kit fox and American badger would not be adverse.

8 **CEQA Conclusion:**

9 **Near-Term Timeframe**

10 Because water conveyance facilities construction (CM1) is being evaluated at the project level, the  
11 near-term BDCP strategy has been analyzed to determine whether it would provide sufficient  
12 habitat protection or restoration in an appropriate timeframe to ensure that the construction effects  
13 would be less than significant for CEQA purposes.

14 Under Alternative 4 there would be a loss of 313 acres of San Joaquin kit fox modeled habitat and  
15 American badger habitat from CM1 (310 acres) and CM11 (3 acres). Typical CEQA project-level  
16 mitigation ratio for the natural community that would be affected and that is identified in the  
17 biological goals and objectives for San Joaquin kit fox in Chapter 3 of the BDCP would be 2:1 for  
18 protection of grassland. Using this ratio would indicate that 626 acres of grassland should be  
19 protected for San Joaquin kit fox to mitigate near-term losses.

20 The BDCP has committed to near-term restoration of 58 acres of alkali seasonal wetland (Objective  
21 ASWNC1.2), 40 acres of vernal pool complex (Objective VPNC1.2), and 1,140 acres of grassland  
22 (Objective GNC1.2). In addition, there would be near-term protection of 120 acres of alkali seasonal  
23 wetland (Objective ASWNC1.1), 400 acres of vernal pool complex (Objective VPNC1.1), and 2,000  
24 acres of grassland (Objective GNC1.1).

25 These conservation actions would occur in the same timeframe as the construction losses, thereby  
26 avoiding adverse effects of habitat loss on San Joaquin kit fox and American badger. These Plan  
27 objectives represent performance standards for considering the effectiveness of CM3 protection and  
28 restoration actions. The acres of restoration and protection contained in the near-term Plan goals  
29 and the additional detail in the biological objectives for San Joaquin kit fox and the mitigation  
30 measure for American badger satisfy the typical mitigation that would be applied to the project-level  
31 effects of CM1, as well as mitigate the near-term effects of the other conservation measures.

32 The BDCP also contains commitments to implement AMM1–AMM6, AMM10, and AMM24, which  
33 include elements that avoid or minimize the risk of construction activity impacting habitat and  
34 species adjacent to work areas. Remaining effects would be addressed by implementation of  
35 Mitigation Measure BIO-162. The AMMs are described in detail in BDCP Appendix 3.C, *Avoidance and*  
36 *Minimization Measures*.

37 These commitments are more than sufficient to support the conclusion that the near-term effects of  
38 Alternative 4 on San Joaquin kit fox and American badger would be less than significant under CEQA,  
39 because the number of acres required to meet the typical ratios described above would be only 626  
40 acres of grassland protected.

1 **Late Long-Term Timeframe**

2 There are 5,327 acres of modeled San Joaquin kit fox habitat in the study area. Alternative 4 as a  
3 whole would result in the permanent loss of and temporary effects on 318 acres of modeled habitat  
4 for San Joaquin kit fox and potential habitat for American badger.

5 With full implementation of Alternative 4, at least 1,000 acres of grassland would be protected in CZ  
6 8, where the San Joaquin kit fox is most likely to occur if present in the study area. Additionally, a  
7 portion of the 2,000 acres of grassland restoration would likely occur in CZ 8. Assuming the restored  
8 grasslands would provide suitable San Joaquin kit fox habitat proportional to the amount of  
9 modeled habitat in this natural community in the Plan Area an estimated 132 acres of restored  
10 grasslands would be suitable for the species.

11 Because San Joaquin kit fox home ranges are large (varying from approximately 1 to 12 square  
12 miles; see BDCP Appendix 2.A, *Covered Species Accounts*), habitat connectivity is key to the  
13 conservation of the species. Grasslands would be acquired for protection in locations that provide  
14 connectivity to existing protected breeding habitats in CZ 8 (Objective L3.1) and to other adjoining  
15 San Joaquin kit fox habitat within and adjacent to the Plan Area. Connectivity to occupied habitat  
16 adjacent to the Plan Area would help ensure the movement of San Joaquin kit foxes, if present, to  
17 larger habitat patches outside of the Plan Area in Contra Costa County. Grassland protection would  
18 focus in particular on acquiring the largest remaining contiguous patches of unprotected grassland  
19 habitat, which are located south of SR 4 in CZ 8 (BDCP Appendix 2.A). This area connects to more  
20 than 620 acres of existing habitat that was protected under the East Contra Costa County  
21 HCP/NCCP.

22 Grasslands in CZ 8 would also be managed and enhanced to increase prey availability and to  
23 increase mammal burrows, which could benefit the San Joaquin kit fox by increasing potential den  
24 sites, which are a limiting factor for the San Joaquin kit fox in the northern portion of its range  
25 (Objectives ASWNC2.3, ASWNC2.4, VPNC2.4, Objective VPNC2.5, Objective GNC2.3, Objective  
26 GNC2.4). These management and enhancement actions are expected to benefit the San Joaquin kit  
27 fox as well as the American badger by increasing the habitat value of the protected and restoration  
28 grasslands.

29 CZ 8 supports 74% of the modeled San Joaquin kit fox grassland habitat in the study area, and the  
30 remainder of habitat consists of fragmented, isolated patches that are unlikely to support this  
31 species. The BDCP's commitment to protect the largest remaining contiguous habitat patches  
32 (including grasslands and

33 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6) estimates that the restoration  
34 and protection actions discussed above, as well as the restoration of grassland and vernal pool that  
35 could overlap with the species model, would result in the restoration of 131 acres of modeled  
36 habitat for San Joaquin kit fox. In addition, protection of grassland and vernal pool complex could  
37 overlap with the species model and would result in the protection of 1,011 acres of modeled habitat  
38 for San Joaquin kit fox.

39 In the absence of other conservation actions, the effects on San Joaquin kit fox and American badger  
40 habitat from Alternative 4 would represent a significant impact as a result of habitat modification  
41 and potential direct mortality of a special-status species. However, with habitat protection,  
42 restoration, management, and enhancement associated with CM3, CM8, and CM11, and guided by  
43 AMM1-AMM6, AMM10, AMM24, and AMM37, which would be in place throughout the time period

1 of construction, and with implementation of Mitigation Measure BIO-162, the impact of Alternative  
2 4 as a whole on San Joaquin kit fox and American badger would be less than significant.

3 **Mitigation Measure BIO-162: Conduct Preconstruction Survey for American Badger**

4 A qualified biologist provided by DWR will survey for American badger concurrent with the  
5 preconstruction survey for San Joaquin kit fox and burrowing owl. If badgers are detected, the  
6 biologist will passively relocate badgers out of the work area prior to construction if feasible. If  
7 an active den is detected within the work area, DWR will avoid the den until the qualified  
8 biologist determines the den is no longer active. Dens that are determined to be inactive by the  
9 qualified biologist will be collapsed by hand to prevent occupation of the den between the time  
10 of the survey and construction activities.

11 **Impact BIO-163: Indirect Effects of Plan Implementation on San Joaquin Kit Fox and**  
12 **American Badger**

13 Noise and visual disturbances outside the project footprint but within 250 feet of construction  
14 activities could temporarily affect modeled San Joaquin kit fox habitat and potential American  
15 badger. Water conveyance facilities operations and maintenance activities would include vegetation  
16 and weed control, ground squirrel control, canal maintenance, infrastructure and road maintenance,  
17 levee maintenance, and maintenance and upgrade of electrical systems. While maintenance  
18 activities are not expected to remove San Joaquin kit fox and badger habitat, operation of equipment  
19 could disturb small areas of vegetation around maintained structures and could result in injury or  
20 mortality of individual foxes and badgers, if present. Given the remote likelihood of active San  
21 Joaquin kit fox or badger dens in the vicinity of the conveyance facility, the potential for this effect is  
22 small and would further be minimized with the implementation of seasonal no-disturbance buffers  
23 around occupied dens, if any, and other measures as described in AMM1–AMM6, AMM10, AMM24,  
24 AMM37, and Mitigation Measure BIO-62.

25 **NEPA Effects:** Implementation of the AMMs listed above Alternative 4 and Mitigation Measure BIO-  
26 162 *Conduct Preconstruction Survey for American Badger*, would avoid the potential for substantial  
27 adverse effects on San Joaquin kit fox or American badger, either indirectly or through habitat  
28 modifications. These measures would also avoid and minimize effects that could substantially  
29 reduce the number of San Joaquin kit fox or American badger, or restrict either species' range.  
30 Therefore, the indirect effects of Alternative 4 would not have an adverse effect on San Joaquin kit  
31 fox or American badger.

32 **CEQA Conclusion:** Indirect effects from conservation measure operations and maintenance as well  
33 as construction-related noise and visual disturbances could impact San Joaquin kit fox and American  
34 badger. With implementation of AMM1–AMM6, AMM10, AMM24, and AMM37 as part of Alternative  
35 4 construction, operation, and maintenance, the BDCP would avoid the potential for significant  
36 adverse effects on either species, either indirectly or through habitat modifications, and would not  
37 result in a substantial reduction in numbers or a restriction in the range of either species. In  
38 addition, Mitigation Measure BIO-162 would reduce the impact of indirect effects of Alternative 4 on  
39 American badger to a less-than-significant level.

40 **Mitigation Measure BIO-162: Conduct Preconstruction Survey for American Badger**

41 Please see Mitigation Measure BIO-162 under Impact BIO-162.

1 **San Joaquin Pocket Mouse**

2 Habitat for San Joaquin pocket mouse consists of the grassland natural community throughout the  
3 Plan Area. The species requires friable soils for burrowing. Construction and restoration associated  
4 with Alternative 4 conservation measures would result in both temporary and permanent losses of  
5 San Joaquin pocket mouse habitat as indicated in Table 12-4-60. Full implementation of Alternative  
6 4 would also include the following conservation actions over the term of the BDCP that would likely  
7 benefit San Joaquin pocket mouse.

- 8 • Protect 8,000 acres of grasslands (GNC1.1, associated with CM3).
- 9 • Restore 2,000 acres of grasslands to connect fragmented patches of protected grasslands  
10 (GNC1.2, associated with CM8).
- 11 • Restore and sustain a mosaic of grassland vegetation alliances, reflecting localized water  
12 availability, soil chemistry, soil texture, topography, and disturbance regimes, with  
13 consideration of historical states (GNC2.1).

14 As explained below, with the restoration or protection of these amounts of habitat, Alternative 4's  
15 impacts on San Joaquin pocket mouse would not be adverse for NEPA purposes and would be less  
16 than significant for CEQA purposes.

17 **Table 12-4-60. Changes in San Joaquin Pocket Mouse Habitat Associated with Alternative 4**  
18 **(acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT	NT	LLT	CM2	CM5
CM1	Grassland	460	460	158	158	NA	NA
<b>Total Impacts CM1</b>		<b>460</b>	<b>460</b>	<b>158</b>	<b>158</b>	<b>NA</b>	<b>NA</b>
CM2–CM18	Grassland	889	2,057	239	273	385–1,277	514
<b>Total Impacts CM2–CM18</b>		<b>889</b>	<b>2,057</b>	<b>239</b>	<b>273</b>	<b>385–1,277</b>	<b>514</b>
<b>TOTAL IMPACTS</b>		<b>1,349</b>	<b>2,517</b>	<b>397</b>	<b>431</b>	<b>385–1,277</b>	<b>514</b>

<sup>a</sup> See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only. Yolo periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

19

1 **Impact BIO-164: Loss or Conversion of Habitat for and Direct Mortality of San Joaquin Pocket**  
2 **Mouse**

3 Alternative 4 conservation measures would result in the combined permanent and temporary loss  
4 of up to 2,948 acres of habitat for San Joaquin pocket mouse, of which 2,517 acres would be a  
5 permanent loss and 431 acres would be a temporary loss of habitat (Table 12-4-60). Conservation  
6 measures that would result in these losses are conveyance facilities and transmission line  
7 construction, and establishment and use of borrow and spoil areas (CM1), *CM2 Yolo Bypass Fisheries*  
8 *Enhancement*, *CM4 Tidal Natural Communities Restoration*, *CM5 Seasonally Inundated Floodplain*  
9 *Restoration*, *CM7 Riparian Natural Community Restoration*, *CM9 Vernal Pool Natural Community and*  
10 *Alkali Seasonal Wetland Complex Restoration*, *CM11 Natural Community Enhancement and*  
11 *Management*, and *CM18 Conservation Hatcheries*. The majority of habitat loss would result from  
12 CM4. Habitat enhancement and management activities (CM11), which include ground disturbance  
13 or removal of nonnative vegetation, could result in local adverse habitat effects. In addition,  
14 maintenance activities associated with the long-term operation of the water conveyance facilities  
15 and other BDCP physical facilities could degrade or eliminate San Joaquin pocket mouse habitat.  
16 Each of these individual activities is described below. A summary statement of the combined  
17 impacts and NEPA and CEQA conclusions follows the individual conservation measure discussions.

- 18 • *CM1 Water Facilities and Operation*: Construction of Alternative 4 conveyance facilities would  
19 result in the combined permanent and temporary loss of up to 618 acres of potential San  
20 Joaquin pocket mouse habitat (460 acres of permanent loss, 158 acres of temporary loss) in CZ  
21 3–CZ 6 and CZ 8. The majority of grassland that would be removed would be in CZ 8, from the  
22 modifications to Clifton Court Forebay. Refer to the Terrestrial Biology Map Book for a detailed  
23 view of Alternative 4 construction locations. Construction of the forebay would affect the area  
24 where there is a record of San Joaquin pocket mouse (California Department of Fish and Game  
25 2012).
- 26 • *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo bypass fisheries enhancement  
27 (CM2) would permanently remove 388 acres of potential San Joaquin pocket mouse habitat in  
28 the Yolo Bypass in CZ 2. In addition, 239 acres would be temporarily removed. Most of the  
29 grassland losses would occur at the north end of the bypass below Fremont Weir, along the Toe  
30 Drain/Tule Canal, and along the west side channels.
- 31 • *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and  
32 inundation would permanently remove an estimated 1,122 acres of potential San Joaquin pocket  
33 mouse habitat. The majority of the losses would likely occur in the vicinity of Cache Slough, on  
34 Decker Island in the West Delta ROA, on the upslope fringes of Suisun Marsh, and along narrow  
35 bands adjacent to waterways in the South Delta ROA. Tidal restoration would directly impact  
36 and fragment remaining grassland just north of Rio Vista in and around French and Prospect  
37 Islands, and in an area south of Rio Vista around Threemile Slough.
- 38 • *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore  
39 seasonally inundated floodplain would permanently and temporarily remove approximately 85  
40 acres of San Joaquin pocket mouse habitat (51 permanent, 34 temporary). These losses would  
41 be expected to occur along the San Joaquin River and other major waterways in CZ 7.
- 42 • *CM7 Riparian Natural Community Restoration*: Riparian restoration would impact 410 acres of  
43 grasslands, primarily in CZ 7, as part of tidal natural communities restoration (11 acres) and  
44 seasonal floodplain restoration (399 acres).

- 1 • *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*: Up to 10 acres of grassland  
2 would be permanently converted to vernal pool complex. The vernal pool and alkali seasonal  
3 wetland restoration would leave intact the grasslands surrounding the vernal pools. Temporary  
4 construction-related disturbance of grassland habitat would result from implementation of *CM9*  
5 in CZ 1, CZ 8, and CZ 11. However, all areas would be restored to their original or higher value  
6 habitat after the construction periods.
- 7 • *CM11 Natural Communities Enhancement and Management*: The creation of recreational trails  
8 and recreational staging areas would result in the permanent removal of 50 acres of grassland.  
9 The protection of 8,000 acres of grassland for covered species is expected to benefit San Joaquin  
10 pocket mouse by protecting existing habitats from potential loss or degradation that otherwise  
11 could occur with future changes in existing land use. Habitat management and enhancement-  
12 related activities could cause disturbance or direct mortality to San Joaquin pocket mouse if they  
13 are present near work areas.

14 A variety of habitat management actions included in *CM11 Natural Communities Enhancement*  
15 *and Management* that are designed to enhance wildlife values in restored or protected habitats  
16 could result in localized ground disturbances that could temporarily remove small amounts of  
17 San Joaquin pocket mouse habitat. Ground-disturbing activities, such as removal of nonnative  
18 vegetation and road and other infrastructure maintenance activities, would be expected to have  
19 minor adverse effects on habitat and would be expected to result in overall improvements to  
20 and maintenance of habitat values over the term of the BDCP. Noise and visual disturbance from  
21 management-related equipment operation could temporarily displace individuals or alter the  
22 behavior of the species if adjacent to work areas. With full implementation Alternative 4,  
23 enhancement and management actions designed for western burrowing owl would also be  
24 expected to benefit San Joaquin pocket mouse. San Joaquin pocket mouse would benefit  
25 particularly from protection of grassland habitat against potential loss or degradation that  
26 otherwise could occur with future changes in existing land use.

- 27 • *CM18 Conservation Hatcheries*: Implementation of *CM18* would remove up to 35 acres of San  
28 Joaquin pocket mouse habitat.
- 29 • *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground  
30 water conveyance facilities and restoration infrastructure could result in ongoing but periodic  
31 disturbances that could affect San Joaquin pocket mouse use of the surrounding habitat.  
32 Maintenance activities would include vegetation management, levee and structure repair, and  
33 re-grading of roads and permanent work areas. These effects, however, would be reduced by  
34 AMMs and conservation actions as described below.
- 35 • *Injury and Direct Mortality*: Construction could result in direct mortality of San Joaquin pocket  
36 mouse if present in construction areas.

37 The following paragraphs summarize the combined effects discussed above and describe other  
38 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA impact conclusions are  
39 also included.

#### 40 ***Near-Term Timeframe***

41 Because the water conveyance facilities construction is being evaluated at the project level, the near-  
42 term BDCP conservation strategy has been evaluated to determine whether it would provide  
43 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the effects of

1 construction would not be adverse under NEPA. The Plan would remove 1,746 acres of San Joaquin  
2 pocket mouse habitat (1,349 permanent, 397 temporary) in the study area in the near-term. One  
3 record of San Joaquin pocket mouse near Clifton Court forebay could be affected by the construction  
4 of the new forebay. These effects would result from the construction of the water conveyance  
5 facilities (CM1, 618 acres), and implementing other conservation measures (Yolo Bypass Fisheries  
6 Enhancement [CM2] Tidal Natural Communities Restoration [CM4], Seasonally Inundated  
7 Floodplain Restoration [CM5], Riparian Natural Community Restoration (CM7), Vernal Pool and  
8 Alkali Seasonal Wetland Complex Restoration [CM9], Natural Community Enhancement and  
9 Management – Recreation Facilities (CM11), and Conservation Hatcheries [CM18] 1,128 acres).

10 Typical NEPA project-level mitigation ratios for those natural communities affected by CM1 would  
11 be 2:1 protection of grassland habitat. Using these typical ratios would indicate that 1,236 acres of  
12 grassland natural communities should be protected to mitigate the CM1 losses of 618 acres of San  
13 Joaquin pocket mouse habitat. The near-term effects of other conservation actions would remove  
14 1,128 acres of modeled habitat, and therefore require 2,256 acres of protection of San Joaquin  
15 pocket mouse habitat using the same typical NEPA ratios (2:1 for protection).

16 The BDCP has committed to near-term goals of protecting 2,000 acres and restoring 1,140 acres of  
17 grassland natural community in CZ 1, 2, 4, 5, 7, 8, and 11. The protection and restoration of  
18 grasslands, would result in a contiguous matrix of grassland, alkali seasonal wetland, and vernal  
19 pool natural communities which would expand habitat for San Joaquin pocket mouse and reduce the  
20 effects of current levels of habitat fragmentation. Under *CM11 Natural Communities Enhancement  
21 and Management*, San Joaquin pocket mouse would likely benefit from the management of the  
22 grasslands for general wildlife benefit.

23 These natural community biological goals and objectives would inform the near-term protection and  
24 restoration efforts and represent performance standards for considering the effectiveness of  
25 restoration actions for the species. The acres of protection and restoration contained in the near-  
26 term Plan goals would satisfy the typical mitigation ratios that would be applied to the project-level  
27 effects of CM1 especially considering that a large portion of the impacts to grasslands consists of  
28 thin strips of grassland along levees and that areas of grassland protection and restoration would be  
29 in large contiguous blocks.

30 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2  
31 Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention  
32 Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containments and  
33 Countermeasure Plan*, and *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged  
34 Material*, and *AMM10 Restoration of Temporarily Affected Natural Communities*. All of these AMMs  
35 include elements that avoid or minimize the risk of affecting habitats and species adjacent to work  
36 areas and RTM storage sites. The AMMs are described in detail in BDCP Appendix 3.C.

### 37 **Late Long-Term Timeframe**

38 The habitat model indicates that the study area supports approximately 78,047 acres of potential  
39 habitat for San Joaquin pocket mouse. Alternative 4 as a whole would result in the permanent loss of  
40 and temporary effects on 2,948 acres of grasslands that could be suitable for San Joaquin pocket  
41 mouse (4% of the habitat in the study area). The locations of these losses are described above in the  
42 analyses of individual conservation measures. The Plan includes a commitment to restore or create  
43 at least 2,000 acres of grassland in CZ 1, CZ 8, and CZ 11 (Objective GNC1.2) and to protect 8,000  
44 acres of grassland (with at least 2,000 acres protected in CZ 1, at least 1,000 acres in CZ 8, at least

1 2,000 acres protected in CZ 11, and the remainder distributed throughout CZ 1, CZ 2, CZ 4, CZ 5, CZ  
2 7, CZ 8, and CZ 11 in the study area)(Objective GNC1.1). The Plan’s commitment to restore  
3 grasslands such that they connect fragmented patches of already protected grasslands (GNC1.2)  
4 would improve habitat connectivity and dispersal abilities of San Joaquin pocket mouse within and  
5 outside of the plan area. All protected habitat would be managed under *CM11 Natural Communities*  
6 *Enhancement and Management*.

7 **NEPA Effects:** In the near-term, the loss of San Joaquin pocket mouse habitat and potential for direct  
8 mortality would not be an adverse effect because the BDCP has committed to protecting and  
9 restoring an acreage that would meet the typical mitigation ratios described above. In the absence of  
10 other conservation actions, the effects on San Joaquin pocket mouse habitat and potential mortality  
11 of a special-status species resulting from Alternative 4 would represent an adverse effect in the late  
12 long-term. However, the BDCP has committed to habitat protection and restoration associated with  
13 CM3, CM8, and CM11. This habitat protection and restoration would be guided by biological goals  
14 and objectives and by AMM1–AMM6 and AMM10, which would be in place during construction.  
15 Considering these commitments, losses of San Joaquin pocket mouse and potential mortality under  
16 Alternative 4 would not be an adverse effect.

17 **CEQA Conclusion:**

18 **Near-Term Timeframe**

19 Because the water conveyance facilities construction is being evaluated at the project level, the near-  
20 term BDCP conservation strategy has been evaluated to determine whether it would provide  
21 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the impacts of  
22 construction would be less than significant. The Plan would remove 1,746 acres of modeled (1,349  
23 permanent, 397 temporary) habitat for San Joaquin pocket mouse in the study area in the near-  
24 term. One record of San Joaquin pocket mouse near Clifton Court forebay could be affected by the  
25 construction of the new forebay. These effects would result from the construction of the water  
26 conveyance facilities (CM1, 618 acres), and implementing other conservation measures (Yolo  
27 Bypass Fisheries Enhancement [CM2] Tidal Natural Communities Restoration [CM4], Seasonally  
28 Inundated Floodplain Restoration [CM5], Riparian Natural Community Restoration (CM7),  
29 Grassland Natural Community Restoration [CM8], Vernal Pool and Alkali Seasonal Wetland Complex  
30 Restoration [CM9], Natural Community Enhancement and Management – Recreation Facilities  
31 (CM11), and Conservation Hatcheries [CM18] 1,116 acres).

32 Typical CEQA project-level mitigation ratios for those natural communities affected by CM1 would  
33 be 2:1 protection of grassland habitat. Using these typical ratios would indicate that 1,236 acres of  
34 grassland natural communities should be protected to mitigate the CM1 losses of 618 acres of San  
35 Joaquin pocket mouse habitat.

36 The BDCP has committed to near-term goals of protecting 2,000 acres and restoring 1,140 acres of  
37 grassland natural community in CZ 1, CZ 2, CZ 4, CZ 5, CZ 7, CZ 8, and CZ 11. The protection and  
38 restoration of grasslands, would result in a contiguous matrix of grassland, alkali seasonal wetland,  
39 and vernal pool natural communities which would expand habitat for San Joaquin pocket mouse and  
40 reduce the effects of current levels of habitat fragmentation. Under *CM11 Natural Communities*  
41 *Enhancement and Management*, San Joaquin pocket mouse would likely benefit from the  
42 management of the grasslands for general wildlife benefit.

1 These natural community biological goals and objectives would inform the near-term protection and  
2 restoration efforts and represent performance standards for considering the effectiveness of  
3 restoration actions for the species. The acres of protection and restoration contained in the near-  
4 term Plan goals would satisfy the typical mitigation ratios that would be applied to the project-level  
5 effects of CM1 especially considering that a large portion of the impacted grasslands consists of thin  
6 strips of grassland along levees and that areas of grassland protection and restoration would be in  
7 large contiguous blocks.

8 The Plan also includes commitments to implement AMM1–AMM6, and AMM10. All of these AMMs  
9 include elements that avoid or minimize the risk of affecting habitats and species adjacent to work  
10 areas and RTM storage sites. The AMMs are described in detail in BDCP Appendix 3.C.

11 These commitments are more than sufficient to support the conclusion that the near-term effects of  
12 Alternative 4 would be less than significant under CEQA.

### 13 ***Late Long-Term Timeframe***

14 The habitat model indicates that the study area supports approximately 78,047 acres of potential  
15 habitat for San Joaquin pocket mouse. Alternative 4 as a whole would result in the permanent loss of  
16 and temporary effects on 2,948 acres of grasslands that could be suitable for San Joaquin pocket  
17 mouse (4% of the habitat in the study area). The locations of these losses are described above in the  
18 analyses of individual conservation measures. The Plan includes a commitment to restore or create  
19 at least 2,000 acres of grassland in CZ 1, 8 and 11 (Objective GNC1.2) and to protect 8,000 acres of  
20 grassland (with at least 2,000 acres protected in CZ 1, at least 1,000 acres in CZ 8, at least 2,000  
21 acres protected in CZ 11, and the remainder distributed throughout CZ 1, CZ 2, CZ 4, CZ 5, CZ 7, CZ 8,  
22 and CZ 11 in the study area) (Objective GNC1.1). The Plan’s commitment to restore grasslands such  
23 that they connect fragmented patches of already protected grasslands (Objective GNC1.2) would  
24 improve habitat connectivity and dispersal abilities of San Joaquin pocket mouse within and outside  
25 of the plan area. All protected habitat would be managed under *CM11 Natural Communities*  
26 *Enhancement and Management*.

27 Considering these protection and restoration provisions, which would provide acreages of new  
28 high-value or enhanced habitat in amounts suitable to compensate for habitats lost to construction  
29 and restoration activities, and with implementation of AMM1–AMM6 and AMM10, the loss of habitat  
30 or direct mortality through implementation of Alternative 4 would not result in a substantial  
31 adverse effect through habitat modifications and would not substantially reduce the number or  
32 restrict the range of San Joaquin pocket mouse. Therefore, the loss of habitat or potential mortality  
33 under this alternative would have a less-than-significant impact on San Joaquin pocket mouse.

### 34 **Impact BIO-165: Indirect Effects of Plan Implementation on San Joaquin Pocket Mouse**

35 Construction activities associated with water conveyance facilities, conservation components and  
36 ongoing habitat enhancement, as well as operations and maintenance of above-ground water  
37 conveyance facilities, including the transmission facilities, could result in ongoing periodic  
38 postconstruction disturbances and noise with localized effects on San Joaquin kit pocket mouse and  
39 its habitat over the term of the BDCP. These potential effects would be minimized and avoided  
40 through AMM1–AMM6, and AMM10, which would be in effect throughout the plan’s construction  
41 phase.

1 Water conveyance facilities operations and maintenance activities would include vegetation and  
2 weed control, ground squirrel control, canal maintenance, infrastructure and road maintenance,  
3 levee maintenance, and maintenance and upgrade of electrical systems. While maintenance  
4 activities are not expected to remove pocket mouse habitat, operation of equipment could disturb  
5 small areas of vegetation around maintained structures and could result in injury or mortality of  
6 individual pocket mice, if present.

7 **NEPA Effects:** Implementation of the AMMs listed above would avoid the potential for substantial  
8 adverse effects on San Joaquin pocket mouse, either indirectly or through habitat modifications.  
9 These measures would also avoid and minimize effects that could substantially reduce the number  
10 of San Joaquin pocket mouse, or restrict the species' range. Therefore, the indirect effects of  
11 Alternative 4 would not have an adverse effect on San Joaquin pocket mouse.

12 **CEQA Conclusion:** Indirect effects from conservation measure operations and maintenance as well  
13 as construction-related noise and visual disturbances could impact San Joaquin pocket mouse. With  
14 implementation of AMM1-AMM6, and AMM10, as part of Alternative 4 construction, operation, and  
15 maintenance, the BDCP would avoid the potential for significant adverse effects on either species,  
16 either indirectly or through habitat modifications, and would not result in a substantial reduction in  
17 numbers or a restriction in the range of the species. Therefore, the indirect effects under this  
18 alternative would have a less-than-significant impact on San Joaquin pocket mouse.

### 19 **Special-Status Bat Species**

20 Special-status bat species with potential to occur in the study area employ varied roost strategies,  
21 from solitary roosting in foliage of trees to colonial roosting in trees and artificial structures, such as  
22 tunnels, buildings, and bridges. Various roost strategies could include night roosts, maternity roosts,  
23 migration stopover, or hibernation. The habitat types used to assess effects for special-status bats  
24 roosting habitat includes valley/foothill riparian natural community, developed lands and  
25 landscaped trees, including eucalyptus, palms and orchards. Potential foraging habitat includes all  
26 riparian habitat types, cultivated lands, developed lands, grasslands, and wetlands.

27 There is potential for at least thirteen different bat species to be present in the study area (Figure  
28 12-51), including four California species of special concern and nine species ranked from low to  
29 moderate priority by the Western Bat Working Group (Table 12A-2 in Appendix 12A). In 2009,  
30 DHCCP conducted a large-scale effort that involved habitat assessments, bridge surveys, and passive  
31 acoustic monitoring surveys for bats (see Appendix 12C, *2009 to 2011 Bay Delta Conservation Plan*  
32 *EIR/EIS Environmental Data Report* for details on methods and results, and Table 12A-2 in Appendix  
33 12A).

34 The majority of the parcels assessed during field surveys contained bat foraging and roosting  
35 features and were considered highly suitable habitat. At the time of the 2009 field surveys, DWR  
36 biologists initially identified 145 bridges in their survey area. Eleven of the 145 bridges were not  
37 accessible and thirteen were determined to not be suitable for bats. Evidence of bat presence was  
38 observed at six of the bridges and bat sign (guano, urine staining, odor, or vocalizations) was  
39 observed at 26 of the bridges. Biologists observed Mexican free-tailed bats at four of the bridges and  
40 unidentified species at the remaining two bridges. One of these bridges, over the Yolo Causeway,  
41 was used by approximately 10,000 Mexican free-tailed bats, indicating a maternity roost. A second  
42 roost site of about 50 individuals was observed under a bridge in eastern Solano County.

1 The remaining 89 bridges contained structural features that were considered conducive to  
2 maternity, solitary, day and/or night roosting. Night roosts may have crevices and cracks but more  
3 often have box beams or other less protected roosting spots where bats rest temporarily while  
4 feeding. Day roosts are commonly found in bridges with expansion joints, crevices, or cracks where  
5 bats are protected from predators and weather. Seventeen bridges in the survey area had no  
6 potential for roosting because they lacked surface features from which bats could hang and offered  
7 no protection from weather or predators.

8 Construction and restoration associated with Alternative 4 conservation measures would result in  
9 both temporary and permanent losses of foraging and roosting habitat for special-status bats as  
10 indicated in Table 12-4-61. Protection and restoration for special-status bat species focuses on  
11 habitats and does not include manmade structures such as bridges. The conservation measures that  
12 would be implemented to achieve the biological goals and objectives that would also benefit special-  
13 status bats are summarized below.

- 14 ● Protect or restore 142,200 acres of high-value natural communities (Objective L1.1, associated  
15 with CM3). This objective involves protecting and restoring a variety of habitat types described  
16 below (Table 3.3-4 in BDCP Chapter 3).
  - 17 ○ Protect 150 acres of alkali seasonal wetland in CZ 1, CZ 8, and/or CZ 11 among a mosaic of  
18 protected grasslands and vernal pool complex (Objective ASWNC1.1, associated with CM3).
  - 19 ○ Protect 600 acres of existing vernal pool complex (Objective VPNC1.1, associated with  
20 CM3).
  - 21 ○ Protect 8,000 acres of grassland (Objective GNC1.1, associated with CM3).
  - 22 ○ Protect 8,100 acres of managed wetland (Objective MWNC1.1, associated with CM3 and  
23 CM11).
  - 24 ○ Protect 48,625 acres of cultivated lands (Objective CLNC1.1, associated with CM3 and  
25 CM11).
  - 26 ○ Protect, restore, or create 2,740 acres of rice land or equivalent habitat type for the giant  
27 garter snake (Objective GGS3.1, associated with CM3, CM4, and CM10).
  - 28 ○ Restore 2,000 acres of grasslands to connect fragmented patches of protected (Objective  
29 GNC1.2, associated with CM3 and 8).
  - 30 ○ Restore 67 acres of vernal pool complex (Objective VPNC1.2, associated with CM3 and 9).
  - 31 ○ Restore and protect 65,000 acres of tidal natural communities (Objective L1.2, associated  
32 with CM2, 3, and 4).
  - 33 ○ Restore or create 5,000 acres of valley/foothill riparian natural community (Objective  
34 VFRNC1.1, associated with CM3 and CM7).
  - 35 ○ Protect 750 acres of existing valley/foothill riparian natural community in CZ 7 by year 10  
36 (Objective VFRNC1.2, associated with CM3).

37 As explained below, with the restoration and protection of these amounts of habitat, in addition to  
38 mitigation measures to reduce potential effects, impacts on special-status bats would not be adverse  
39 for NEPA purposes and would be less than significant for CEQA purposes.

1 **Table 12-4-61. Changes in Special-Status Bat Roosting and Foraging Habitat Associated with**  
2 **Alternative 4<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type <sup>c</sup>	Permanent		Temporary		Periodic <sup>e</sup>	
		NT	LLT <sup>d</sup>	NT	LLT	CM2	CM5
CM1	Roosting	119	119	149	149	NA	NA
	Foraging	5,443	5,443	3,801	3,801	NA	NA
<b>Total Impacts CM1</b>		<b>5,562</b>	<b>5,562</b>	<b>3,950</b>	<b>3,950</b>	<b>NA</b>	<b>NA</b>
CM2-CM18	Roosting	524	1,570	167	212	324	411
	Foraging	14,497	60,399	773	2,126	21,265	10,137
<b>Total Impacts CM2-CM18</b>		<b>15,021</b>	<b>61,696</b>	<b>940</b>	<b>2,338</b>	<b>21,589</b>	<b>10,548</b>
<b>TOTAL IMPACTS</b>		<b>20,583</b>	<b>67,531</b>	<b>4,890</b>	<b>6,288</b>	<b>21,589</b>	<b>10,548</b>

<sup>a</sup> See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> Affected roosting habitat acreages include valley foothill riparian habitat and orchards. An unknown number of buildings, bridges, tunnels, and individual trees could also be affected but were not included in this analysis. Foraging habitat includes all natural communities, cultivated lands, and developed lands in the study area. Foraging habitat effects for CM2-CM18 were not considered adverse as they reflect a conversion from one foraging habitat type (mostly cultivated lands) to another foraging habitat (wetlands).

<sup>d</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>e</sup> Periodic effects were estimated for the late long-term only. NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-166: Loss or Conversion of Habitat for and Direct Mortality of Special-Status Bats**

5 Alternative 4 conservation measure CM1 would result in the permanent and temporary loss  
6 combined of up to 268 acres of roosting habitat and 9,244 acres of foraging habitat for special-status  
7 bats in the study area. DWR identified two bridges as potential night roosting habitat that could be  
8 affected by construction in CM1. Conservation measures Fremont Weir/Yolo Bypass improvements  
9 (CM2), tidal habitat restoration (CM4), and floodplain restoration (CM5) would result in the  
10 permanent and temporary loss of 1,782 acres of roosting habitat and the conversion of  
11 approximately 65,525 acres of foraging habitat from mostly cultivated lands and managed wetlands  
12 to tidal and nontidal wetlands. Foraging habitat effects for CM2-CM18 were not considered adverse  
13 as they reflect a conversion from one foraging habitat type (mostly cultivated lands) to another  
14 foraging habitat (wetlands). Habitat enhancement and management activities (CM11) could result in  
15 local adverse effects. In addition, maintenance activities associated with the long-term operation of  
16 the water conveyance facilities and other BDCP physical facilities could affect special-status bat  
17 habitat. A summary of combined impacts and NEPA effects and a CEQA conclusion follows the  
18 individual conservation measure discussions.

- 19 • *CM1 Water Facilities and Operation*: Construction of Alternative 4 conveyance facilities would  
20 result in the permanent loss of approximately 119 acres of roosting habitat and 5,443 acres of

1 foraging habitat in the study area. Development of the water conveyance facilities would also  
2 result in the temporary removal of up to 149 acres of roosting habitat and up to 3,801 acres of  
3 foraging habitat for special-status bats in the study area (Table 12-4-61). DWR identified two  
4 bridges with potential night roosting habitat in the forebay embankment area and tunnel muck  
5 area that could be permanently affected by construction for CM1.

- 6 • *CM2 Yolo Bypass Fisheries Enhancement*: Improvements in the Yolo Bypass would result in the  
7 conversion of approximately 2,025 acres of foraging habitat into wetlands that could still be  
8 used by bats for foraging. CM2 would also result in the permanent removal of 89 acres and  
9 temporary removal of 167 acres of roosting habitat for special-status bats. The maternity colony  
10 of Mexican free-tailed bats located at both ends of the Yolo Causeway bridge could also be  
11 affected during construction for CM2. Implementation of Mitigation Measure BIO-166, *Conduct*  
12 *Preconstruction Surveys for Roosting Bats and Implement Protective Measures*, would ensure that  
13 improvements in the Yolo Bypass avoid effects on roosting special-status bats.
- 14 • *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and  
15 inundation would result in the conversion of approximately 56,810 acres of foraging habitat into  
16 wetlands that could still be used by bats for foraging. Approximately 1,425 acres of roosting  
17 habitat for special-status bats would permanently affected. This habitat is of low value,  
18 consisting of a small, isolated patch surrounded by cultivated lands, and the species have a  
19 relatively low likelihood of being present in these areas. The roosting habitat that would be  
20 removed consists of relatively small and isolated patches along canals and irrigation ditches  
21 surrounded by cultivated lands in the Union Island and Roberts Island areas, and several small  
22 patches along the San Joaquin River. Mitigation Measure BIO-166, *Conduct Preconstruction*  
23 *Surveys for Roosting Bats and Implement Protective Measures*, requires that tidal natural  
24 communities restoration avoid effects on roosting special-status bats.
- 25 • *CM5 Seasonally Inundated Floodplain Restoration*: Levee construction associated with floodplain  
26 restoration would result in the conversion of an estimated 3,690 acres of foraging habitat into  
27 wetlands that could still be used by bats for foraging. CM5 would also result in the permanent  
28 removal of 57 acres and temporary removal of 45 acres of roosting habitat for special-status  
29 bats in the study area.
- 30 • *CM11 Natural Communities Enhancement and Management*: Implementation of the plan would  
31 result in an overall benefit to special-status bats within the study area through protection and  
32 restoration of their foraging and roosting habitats. The majority of affected acres would convert  
33 agricultural land to natural communities with higher potential foraging and roosting value, such  
34 as riparian, tidal and nontidal wetlands, and periodically inundated lands. Restored foraging  
35 habitats primarily would replace agricultural lands. Restored habitats are expected to be of  
36 higher function because the production of flying insect prey species is expected to be greater in  
37 restored wetlands and uplands on which application of pesticides would be reduced relative to  
38 affected agricultural habitats. Noise and visual disturbances during implementation of riparian  
39 habitat management actions could result in temporary disturbances that, if bat roost sites are  
40 present, could cause temporary abandonment of roosts. This effect would be minimized with  
41 implementation of Mitigation Measure BIO-166, *Conduct Preconstruction Surveys for Roosting*  
42 *Bats and Implement Protective Measures*.
- 43 • *Operations and maintenance*: Ongoing facilities operation and maintenance is expected to have  
44 little if any adverse effect on special-status bats. Postconstruction operation and maintenance of  
45 the above-ground water conveyance facilities and restoration infrastructure could result in

1 ongoing but periodic disturbances that could affect special-status bat use of the surrounding  
2 habitat in the Yolo Bypass, the Cache Slough area, and the north and south Delta (CZ 1, CZ 2, CZ  
3 4, CZ 5, CZ 6, CZ 7, and CZ 8). Maintenance activities would include vegetation management,  
4 levee and structure repair, and regrading of roads and permanent work areas. These effects,  
5 however, would be minimized with implementation of the mitigation measures described  
6 below.

- 7 • Injury and direct mortality: In addition, to habitat loss and conversion, construction activities,  
8 such as grading, the movement of construction vehicles or heavy equipment, and the installation  
9 of water conveyance facilities components and new transmission lines, may result in the direct  
10 mortality, injury, or harassment of roosting special-status bats. Construction activities related to  
11 conservation components could have similar affects. Preconstruction surveys would be  
12 conducted and if roosting or maternity sites are detected, seasonal restrictions would be placed  
13 while bats are present, as described below in the mitigation measures.

14 The following paragraphs summarize the combined effects discussed above and describe other  
15 BDCP conservation actions that offset or avoid these effects. NEPA effects and CEQA conclusions are  
16 also included.

### 17 ***Near-Term Timeframe***

18 Because water conveyance facilities construction is being evaluated at the project level, the near-  
19 term BDCP strategy has been analyzed to determine whether it would provide sufficient habitat  
20 protection or restoration in an appropriate timeframe to ensure that the construction effects would  
21 not be adverse under NEPA. Because the majority of affected acres would convert agricultural land  
22 to natural communities with higher potential foraging and roosting value, such as riparian, tidal and  
23 nontidal wetlands, and periodically inundated lands this analysis focuses only on losses to roosting  
24 habitat resulting for CM1, CM2, and CM4.

25 Alternative 4 would permanently or temporarily affect 959 acres of roosting habitat for special-  
26 status bats in the near-term as a result of implementing CM1 (268 acres roosting habitat), CM2 (256  
27 acres roosting habitat), and CM4 (435 acres roosting habitat). Effects from CM5 would all occur in  
28 the late long-term. Most of the roosting habitat losses would occur in an valley/foothill riparian.  
29 Typical NEPA project-level mitigation ratios for those natural communities that would be affected  
30 for roosting habitat would be 1:1 for restoration and protection of the valley/foothill riparian  
31 natural community. Using these ratios would indicate that 959 acres of riparian habitat should be  
32 restored and 959 acres of riparian habitat should be protected.

33 Implementation of BDCP actions in the near-term would result in an overall benefit to special-status  
34 bats within the study area through protection and restoration of their foraging and roosting habitats  
35 (Objective L1.1). BDCP actions in the near-term would restore 800 acres of riparian roosting and  
36 foraging habitat (Objective VFRNC1.1) and 21,288 acres of foraging habitat in natural communities  
37 and developed lands (Objective L1.1, Objective GNC1.2, Objective VPNC1.2, Objective L1.2, and  
38 Objective L2.11). In addition, the BDCP would protect 750 acres of riparian roosting and foraging  
39 habitat (Objective VFRNC1.2) and 41,445 acres of foraging habitat (Objective L1.1, Objective  
40 ASWNC1.1, Objective VPNC1.1, Objective MWNC1.1, Objective CLNC1.1, Objective GGS3.1, and  
41 Objective GNC1.1.). Restored foraging habitats would replace primarily cultivated lands. Restored  
42 habitats are expected to be of higher function because the production of flying insect prey species is  
43 expected to be greater in restored wetlands and uplands on which application of pesticides would

1 be reduced relative to affected agricultural habitats. Conservation components in the near-term  
2 would sufficiently offset the adverse effects resulting from near-term effects from Alternative 4.

3 In addition, activities associated with natural communities enhancement and protection and with  
4 ongoing facilities operations and maintenance could affect special-status bat use of surrounding  
5 habitat and could result in harassment, injury or mortality of bats. Mitigation Measure BIO-166,  
6 described below, requires preconstruction surveys to reduce these effects.

7 The BDCP also contains commitments to implement *AMM1 Worker Awareness Training, AMM2*  
8 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*  
9 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
10 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
11 *Material, and AMM10 Restoration of Temporarily Affected Natural Communities. These AMMs include*  
12 *elements that avoid or minimize the risk of construction activity affecting habitat and species*  
13 *adjacent to work areas and storage sites. The AMMs are described in detail in BDCP Appendix 3.C,*  
14 *Avoidance and Minimization Measures.*

### 15 **Late Long-Term Timeframe**

16 Alternative 4 as a whole would affect 2,050 acres of roosting habitat (Table 12-4-61). Because the  
17 majority of affected acres would convert agricultural land to natural communities with higher  
18 potential foraging and roosting value, such as riparian, tidal and nontidal wetlands, and periodically  
19 inundated lands this analysis focuses only on losses to roosting habitat for CM1, CM2, CM4, and CM5  
20 in the late long-term.

21 Implementation of BDCP actions in the late long-term would result in an overall benefit to special-  
22 status bats within the study area through protection and restoration of approximately 142,200 acres  
23 of their foraging and roosting habitats (Objective L1.1). Achieving this objective is intended to  
24 protect the highest quality natural communities and covered species habitat in the Plan Area to  
25 optimize the ecological value of the reserve system for conserving covered species and native  
26 biodiversity. The target for total protected and restored acreage is based on the sum of all natural  
27 community acreage targets. Achieving this objective is intended to protect and restore natural  
28 communities, species-specific habitat elements, and species diversity on a landscape-scale.  
29 Achieving this objective is also intended to conserve representative natural and seminatural  
30 landscapes in order to maintain the ecological integrity of large habitat blocks, including desired  
31 ecosystem function, and biological diversity.

32 BDCP actions in the late long-term would restore and protect 5,750 acres of riparian roosting and  
33 foraging habitat (Objective VFRNC1.1 and Objective VFRNC1.2), and 136,450 acres of foraging  
34 habitat (Objective L1.1, Objective GNC1.2, Objective VPNC1.2, Objective L1.2, Objective L2.11,  
35 Objective L1.1, Objective ASWNC1.1, Objective VPNC1.1, Objective MWNC1.1, Objective CLNC1.1,  
36 Objective GGS3.1, and Objective GNC1.1,) in natural communities and developed lands. Restored  
37 foraging habitats would replace primarily cultivated lands. Restored habitats are expected to be of  
38 higher function because the production of flying insect prey species is expected to be greater in  
39 restored wetlands and uplands on which application of pesticides would be reduced relative to  
40 affected agricultural habitats.

41 Should any of the special-status bat species be detected roosting in the study area, construction of  
42 water conveyance facilities and restoration activities would have an adverse effect on roosting  
43 special-status bats. Noise and visual disturbances and the potential for injury or mortality of

1 individuals associated within implementation of the restoration activities on active roosts would be  
2 minimized with implementation of Mitigation Measure BIO-166, *Conduct Preconstruction Surveys for*  
3 *Roosting Bats and Implement Protective Measures*. Conservation components would sufficiently  
4 offset the adverse effects resulting from late long-term effects from CM1, CM2, CM4, and CM5.

5 **NEPA Effects:** In the near-term, the losses of roosting habitat for special-status bats associated with  
6 implementing Alternative 4 are not expected to result in substantial adverse effects on special-status  
7 bats, either directly or through habitat modifications, and would not result in a substantial reduction  
8 in numbers or a restriction in the range of special-status bats because the BDCP has committed to  
9 protecting the acreage required to meet the typical mitigation ratios described above. In the late  
10 long-term, the losses of roosting habitat for special-status bats, in the absence of other conservation  
11 actions, would represent an adverse effect as a result of habitat modification and potential direct  
12 mortality of a special-status species. However, with habitat protection and restoration associated  
13 with the conservation components, guided by landscape-scale goals and objectives and by AMM1–  
14 AMM6, and AMM10, and with implementation of Mitigation Measure BIO-166, the effects of  
15 Alternative 4 as a whole on special-status bats would not be adverse.

16 **CEQA Conclusion:**

17 **Near-Term Timeframe**

18 Because water conveyance facilities construction is being evaluated at the project level, the near-  
19 term BDCP strategy has been analyzed to determine whether it would provide sufficient habitat  
20 protection or restoration in an appropriate timeframe to ensure that the construction impacts  
21 would be less than significant for CEQA purposes. Because the majority of affected acres would  
22 convert agricultural land to natural communities with higher potential foraging and roosting value,  
23 such as riparian, tidal and nontidal wetlands, and periodically inundated lands this analysis focuses  
24 only on losses to roosting habitat for CM1, CM2, and CM4.

25 Alternative 4 would permanently or temporarily affect 959 acres of roosting habitat for special-  
26 status bats in the near-term as a result of implementing CM1 (268 acres roosting habitat), CM2 (256  
27 acres roosting habitat), and CM4 (435 acres roosting habitat). Effects from CM5 would all occur in  
28 the late long-term. Most of the roosting habitat losses would occur in an valley/foothill riparian.

29 Typical CEQA project-level mitigation ratios for those natural communities that would be affected  
30 for roosting habitat would be 1:1 for restoration and protection of the valley/foothill riparian  
31 natural community. Using these ratios would indicate that 959 acres of riparian habitat should be  
32 restored and 959 acres of riparian habitat should be protected. Implementation of BDCP actions in  
33 the near-term would result in an overall benefit to special-status bats within the study area through  
34 protection and restoration of their foraging and roosting habitats (Objective L1.1). BDCP actions in  
35 the near-term would restore 800 acres of riparian roosting and foraging habitat (Objective  
36 VFRNC1.1) and 21,288 acres of foraging habitat in natural communities and developed lands  
37 (Objective L1.1, Objective GNC1.2, Objective VPNC1.2, Objective L1.2, and Objective L2.11). In  
38 addition, the BDCP would protect 750 acres of riparian roosting and foraging habitat (Objective  
39 VFRNC1.2) and 41,445 acres of foraging habitat (Objective L1.1, Objective ASWNC1.1, Objective  
40 VPNC1.1, Objective MWNC1.1, Objective CLNC1.1, Objective GGS3.1, and Objective GNC1.1.).  
41 Restored foraging habitats would replace primarily cultivated lands. Restored habitats are expected  
42 to be of higher function because the production of flying insect prey species is expected to be greater  
43 in restored wetlands and uplands on which application of pesticides would be reduced relative to

1 affected agricultural habitats. Conservation components in the near-term would sufficiently offset  
2 the adverse effects resulting from near-term effects from Alternative 4.

3 In addition, activities associated with natural communities enhancement and protection and with  
4 ongoing facilities operations and maintenance could affect special-status bat use of surrounding  
5 habitat and could result in harassment, injury or mortality of bats. Mitigation Measure BIO-166,  
6 described below, requires preconstruction surveys to reduce these impacts to a less-than-significant  
7 level.

8 The permanent loss of roosting habitat from Alternative 4 would be mitigated through  
9 implementation of Mitigation Measure BIO-166, which would ensure there is no significant impact  
10 under CEQA on roosting special-status bats, either directly or through habitat modifications and no  
11 substantial reduction in numbers or a restriction in the range of special-status bats. The BDCP also  
12 contains commitments to implement AMM1-6 and AMM10. These AMMs include elements that  
13 avoid or minimize the risk of construction activity affecting habitat and species adjacent to work  
14 areas and storage sites. The AMMs are described in detail in BDCP Appendix 3.C, *Avoidance and*  
15 *Minimization Measures*.

### 16 **Late Long-Term Timeframe**

17 Alternative 4 as a whole would affect 2,050 acres of roosting habitat (Table 12-4-61). Because the  
18 majority of affected acres would convert agricultural land to natural communities with higher  
19 potential foraging and roosting value, such as riparian, tidal and nontidal wetlands, and periodically  
20 inundated lands this analysis focuses only on losses to roosting habitat for CM1, CM2, CM4, and CM5  
21 in the late long-term.

22 Implementation of BDCP actions in the late long-term would result in an overall benefit to special-  
23 status bats within the study area through protection and restoration of approximately 142,200 acres  
24 of their foraging and roosting habitats (Objective L1.1). Achieving this objective is intended to  
25 protect the highest quality natural communities and covered species habitat in the Plan Area to  
26 optimize the ecological value of the reserve system for conserving covered species and native  
27 biodiversity. The target for total protected and restored acreage is based on the sum of all natural  
28 community acreage targets. Achieving this objective is intended to protect and restore natural  
29 communities, species-specific habitat elements, and species diversity on a landscape-scale.  
30 Achieving this objective is also intended to conserve representative natural and seminatural  
31 landscapes in order to maintain the ecological integrity of large habitat blocks, including desired  
32 ecosystem function, and biological diversity.

33 BDCP actions in the late long-term would restore and protect 5,750 acres of riparian roosting and  
34 foraging habitat (Objective VFRNC1.1 and Objective VFRNC1.2), and 136,450 acres of foraging  
35 habitat (Objective L1.1, Objective GNC1.2, Objective VPNC1.2, Objective L1.2, Objective L2.11,  
36 Objective L1.1, Objective ASWNC1.1, Objective VPNC1.1, Objective MWNC1.1, Objective CLNC1.1,  
37 Objective GGS3.1, and Objective GNC1.1,) in natural communities and developed lands. Restored  
38 foraging habitats would replace primarily cultivated lands. Restored habitats are expected to be of  
39 higher function because the production of flying insect prey species is expected to be greater in  
40 restored wetlands and uplands on which application of pesticides would be reduced relative to  
41 affected agricultural habitats.

42 Should any of the special-status bat species be detected roosting in the study area, construction of  
43 water conveyance facilities and restoration activities would have an adverse effect on roosting

1 special-status bats. Noise and visual disturbances and the potential for injury or mortality of  
2 individuals associated within implementation of the restoration activities on active roosts would be  
3 minimized with implementation of Mitigation Measure BIO-166, *Conduct Preconstruction Surveys for*  
4 *Roosting Bats and Implement Protective Measures*. Conservation components would sufficiently  
5 offset the adverse effects resulting from late long-term effects from CM1, CM2, CM4, and CM5.

6 The permanent loss of roosting habitat from Alternative 4 would be mitigated through  
7 implementation of Mitigation Measure BIO-166, which would ensure there is no significant impact  
8 on roosting special-status bats, either directly or through habitat modifications, and no substantial  
9 reduction in numbers or a restriction in the range of special-status bats. Therefore, Alternative 4  
10 would not result in a significant impact on special-status bats under CEQA.

### 11 **Mitigation Measure BIO-166: Conduct Preconstruction Surveys for Roosting Bats and** 12 **Implement Protective Measures**

13 The following measure was designed to avoid and minimize adverse effects on special-status  
14 bats. However, baseline data are not available or are limited on how bats use the study area, and  
15 on individual numbers of bats and how they vary seasonally. Therefore, it is difficult to  
16 determine if there would be a substantial reduction in species numbers. Bat species with  
17 potential to occur in the study area employ varied roost strategies, from solitary roosting in  
18 foliage of trees to colonial roosting in trees and artificial structures, such as buildings and  
19 bridges. Daily and seasonal variations in habitat use are common. To obtain the highest  
20 likelihood of detection, preconstruction bat surveys will be conducted by DWR and will include  
21 these components.

- 22 • Identification of potential roosting habitat within project area.
- 23 • Daytime search for bats and bat sign in and around identified habitat.
- 24 • Evening emergence surveys at potential day-roost sites, using night-vision goggles and/or  
25 active full-spectrum acoustic monitoring where species identification is sought.
- 26 • Passive full-spectrum acoustic monitoring and analysis to detect bat use of the area from  
27 dusk to dawn over multiple nights.
- 28 • Additional on-site night surveys as needed following passive acoustic detection of special  
29 status bats to determine nature of bat use of the structure in question (e.g., use of structure  
30 as night roost between foraging bouts).
- 31 • Qualified biologists will have knowledge of the natural history of the species that could  
32 occur in the study area and experience using full-spectrum acoustic equipment. During  
33 surveys, biologists will avoid unnecessary disturbance of occupied roosts.

### 34 ***Preconstruction Bridges and Other Structure Surveys***

35 Before work begins on the bridge/structure, qualified biologists will conduct a daytime search  
36 for bat sign and evening emergence surveys to determine if the bridge/structure is being used  
37 as a roost. Biologists conducting daytime surveys would listen for audible bat calls and would  
38 use naked eye, binoculars, and a high-powered spotlight to inspect expansion joints, weep holes,  
39 and other bridge features that could house bats. Bridge surfaces and the ground around the  
40 bridge/structure would be surveyed for bat sign, such as guano, staining, and prey remains.

1 Evening emergence surveys will consist of at least one biologist stationed on each side of the  
2 bridge/structure watching for emerging bats from a half hour before sunset to 1–2 hours after  
3 sunset for a minimum of two nights within the season that construction would be taking place.  
4 Night-vision goggles and/or full-spectrum acoustic detectors shall be used during emergence  
5 surveys to assist in species identification. All emergence surveys would be conducted during  
6 favorable weather conditions (calm nights with temperatures conducive to bat activity and no  
7 precipitation predicted).

8 Additionally, passive monitoring with full-spectrum bat detectors will be used to assist in  
9 determining species present. A minimum of four nights of acoustic monitoring surveys will be  
10 conducted within the season that the construction would be taking place. If site security allows,  
11 detectors should be set to record bat calls for the duration of each night. To the extent possible,  
12 all monitoring will be conducted during favorable weather conditions (calm nights with  
13 temperatures conducive to bat activity and no precipitation predicted). The biologists will  
14 analyze the bat call data using appropriate software and prepare a report with the results of the  
15 surveys. If acoustic data suggest that bats may be using the bridge/structure as a night roost,  
16 biologists will conduct a night survey from 1–2 hours past sunset up to 6 hours past sunset to  
17 determine if the bridge is serving as a colonial night roost.

18 If suitable roost structures would be removed, additional surveys may be required to determine  
19 how the structure is used by bats, whether it is as a night roost, maternity roosts, migration  
20 stopover, or for hibernation.

#### 21 ***Preconstruction Tree Surveys***

22 If tree removal or trimming is necessary, qualified biologists will examine trees to be removed  
23 or trimmed for suitable bat roosting habitat. High-value habitat features (large tree cavities,  
24 basal hollows, loose or peeling bark, larger snags, palm trees with intact thatch, etc.) will be  
25 identified and the area around these features searched for bats and bat sign (guano, culled insect  
26 parts, staining, etc.). Riparian woodland, orchards, and stands of mature broadleaf trees should  
27 be considered potential habitat for solitary foliage roosting bat species.

28 If bat sign is detected, biologists will conduct evening visual emergence survey of the source  
29 habitat feature, from a half hour before sunset to 1–2 hours after sunset for a minimum of two  
30 nights within the season that construction would be taking place. Methodology should follow  
31 that described above for the bridge emergence survey.

32 Additionally, if suitable tree roosting habitat is present, acoustic monitoring with a bat detector  
33 will be used to assist in determining species present. These surveys would be conducted in  
34 coordination with the acoustic monitoring conducted for the bridge/structure.

#### 35 ***Protective Measures for Bats using Bridges/Structures and Trees***

36 Avoidance and minimization measures may be necessary if it is determined that bats are using  
37 the bridge/structure or trees as roost sites and/or sensitive bats species are detected during  
38 acoustic monitoring. Appropriate measures will be determined in coordination with CDFW and  
39 may include measures listed below.

- 40 • Disturbance of the bridge will be avoided between April 15 and September 15 (the  
41 maternity period) to avoid impacts on reproductively active females and dependent young.

- 1           • Installation of exclusion devices from March 1 through April 14 or September 15 through  
2           October 30 to preclude bats from occupying the bridge during construction. Exclusionary  
3           devices will only be installed by or under the supervision of an experienced bat biologist.
- 4           • Tree removal will be avoided between April 15 and September 15 (the maternity period) to  
5           avoid impacts on pregnant females and active maternity roosts (whether colonial or  
6           solitary).
- 7           • All tree removal will be conducted between September 15 and October 30, which  
8           corresponds to a time period when bats would not likely have entered winter hibernation  
9           and would not be caring for flightless young. If weather conditions remain conducive to  
10          regular bat activity beyond October 30<sup>th</sup>, later tree removal may be considered in  
11          consultation with CDFW.
- 12          would.
- 13          • Trees will be removed in pieces, rather than felling the entire tree.
- 14          • If a maternity roost is located, whether solitary or colonial, that roost will remain  
15          undisturbed with a buffer as determined in consultation with CDFW until September 15 or  
16          until a qualified biologist has determined the roost is no longer active.
- 17          • If a non-maternity roost is found, that roost will be avoided and an appropriate buffer  
18          established in consultation with CDFW. Every effort should be made to avoid the roost, as  
19          methods to evict bats from trees are largely untested. However, if the roost cannot be  
20          avoided, eviction would be attempted and procedures designed in consultation with CDFW  
21          to reduce the likelihood of mortality of evicted bats. In all cases:
- 22           ○ Eviction will not occur before September 15<sup>th</sup> and will match the timeframe for tree  
23           removal approved by CDFW.
- 24           ○ Qualified biologists will carry out or oversee the eviction tasks and monitor the tree  
25           trimming/removal.
- 26           ○ Eviction will take place late in the day or in the evening to reduce the likelihood of  
27           evicted bats falling prey to diurnal predators.
- 28           ○ Eviction will take place during weather and temperature conditions conducive to bat  
29           activity.
- 30           ○ Special-status bat roosts would not be disturbed.
- 31          Eviction procedures may include but are not limited to:
- 32           ○ Pre-eviction surveys to obtain data to inform the eviction approach and subsequent  
33           mitigation requirements. Relevant data may include the species, sex, reproductive status  
34           and/or number of bats using the roost, and roost conditions themselves such as  
35           temperature and dimensions. Surveys may include visual emergence, night vision,  
36           acoustic, and/or capture.
- 37           ○ Structural changes may be made to the roost, performed without harming bats, such  
38           that the conditions in the roost are undesirable to roosting bats and the bats leave on  
39           their own (e.g., open additional portals so that temperature, wind, light and  
40           precipitation regime in the roost change).

- Noninjurious harassment at the roost site to encourage bats to leave on their own, such as ultrasound deterrents or other sensory irritants.
- Prior to removal/trimming, after other eviction efforts have been attempted, any confirmed roost tree would be shaken, repeatedly struck with a heavy implement such as an axe and several minutes should pass before felling trees or trimming limbs to allow bats time to arouse and leave the tree. The biologists should search downed vegetation for dead and injured bats. The presence of dead or injured bats would be reported to CDFW.

Compensatory mitigation for the loss of roosting habitat will also be determined through consultation with CDFW and may include the construction and installation of suitable replacement habitat onsite. Depending on the species and type of roost lost, various roost replacement habitats have met with some success (e.g., bat houses, “bat bark,” planting cottonwood trees, leaving palm thatch in place rather than trimming). The creation of natural habitat onsite is generally preferable to artificial.

Artificial roosts are often unsuccessful, and care must be taken to determine as closely as possible the conditions in the natural roost to be replaced. Even with such care, artificial habitat may fail. Several artificial roosts have been highly successful in replacing bridge roost habitat when incorporated into new bridge designs. “Bat bark” has been successfully used by Arizona Department of Game and Fish to create artificial crevice-roosting bat habitat mounted on pine trees (Mering and Chambers 2012: 765). Bat houses have at best an inconsistent track record but information is mounting on how to create successful houses. There is no single protocol or recipe for bat-house success. Careful study of the roost requirements of the species in question; the particular conditions at the lost roost site including temperature, orientation of the openings, airflow, internal dimensions and structures (cavity vs. crevice, etc.) should increase the chances of designing a successful replacement.

Restoring riparian woodland with plantings shows signs of success in Colorado. Western red bat activity has been positively correlated with increased vegetation and tree growth, canopy complexity and restoration acreage at cottonwood-willow restoration sites along the Lower Colorado River (Broderick 2012: 39). These complex woodland areas would ultimately provide a wider range of bat species with preferred roost types, including both foliage-roosting and crevice-/cavity-roosting bats.

### **Impact BIO-167: Indirect Effects of Plan Implementation on Special-Status Bats**

Construction activities associated with water conveyance facilities, conservation components and ongoing habitat enhancement, as well as operations and maintenance of above-ground water conveyance facilities, including the transmission facilities, could result in ongoing periodic postconstruction disturbances and noise with localized effects on special-status bats and their roosting habitat over the term of the BDCP.

Water conveyance facilities operations and maintenance activities would include vegetation and weed control, ground squirrel control, canal maintenance, infrastructure and road maintenance, levee maintenance, and maintenance and upgrade of electrical systems. While maintenance activities are not expected to remove special-status bat habitat, operation of equipment could disturb small areas of vegetation around maintained structures and could result in disturbances to roosting bats, if present. Mitigation Measure BIO-166, *Conduct Preconstruction Surveys for Roosting Bats and Implement Protective Measures*, is available to address these adverse effects.

1 Increased exposure to methylmercury associated with tidal natural communities restoration would  
2 potentially indirectly affect special-status bat species. *CM12 Methylmercury Management* describes  
3 the process by which tidal natural communities restoration may increase methyl mercury levels in  
4 wetlands in the study area. Mercury has been found in high concentrations in some bat species, such  
5 as the Indiana bat. Many bat species forage heavily on aquatic insects, which might result in rapid  
6 bioaccumulation (Evers et al. 2012). Measures described in *CM12 Methylmercury Management* are  
7 expected to reduce the effects of methylmercury on special-status bat species resulting from BDCP  
8 tidal natural communities restoration.

9 **NEPA Effects:** Implementation of the Mitigation Measure BIO-166 for special-status bats would  
10 avoid the potential for substantial adverse effects on roosting special-status bats, either indirectly or  
11 through habitat modifications. This mitigation measure would also avoid and minimize effects that  
12 could substantially reduce the number of special-status bats, or restrict species' range. Therefore,  
13 the indirect effects of Alternative 4 would not have an adverse effect on special-status bats.

14 **CEQA Conclusion:** Indirect effects from conservation components operations and maintenance as  
15 well as construction-related noise and visual disturbances could have a significant impact on  
16 special-status bat species, either indirectly or through habitat modifications. Mitigation Measure  
17 BIO-166, *Conduct Preconstruction Surveys for Roosting Bats and Implement Protective Measures*,  
18 would reduce this impact to a less-than-significant level and ensure Alternative 4 would not result in  
19 a substantial reduction in numbers or a restriction in the range of species.

20 **Mitigation Measure BIO-166: Conduct Preconstruction Surveys for Roosting Bats and**  
21 **Implement Protective Measures**

22 See Mitigation Measure BIO-166 under Impact BIO-166.

23 **Impact BIO-168: Periodic Effects of Inundation of Special-Status Bat Habitat as a Result of**  
24 **Implementation of Conservation Components**

25 Flooding of the Yolo Bypass from *CM2 Yolo Bypass Fisheries Enhancement* would periodically affect  
26 324 acres of roosting habitat and 21,265 acres of foraging habitat for special-status bats in the study  
27 area (Table 12-4-61).

28 *CM5 Seasonally Inundated Floodplain Restoration* would periodically inundate up to 411 acres of  
29 roosting habitat and 10,137 acres of foraging habitat for special-status bats (Table 12-4-61).  
30 Potential roosting trees are likely to be retained within seasonally flooded areas, although high  
31 velocity flooding could uproot some trees. Seasonal flooding would not adversely affect foraging  
32 habitat for the species. The overall effect of seasonal inundation in existing riparian natural  
33 communities may instead be beneficial. Historically, flooding was the main natural disturbance  
34 regulating ecological processes in riparian areas, and flooding promotes the germination and  
35 establishment of many native riparian plants. In the late long-term, seasonal inundation in areas  
36 currently occupied by riparian vegetation may contribute to the establishment of high-value habitat  
37 for special-status bats that use riparian habitats.

38 **NEPA Effects:** The periodic losses of roosting and foraging habitat for special-status bats associated  
39 with implementing Alternative 4 are not expected to result in substantial adverse effects on special-  
40 status bats, either directly or through habitat modifications and would not result in a substantial  
41 reduction in numbers or a restriction in the range of special-status bats. Mitigation Measure BIO-  
42 166, *Conduct Preconstruction Surveys for Roosting Bats and Implement Protective Measures*, is

1 available to address any effects of periodic inundation on special-status bats and roosting habitat.  
2 Therefore, Alternative 4 would not adversely affect the species.

3 **CEQA Conclusion:** Periodic inundation under CM2 and floodplain restoration under CM5 would  
4 periodically affect foraging and roosting habitat for special-status bats in the study area. Any impact  
5 of periodic inundation on special-status bats would be mitigated through implementation of  
6 Mitigation Measure BIO-166, which would ensure there is no significant impact on roosting special-  
7 status bats, either directly or through habitat modifications and no substantial reduction in numbers  
8 or a restriction in the range of special-status bats.

9 **Mitigation Measure BIO-166: Conduct Preconstruction Surveys for Roosting Bats and**  
10 **Implement Protective Measures**

11 See Mitigation Measure BIO-166 under Impact BIO-166.

12 **Plant Species**

13 **Vernal Pool Plants**

14 Five covered plant species and 12 noncovered special-status plant species occur in vernal pools in  
15 the study area (Tables 12-2 and 12-3, summarized in Table 12-4-62). The vernal pool habitat model  
16 used for the impact analysis was based on vegetation types and associations from various data sets  
17 which were used to create maps showing the distribution of vernal pool habitat in the study area  
18 according to three habitat types in which these species are known to occur, including vernal pool  
19 complex, degraded vernal pool complex, and alkali seasonal wetland habitat. Vernal pool complex  
20 habitat consists of vernal pools and uplands that display characteristic vernal pool and swale visual  
21 signatures that have not been significantly impacted by agricultural or development practices.  
22 Degraded vernal pool complex habitat consists of habitat that ranges from areas with vernal pool  
23 and swale visual signatures that display clear evidence of significant disturbance due to plowing,  
24 discing, or leveling to areas with clearly artificial basins such as shallow agricultural ditches,  
25 depressions in fallow fields, and areas of compacted soils in pastures. Because wetlands in the  
26 degraded vernal pool complex are inundated during the wet season and may have historically been  
27 located in or near areas with natural vernal pool complex, they may support individuals or small  
28 populations of species that are found in vernal pools and swales. However, they do not possess the  
29 full complement of ecosystem and community characteristics of natural vernal pools, swales and  
30 their associated uplands and they are generally ephemeral features that are eliminated during the  
31 course of normal agricultural practices. A small amount of alkali seasonal wetland habitat was  
32 included in the model because alkaline vernal pools are also present in some areas mapped as alkali  
33 seasonal wetland.

34 Because each of the vernal pool species addressed in this EIR/EIS have specific microhabitat  
35 affinities, and because vernal pool habitat within the study area is highly heterogeneous with  
36 respect to habitat parameters such as soil type and pool depth, the vernal pool habitat model greatly  
37 overestimates the extent of habitat in the study area occupied by each species. However, the vernal  
38 pool habitat model is likely to encompass all or most of the potential area within which special-  
39 status vernal pool plant species would occur. Therefore, it is not likely to underestimate the extent  
40 of occupied habitat or to underestimate the effects of Alternative 4.

41 Full implementation of Alternative 4 would include the following conservation actions over the term  
42 of the BDCP to benefit covered vernal pool plants (BDCP Chapter 3.3, Conservation Strategy).

- 1 • Protect at least two currently unprotected occurrences of alkali milk-vetch in the Altamont Hills
- 2 or Jepson Prairie core recovery areas (Objective VPP1.1, associated with CM3);
- 3 • Maintain no net loss of Heckard’s peppergrass in Conservation Zones 1, 8, or 11 within
- 4 restoration sites or within the area of affected tidal range of restoration projects (Objective
- 5 VPP1.2, associated with CM3 and CM9).

6 The construction and restoration activities covered under Alternative 4 could have impacts on  
 7 special-status vernal pool plants. Modeled habitat is within the proposed footprint for the  
 8 Alternative 4 water conveyance facilities and within the hypothetical footprint for restoration  
 9 activities. One known occurrence of a covered plant species is within the proposed footprint for the  
 10 Alternative 4 water conveyance facilities. Table 12-4-62 summarizes the acreage of modeled vernal  
 11 pool habitat in the study area and the number of occurrences of each special-status vernal pool plant  
 12 in the study area.

13 **Table 12-4-62. Summary of Impacts on Vernal Pool Plants under Alternative 4**

	Acres in Study Area	Acres Affected	Occurrences in Study Area	Occurrences Affected	Impacts
<b>Habitat</b>					
Vernal pool complex	9,557	23	0	0	Habitat loss from construction of the water conveyance facilities and tidal wetland restoration
Degraded vernal pool complex	2,576	380	0	0	Habitat loss from construction of the water conveyance facilities and tidal wetland restoration
Alkali Seasonal Wetland	188	2	0	0	Habitat loss from construction of the water conveyance facilities and tidal wetland restoration
Total	12,321	405	0	0	Habitat loss from construction of the water conveyance facilities and tidal wetland restoration
<b>Covered Species</b>					
Alkali milk-vetch	0	0	16	1	Population loss from construction of the water conveyance facilities
Dwarf downingia	0	0	12	0	None
Boggs Lake hedge-hyssop	0	0	1	0	None
Legenere	0	0	8	0	None
Heckard’s peppergrass	0	0	4 <sup>a</sup>	0	None
<b>Noncovered Species</b>					
Ferris’ milk-vetch	0	0	6	0	None
Vernal pool smallscale	0	0	2	0	None
Hogwallow starfish	0	0	0	0	None
Ferris’ goldfields	0	0	4	0	None

	Acres in Study Area	Acres Affected	Occurrences in Study Area	Occurrences Affected	Impacts
Contra Costa goldfields	0	0	7	0	None
Cotula-leaf navarretia	0	0	5	0	None
Baker's navarretia	0	0	3	0	None
Colusa grass	0	0	1	0	None
Bearded popcorn-flower	0	0	4	0	None
Delta woolly marbles	0	0	3	0	None
Saline clover	0	0	9	0	None
Solano grass	0	0	1	0	None

<sup>a</sup> One additional occurrence is in alkali seasonal wetlands.

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### Impact BIO-169: Effects on Habitat and Populations of Vernal Pool Plants

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Under Alternative 4, conservation measures would affect habitat for special-status vernal pool plants and one occurrence of a noncovered vernal pool plant.

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The individual effects of each relevant conservation measure are addressed below. A summary statement of the combined impacts and NEPA and CEQA conclusions follows the individual conservation measure discussions.

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- *CM1 Water Facilities and Operations*: Thirty-four acres of modeled habitat, 19.4 acres of critical habitat for Contra Costa goldfields, and one known occurrence of the 17 vernal pool plants are within the proposed footprint for the Alternative 4 water conveyance facilities. One occurrence of alkali milk-vetch in CZ 8 would be crossed by an electric transmission line. Under Alternative 4, construction and operation of the water conveyance facilities could affect undiscovered occurrences of the five covered vernal pool plants or the 12 noncovered special-status plants.

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The east-west transmission line would not affect four covered vernal pool species that occur in the study area. One occurrence each of dwarf downingia, legenere, Heckard's peppergrass, and Boggs Lake hedge-hyssop are within the east-west transmission line study area. However, the transmission line would not cross any of the occurrences.

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- *CM2 Yolo Bypass Fisheries Enhancement*: No modeled vernal pool habitat and no known occurrences of the 17 vernal pool plant species are within the hypothetical footprint for construction or operation of the Yolo Bypass fisheries enhancements. Therefore, construction and operation of CM2 would not affect the 17 covered or noncovered vernal pool plants.

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- *CM3 Natural Communities Protection and Restoration*: The BDCP proposes to benefit covered vernal pool plants by protecting 600 acres of vernal pool complex in CZs 1, 8, and 11 (Objective VPNC1.1). The protected vernal pool habitat would be managed and enhanced to sustain populations of native vernal pool species. These benefits also would accrue to any noncovered vernal pool plants occurring in the protected vernal pool complex.

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- *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration would result in the inundation of 372 acres of vernal pool complex and would, therefore, potentially affect special-status vernal pool plants. However, most of this habitat (370 acres) consists of degraded vernal pool habitat that is unlikely to contain special-status plants. In addition, 257.8 acres of critical habitat for Contra Costa goldfields could be affected. No known occurrences of covered or noncovered vernal pool plants would be affected by tidal restoration.

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- 1       • *CM5 Seasonally Inundated Floodplain Restoration*: No vernal pool habitat or occurrences of  
2       special-status vernal pool plants are present within areas proposed for floodplain restoration.  
3       Therefore, floodplain restoration and construction of new floodplain levees would have no  
4       impacts on covered and noncovered vernal pool plants.
- 5       • *CM6 Channel Margin Enhancement*: No vernal pool habitat or occurrences of special-status  
6       vernal pool plants are present within areas proposed for channel margin habitat enhancement.  
7       Therefore, channel margin habitat enhancement would have no impacts on covered and  
8       noncovered vernal pool plants.
- 9       • *CM7 Riparian Natural Community Restoration*: No vernal pool habitat or occurrences of special-  
10       status vernal pool plants are present within areas proposed for riparian habitat enhancement.  
11       Therefore, riparian habitat enhancement would have no impacts on covered and noncovered  
12       vernal pool plants.
- 13       • *CM8 Grassland Natural Community Restoration*: Although the vernal pool complex habitat  
14       includes grassland matrix within which the vernal pools occur, grassland restoration activities  
15       would take place in nongrasslands (ruderal habitat, cultivated land) or degraded grasslands that  
16       are not included within vernal pool complex habitat. Therefore, grassland communities  
17       restoration would have no impacts on covered and noncovered vernal pool plants.
- 18       • *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*: If, through unforeseen  
19       circumstances, BDCP activities result in the net loss of vernal pool habitat, CM9 would be  
20       implemented to compensate for that loss. Because vernal pool complex restoration would focus  
21       on habitat that had been cleared and leveled but maintained an intact duripan or claypan, the  
22       likelihood of affecting any special-status vernal pool plants would be low. However, vernal pool  
23       restoration could adversely affect remnant populations of special-status vernal pool plants or  
24       affect vernal pool habitat adjacent to the restoration areas.
- 25       • *CM10 Nontidal Marsh Restoration*: Nontidal marsh restoration would take place through  
26       conversion of cultivated lands. Therefore, nontidal marsh restoration would avoid vernal pool  
27       habitat and would have no impacts on covered and noncovered vernal pool plants.
- 28       • *CM22 Avoidance and Minimization Measures*: Effects on covered vernal pool plants potentially  
29       resulting from implementation of Alternative 4 would be avoided or minimized though *AMM11*  
30       *Covered Plant Species*, *AMM2 Construction Best Management Practices and Monitoring*, *AMM12*  
31       *Vernal Pool Crustaceans*, *AMM30 Transmission Line Design and Alignment Guidelines*, and *AMM37*  
32       *Recreation*. *AMM11* prohibits ground disturbance or hydrologic disturbance within 250 feet of  
33       existing vernal pools. In addition, *AMM11* specifies that individual projects be designed to avoid  
34       critical habitat for listed plant and wildlife vernal pool species *AMM12* limits the direct removal  
35       of vernal pool crustacean habitat to no more than 10 wetted acres and the indirect effect to no  
36       more than 20 wetted acres through the life of the Plan. *AMM12* also requires that that tidal  
37       natural communities restoration or other ground-disturbing covered activities in Conservation  
38       Zones 1 and 11 will not result in the adverse modification of primary constituent elements of  
39       critical habitat for vernal pool fairy shrimp, conservancy fairy shrimp, and vernal pool tadpole  
40       shrimp. These protections would also apply to critical habitat for Contra Costa goldfields, where  
41       it overlaps with critical habitat for these vernal pool crustaceans. *AMM30* specifies that the  
42       alignment of proposed transmission lines will be designed to avoid sensitive terrestrial and  
43       aquatic habitats when siting poles and towers, to the maximum extent feasible. *AMM37* requires  
44       that new recreation trails avoid populations of covered vernal pool plants.

1 In addition, the BDCP includes species-specific goals to benefit covered vernal pool plants. This  
2 includes protecting two occurrences of alkali milk-vetch (Objective VPP1.1) and requiring no net  
3 loss of Heckard's peppergrass occurrences (Objective VPP1.2).

4 In summary, no adverse effects on special-status vernal pool plants would be expected from  
5 implementing Alternative 4. Construction of the water conveyance facilities could affect one species,  
6 alkali milk-vetch, although adverse effects on this species would be avoided or minimized through  
7 implementation of AMM11 and AMM30. No other known occurrences of special-status vernal pool  
8 plants would be affected under Alternative 4. Beneficial effects on special-status vernal pool plants  
9 could occur by protecting 600 acres of vernal pool complex in CZs 1, 8, and 11 and by protecting  
10 occurrences of alkali milk-vetch.

11 The GIS analysis estimated that up to 403 acres of vernal pool complex could be adversely affected  
12 by covered activities. However, the actual effect on habitat for special-status vernal pool plants is  
13 expected to be much less than the estimated impact because the BDCP limits the total loss of wetted  
14 vernal pool habitat resulting from specific projects to 10 acres (approximately 67 acres of vernal  
15 pool complex) over the permit term (AMM12). At the proposed restoration ratios of 1:1 (prior to  
16 impact) and 1.5:1 (concurrent with impact), between 67 and 100.5 acres of vernal pool complex  
17 restoration would be required to compensate for the loss of modeled habitat for special-status  
18 vernal pool plants (Objective VPNC1.2, associated with CM9). This would be consistent with typical  
19 NEPA and CEQA project-level mitigation ratios for vernal pool impacts. The limitation on the loss of  
20 wetted vernal pool habitat will constrain the implementation of tidal restoration projects that are  
21 adjacent to vernal pool complex, which could affect the feasibility of restoring 65,000 acres of tidal  
22 habitat (Objective TPANC1.1, associated with CM4).

23 **NEPA Effects:** The loss of modeled habitat for vernal pool plant species would be minimized by  
24 AMM12 and offset through CM9, and effects of constructing CM1 on one occurrence of alkali milk-  
25 vetch would be avoided through AMM30. Therefore, Alternative 4 would not result in adverse  
26 effects on covered and noncovered vernal pool plant species.

27 **CEQA Conclusion:** Because loss of modeled habitat for vernal pool plant species would be offset  
28 through restoration, and because impacts on occurrences of covered vernal pool plants would be  
29 avoided, implementation of Alternative 4 would not result in a reduction in the range or numbers of  
30 17 covered and noncovered special-status vernal pool plants in the study area. Therefore, impacts  
31 on covered and noncovered vernal pool plant species would be less than significant. No mitigation is  
32 required.

### 33 **Alkali Seasonal Wetland Plants**

34 Five covered species and three noncovered plants occur in alkali seasonal wetlands in the study area  
35 (Tables 12-2, 12-3, summarized in Table 12-4-63). Alkali seasonal wetland habitat was modeled  
36 separately for four covered plant species occurring in seasonal alkali wetlands.

37 The San Joaquin spearscale habitat model approximated the distribution of suitable San Joaquin  
38 spearscale habitat in the study area according to the species' preferred habitat types, intersected  
39 with soil series and slope position. Historical and current records of San Joaquin spearscale in the  
40 study area indicate that its current distribution is limited to alkaline soil areas with shallow basin or  
41 swale microtopography along the western border. The vegetation cover of the alkaline soils is  
42 typically a combination of alkaline soil-adapted species and annual grasses, including annual  
43 ryegrass and Mediterranean barley. Habitat types used for the model included alkali seasonal

1 wetlands, vernal pool complex, and grasslands. Soil series used in the model consisted of either clays  
2 or clay loams with alkaline horizons. San Joaquin spearscale typically occurs in swales or in level  
3 terrain but occasionally occurs on the lower slopes adjacent to streams or swales or where seeps are  
4 present. Because some of the soil series with which San Joaquin spearscale is associated can occur  
5 on hillsides, slope was used to limit the extent of the model to the toe of the slope where these soils  
6 occur by excluding areas with slope greater than 1%. Land uses that are incompatible with the  
7 species' habitat requirements, such as modeled habitat polygons falling on leveled or developed  
8 lands, were removed from the model.

9 Modeled habitat for brittlescale was mapped as hydrologic features such as stream corridors and  
10 playa pools located on alluvium associated with the Montezuma Block along the western boundary  
11 of the study area or on alluvium associated with tertiary formations located along the southwest  
12 boundary of the study area. Stream corridors (intermittent and perennial) that intersected these  
13 geologic units were selected and truncated at the point at which they encountered the upper  
14 elevation of intertidal marsh. The corridors were buffered 50 feet (15.2 meters) on either side of  
15 their centerlines to capture the estimated maximum extent of alluvium deposits in proximity to the  
16 streams. Mapped habitat that was occupied by urban or intensive agricultural uses was removed  
17 from the model.

18 The habitat model for heartscale was based on the species distribution in the (Solano and Yolo  
19 Counties) and on the soil types and plant communities within which it occurs. Potential habitat was  
20 determined by intersecting the GIS coverage for three parameters: 1) Yolo and Solano County  
21 boundaries; 2) Solano, Pescadero, and Willows soils; and 3) grassland, alkali seasonal wetland, and  
22 vernal pool complex natural communities. The model excluded areas that have been developed or  
23 cultivated, i.e., where the topography, soils, and hydrology have been substantially altered.

24 Delta button-celery habitat was modeled as alkali seasonal wetland complex, vernal pool complex,  
25 other natural seasonal wetland, and grassland occurring on Brentwood, Grangerville, Marcuse,  
26 Solano, and Vernalis soil map units within the San Joaquin Basin (i.e., south of the mainstem San  
27 Joaquin River). For this species, land cover north of the Discovery Bay area where intensive  
28 agriculture was classified as annual grassland were manually deleted from the area of predicted  
29 habitat. Additionally, other areas of potential habitat that have been developed were also manually  
30 deleted.

31 Full implementation of Alternative 4 would include the following conservation actions over the term  
32 of the BDCP to benefit covered alkali seasonal wetland plants (BDCP Chapter 3.3, Conservation  
33 Strategy).

- 34 ● Of the 150 acres of alkali seasonal wetland complex protected under Objective ASWNC1.1, 600  
35 acres of vernal pool complex protected under Objective VPNC1.1, and 8,000 acres of grassland  
36 natural community protected under Objective GNC1.1, protect 75 acres of suitable brittlescale  
37 habitat and 75 acres of suitable heartscale habitat in Conservation Zones 1, 8, or 11 (Objective  
38 BRIT/HART/SJSC1.1, associated with CM3).
- 39 ● Protect two currently unprotected occurrences of San Joaquin spearscale in Conservation Zones  
40 1, 8, or 11 (Objective BRIT/HART/SJSC1.2, associated with CM3).

41 Modeled habitat for Delta button-celery would be adversely affected by construction of the  
42 Alternative 4 water conveyance facilities. One population of crownscale also would be adversely  
43 affected by construction of the water conveyance facilities. Modeled habitat for brittlescale and  
44 heartscale could be adversely affected by tidal habitat restoration. One occurrence each of

1 heartscale and Heckard's peppergrass could be affected by tidal habitat restoration. No adverse  
 2 effects on palmate-bracted bird's-beak or recurved larkspur would be expected. Table 12-4-63  
 3 summarizes the acreage of modeled alkali seasonal wetland habitat in the study area and the  
 4 number of occurrences of each special-status alkali seasonal wetland plant in the study area.

5 **Table 12-4-63. Summary of Impacts on Seasonal Alkali Wetland Plants under Alternative 4**

	Acres in Study Area	Acres Affected	Occurrences in Study Area	Occurrences Affected	Impacts
<b>Habitat</b>					
San Joaquin spearscale modeled habitat	14,933	761	0	0	Habitat loss from construction of water conveyance facilities, construction of Yolo Bypass fisheries enhancements, tidal habitat restoration, and floodplain restoration levee construction
Brittlescale modeled habitat	451	4	0	0	Habitat loss from tidal habitat restoration
Heartscale modeled habitat	6,528	306	0	0	Habitat loss from tidal habitat restoration
Delta button-celery modeled habitat	3,361 <sup>a</sup>	95	0	0	Habitat loss from construction of water conveyance facilities
Alkali seasonal wetlands	3,723	75	0	0	Habitat loss from tidal restoration and Yolo Bypass Fisheries enhancements
<b>Covered Species</b>					
San Joaquin spearscale	0	0	19	1	Population loss from tidal habitat restoration
Brittlescale	0	0	8	0	None
Heartscale	0	0	3	0	None
Delta button-celery	0	0	1 <sup>b</sup>	0	None
Heckard's peppergrass	0	0	1 <sup>c</sup>	1	Population loss from tidal habitat restoration
<b>Noncovered Species</b>					
Crownscale	0	0	17	1	Population loss from construction of water conveyance facilities
Palmate-bracted bird's-beak	0	0	1	0	None
Recurved larkspur	0	0	4	0	None
<sup>a</sup> A portion of this acreage consists of riparian habitat.					
<sup>b</sup> A second occurrence in study area is in riparian habitat.					
<sup>c</sup> Four additional occurrences of Heckard's peppergrass are associated with vernal pools.					

6

## 1 **Impact BIO-170: Effects on Habitat and Populations of Alkali Seasonal Wetland Plants**

2 Alternative 4 would have adverse effects on modeled habitat for San Joaquin spearscale, brittlescale,  
3 heartscale, and Delta button-celery. It would also have adverse effects on occurrences of San Joaquin  
4 spearscale, Heckard's peppergrass, and crownscale.

5 The individual effects of each relevant conservation measure are addressed below. A summary  
6 statement of the combined impacts and NEPA and CEQA conclusions follows the individual  
7 conservation measure discussions.

- 8 • *CM1 Water Facilities and Operations:* Under Alternative 4, construction of the Byron Tract  
9 Forebay would permanently remove 69 acres of modeled habitat for San Joaquin spearscale and  
10 18 acres of modeled habitat for Delta button-celery. This could be an adverse effect, depending  
11 on whether or not the affected modeled habitat is actually occupied by the species. Modeled  
12 habitat is assumed to encompass all potential habitat for a species and may therefore  
13 overestimate the area actually occupied. One known occurrence of San Joaquin spearscale near  
14 the forebay would be affected by facilities construction. Delta button-celery is not known to  
15 occur in CZ 8; the nearest known occurrence, in CZ 9, would not be affected.

16 Construction of the water conveyance facilities would permanently remove 0.2 acre of habitat  
17 occupied by crownscale at the Byron Tract Forebay. Part of the occurrence would be removed,  
18 but most of the occurrence would not be directly affected. However, a reduction of the  
19 population size, both in area and number of individuals present, would be an adverse impact.

20 Construction of the water conveyance facilities would not affect brittlescale, heartscale,  
21 Heckard's peppergrass, palmate-bracted bird's-beak, or recurved larkspur.

- 22 • *CM2 Yolo Bypass Fisheries Enhancement:* Construction of the Yolo Bypass improvements would  
23 permanently remove 56 acres of modeled habitat for San Joaquin spearscale. No known  
24 occurrences of San Joaquin spearscale would be affected. No modeled habitat and no known  
25 occurrences of the seven other alkali seasonal wetland plants are within the hypothetical  
26 footprint for construction or operation of the Yolo Bypass fisheries enhancements.

- 27 • *CM3 Natural Communities Protection and Restoration:* Alternative 4 would benefit alkali seasonal  
28 wetland plants by protecting 150 acres of alkali seasonal wetland in Conservation Zones 1, 8,  
29 and/or 11. The protected alkali seasonal wetland habitat would be managed and enhanced to  
30 sustain populations of native plant species.

- 31 • *CM4 Tidal Natural Communities Restoration:* Tidal habitat restoration is expected to convert  
32 alkali seasonal wetlands on the margins of tidal wetlands to freshwater or brackish tidal marsh.  
33 Tidal habitat restoration would convert 622 acres of modeled habitat for San Joaquin spearscale  
34 to tidal marsh. Tidal habitat restoration would permanently remove 4 acres of modeled habitat  
35 for brittlescale in CZ 1 near Lindsey Slough and in CZ 11 near Nurse Slough; however, the BDCP  
36 would allow up to 50 acres of modeled habitat to be converted to tidal wetlands. Tidal habitat  
37 restoration would remove 306 acres of modeled habitat for heartscale in CZ 1 in the vicinity of  
38 Jepson Prairie and in CZ 11 adjacent to Suisun Marsh. The extent to which the modeled habitat is  
39 actually occupied by these species is not known; modeled habitat is assumed to encompass all  
40 potential habitat for a species and may therefore overestimate the area actually occupied. Tidal  
41 habitat restoration could adversely affect an occurrence of Heckard's peppergrass at Hass  
42 Slough and an occurrence of San Joaquin spearscale at Main Prairie, both in CZ 1. These  
43 occurrences are based on historic records, and the whether or not the populations still exist is  
44 not known. In each case, the loss of modeled habitat and occurrences for covered species would

- 1 be adverse effects. Delta button celery, crownscale, palmate-bracted bird's-beak, and recurved  
2 larkspur would not be affected by tidal habitat restoration.
- 3 • *CM5 Seasonally Inundated Floodplain Restoration*: Floodplain restoration levee construction  
4 would result in the removal of 2 acres of modeled habitat for San Joaquin spearscale. No known  
5 occurrences of San Joaquin spearscale would be affected. No other alkali seasonal wetland  
6 habitat or occurrences of special-status alkali seasonal wetland plants are present within areas  
7 proposed for floodplain restoration. Therefore, floodplain restoration and construction of new  
8 floodplain levees would have no impacts on covered and noncovered alkali seasonal wetland  
9 plants.
  - 10 • *CM6 Channel Margin Enhancement*: No alkali seasonal wetland habitat or occurrences of special-  
11 status alkali seasonal wetland plants are present within areas proposed for channel margin  
12 habitat enhancement. Therefore, channel margin habitat enhancement would have no impacts  
13 on covered and noncovered alkali seasonal wetland plants.
  - 14 • *CM7 Riparian Natural Community Restoration*: No alkali seasonal wetland habitat or occurrences  
15 of special-status alkali seasonal wetland plants are present within areas proposed for riparian  
16 habitat enhancement. Therefore, riparian habitat enhancement would have no impacts on  
17 covered and noncovered alkali seasonal wetland plants.
  - 18 • *CM8 Grassland Natural Community Restoration*: Although the alkali seasonal wetland habitat  
19 includes the grassland matrix within which the wetlands occur, grassland restoration activities  
20 would take place in non-grasslands (ruderal habitat, cultivated land) or degraded grasslands  
21 that are not included within alkali seasonal wetland habitat. Therefore, grassland communities  
22 restoration would have no impacts on covered and noncovered alkali seasonal wetland plants.
  - 23 • *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*: Although some vernal pools  
24 are alkaline, alkali seasonal wetlands in the study area consist of alkali grassland, alkali meadow,  
25 or iodine bush scrub. Therefore, vernal pool restoration would avoid alkali seasonal wetland  
26 habitat and would have no impacts on covered and noncovered alkali seasonal wetland plants.  
27 In addition, the BDCP would compensate for the loss of alkali seasonal wetlands resulting from  
28 other conservation measures by restoring or creating 72 acres of alkali seasonal wetlands in  
29 Conservation Zones 1, 8, or 11 to achieve no net loss of this habitat.
  - 30 • *CM10 Nontidal Marsh Restoration*: Nontidal marsh restoration would take place through  
31 conversion of cultivated lands. Therefore, nontidal marsh restoration would avoid alkali  
32 seasonal wetland habitat and would have no impacts on covered and noncovered alkali seasonal  
33 wetland plants.
  - 34 • *CM22 Avoidance and Minimization Measures*: Effects on special-status alkali seasonal wetland  
35 plants potentially resulting from implementation of CM1 and CM4 would be avoided or  
36 minimized through *AMM2 Construction Best Management Practices and Monitoring*, *AMM11*  
37 *Covered Plant Species*, *AMM30 Transmission Line Design and Alignment Guidelines*, and *AMM37*  
38 *Recreation*. Under AMM11, surveys for covered plant species would be performed during the  
39 planning phase of projects, and any impacts on populations of covered species would be avoided  
40 through project design or subsequently minimized through AMM2. In addition, AMM11 prohibits  
41 ground disturbance or hydrologic disturbance within 250 feet of existing vernal pools, which  
42 would protect those species with modeled habitat that includes vernal pool complex.  
43 Occurrences of covered species in vernal pools near tidal wetlands would not be affected by  
44 tidal habitat restoration where critical habitat for vernal pool species is present and would be

1           avoided under AMM11. AMM30 requires that transmission line construction avoid any losses of  
2           alkali seasonal wetland complex natural community. AMM37 requires that new recreation trails  
3           avoid populations of covered alkali seasonal wetland plants.

4           In summary, only one known occurrence of a special-status alkali seasonal wetland species  
5           (crownscale) would be affected under Alternative 4, although one historic occurrence of Heckard's  
6           peppergrass and one historic occurrence of San Joaquin spearscale could also be affected by tidal  
7           restoration activities, if those occurrences still exist. AMM11 would be implemented to avoid an  
8           adverse effect on Heckard's peppergrass and San Joaquin spearscale occurrences.

9           The primary effect of Alternative 4 on special-status alkali seasonal wetland plants would be the loss  
10          of potential (i.e., modeled) habitat for San Joaquin spearscale, brittlescale, heartscale, and Delta  
11          button-celery. Approximately 72 acres of this habitat loss would be alkali seasonal wetlands. The  
12          actual effect on modeled habitat for alkali seasonal wetland plants is expected to be somewhat less  
13          than the estimated impact because some of this habitat is composed of vernal pool complex, and the  
14          BDCP limits the total loss of wetted vernal pool habitat to 10 acres (approximately 67 acres of vernal  
15          pool complex) over the permit term (AMM12). Loss of modeled habitat would be compensated for  
16          by restoring or creating vernal pool complex, alkali seasonal wetlands, and grasslands, in proportion  
17          to the amount of each habitat removed. At the proposed restoration ratios of 1:1 (prior to impact)  
18          and 1.5:1 (concurrent with impact), between 67 and 100.5 acres of vernal pool complex restoration  
19          would be required to compensate for the loss of modeled habitat composed of vernal pool complex  
20          (Objective VPNC1.2, associated with CM9). Approximately 72 acres of alkali seasonal wetlands  
21          would be restored (Objective ASWC1.2, associated with CM9). Loss of modeled habitat composed of  
22          grasslands would be compensated for by restoring grassland habitat on a 1:1 basis (Objective  
23          GNC1.1, associated with CM8). These compensation levels would be consistent with typical NEPA  
24          and CEQA project-level mitigation ratios for impacts on vernal pools, alkali seasonal wetlands, and  
25          grasslands.

26          The BDCP would have a small beneficial effect on special-status alkali seasonal wetland plants by  
27          protecting 150 acres of alkali seasonal wetland habitat. The BDCP also includes the species-specific  
28          goal that 75 acres of the protected alkali seasonal wetland habitat would be modeled habitat for  
29          brittlescale and heartscale (Objective BRIT/HART/SJSC1.1) and another goal that would protect 2  
30          occurrences of San Joaquin spearscale (Objective BRIT/HART/SJSC1.2). The benefits of habitat  
31          protection and management also would accrue to any noncovered alkali seasonal wetland plants  
32          occurring in the protected habitat.

33          **NEPA Effects:** Under Alternative 4, loss of modeled habitat for alkali seasonal wetland plant species  
34          would be offset through restoration of grassland, vernal pool, and alkali seasonal wetland habitat  
35          (CM8, CM9), and impacts on one occurrence of San Joaquin spearscale and one occurrence of  
36          Heckard's peppergrass would be avoided through AMM11. With avoidance and habitat restoration,  
37          these effects would not be adverse. The loss of two occurrences of crownscale, a non-covered  
38          species, would result in a reduction in the range and numbers of this species and would be an  
39          adverse effect. Adverse effects on crownscale could be avoided or offset through implementation of  
40          Mitigation Measure BIO-170.

41          **CEQA Conclusion:** Because loss of modeled habitat for alkali seasonal wetland plant species would  
42          be offset through restoration, and because impacts on occurrences of covered alkali seasonal  
43          wetland plants would be avoided, impacts on alkali seasonal wetlands as a result of implementing  
44          Alternative 4 would not result in substantially reducing the number or restricting the range of five

1 covered and two noncovered plant species. However, conservation measures that benefit or protect  
2 covered species do not apply to noncovered species, and portions of the crownscale population at  
3 Byron Tract Forebay would be lost, which would be a significant impact. Implementation  
4 of Mitigation Measure BIO-170 would reduce this impact to a less-than-significant level.

5 **Mitigation Measure BIO-170: Avoid, Minimize, or Compensate for Impacts on Noncovered**  
6 **Special-Status Plant Species**

7 DWR will evaluate all projects for their impacts on special-status plants, avoid or minimize  
8 impacts on species that occur on project sites, and compensate for impacts on species. All  
9 impacts on federally listed noncovered species, diamond-petaled California poppy, or caper-  
10 fruited tropidocarpum shall be avoided. Impacts on other special-status plant species shall be  
11 avoided to the extent feasible, and any unavoidable impacts shall be compensated for.

- 12 • DWR shall conduct surveys for the special-status plant species within and adjacent to all  
13 project sites. Special-status plant surveys required for project-specific permit compliance  
14 will be conducted during the planning phase to allow design of the individual restoration  
15 projects to avoid adverse modification of habitat for specified covered plants. The purpose  
16 of these surveys will be to verify that the locations of special-status plants identified in  
17 previous record searches or surveys are extant, identify any new special-status plant  
18 occurrences, and cover any portions of the project area not previously surveyed. The extent  
19 of mitigation of direct loss of or indirect effects on special-status plants will be based on  
20 these survey results.
- 21 • All surveys shall be conducted by qualified biologists using the using *Guidelines for*  
22 *Conducting and Reporting Botanical Inventories for Federally Listed, Proposed and Candidate*  
23 *Plants* (U.S. Fish and Wildlife Service 1996) and *Protocols for Surveying and Evaluating*  
24 *Impacts to Special Status Native Plant Populations and Natural Communities* (California  
25 Department of Fish and Game 2009) during the season that special-status plant species  
26 would be evident and identifiable, i.e., during their blooming season. Locations of special-  
27 status plants in proposed construction areas will be recorded using a GPS unit and flagged.
- 28 • The construction monitoring plan for the protection of covered fish, wildlife, and plant  
29 species, prepared by DWR before implementing an approved project, will provide for  
30 construction activity monitoring in areas identified during the planning stages and  
31 species/habitat surveys as having noncovered special-status plant species.
- 32 • Where surveys determine that a special-status plant species is present in or adjacent to a  
33 project site, direct and indirect impacts of the project on the species shall be avoided  
34 through the establishment of activity exclusion zones, within which no ground-disturbing  
35 activities shall take place, including construction of new facilities, construction staging, or  
36 other temporary work areas. Activity exclusion zones for special-status plant species shall  
37 be established around each occupied habitat site, the boundaries of which shall be clearly  
38 marked with standard orange plastic construction exclusion fencing or its equivalent. The  
39 establishment of activity exclusion zones shall not be required if no construction-related  
40 disturbances will occur within 250 feet of the occupied habitat site. The size of activity  
41 exclusion zones may be reduced through consultation with a qualified biologist and with  
42 concurrence from USFWS or CDFW based on project site-specific conditions.
- 43 • Where avoidance of impacts on a special-status plant species is infeasible, DWR will  
44 compensate for loss of individuals or occupied habitat of a special-status plant species

1 through the acquisition, protection, and subsequent management in perpetuity of other  
2 existing occurrences at a 2:1 ratio (occurrences affected:occurrences preserved). DWR will  
3 provide detailed information to USFWS and CDFW on the location of the preserved  
4 occurrences, quality of the preserved habitat, feasibility of protecting and managing the  
5 areas in-perpetuity, responsible parties, and other pertinent information. If suitable  
6 occurrences of a special-status plant species are not available for preservation, then the  
7 project shall be redesigned to remove features that would result in impacts on that species.

## 8 **Grassland Plants**

9 One covered plant and 11 noncovered special-status plants occur in grasslands in the study area  
10 (Tables 12-2, 12-3, summarized in Table 12-4-64). The only covered plant species occurring in  
11 grassland is Carquinez goldenbush. Carquinez goldenbush modeled habitat included hydrological  
12 features such as stream corridors on alluvium derived from the Montezuma Formation. Stream  
13 corridors (intermittent and perennial) that intersected these geologic units were selected and  
14 truncated at the point at which they encountered the upper elevation of intertidal marsh. The  
15 corridors were buffered 50 feet (15 meters) on either side in an effort to capture the estimated  
16 maximum extent of alluvium deposits in close proximity to the actual rivers/streams.

17 Full implementation of Alternative 4 would include the following conservation actions over the term  
18 of the BDCP to benefit covered grassland plants (BDCP Chapter 3.3, Conservation Strategy).

- 19 • Protect three unprotected occurrences of the Carquinez goldenbush in Conservation Zones 1  
20 and/or 11 (Objective CGB1.1, associated with CM3).
- 21 • Maintain and enhance occupied Carquinez goldenbush habitat to slow erosion and reverse  
22 degradation from livestock grazing (Objective CGB1.2, associated with CM11).

23 Of 78,047 acres of grasslands in the study area, Alternative 4 would adversely affect 2,948 acres  
24 under Alternative 4, including 4 acres that are modeled habitat for Carquinez goldenbush. For 10 of  
25 the plants, no known occurrences would be affected. One of five Parry's rough tarplant occurrences  
26 in the study area could be adversely affected by Alternative 4. Table 12-4-64 summarizes the  
27 acreage of grassland habitat in the study area and the number of occurrences of each special-status  
28 grassland plant in the study area.

1 **Table 12-4-64. Summary of Impacts on Grassland Plants under Alternative 4**

	Acres in Study Area	Acres Affected	Occurrences in Study Area	Occurrences Affected	Impacts
<b>Habitat</b>					
Carquinez goldenbush modeled habitat	1,346	4	0	0	Habitat loss from tidal habitat restoration
Grassland	78,047	2,857	0	0	Habitat loss from construction of water conveyance facilities, tidal restoration, Yolo Bypass Fisheries enhancements, floodplain restoration, and construction of conservation hatcheries
<b>Covered Species</b>					
Carquinez goldenbush	0	0	10	1	Population loss from tidal restoration
<b>Noncovered Species</b>					
Big tarplant	0	0	5	0	None
Round-leaved filaree	0	0	2	0	None
Pappose tarplant	0	0	7	0	None
Parry's rough tarplant	0	0	5	1	Periodic inundation of one occurrence as a result of Yolo Bypass operations
Small-flowered morning-glory	0	0	0	0	None
Diamond-petaled poppy	0	0	1	0	None
Stinkbells	0	0	1	0	None
Fragrant fritillary	0	0	4	0	None
Gairdner's yampah	0	0	0	0	None
Streamside daisy <sup>a</sup>	0	0	1	0	None
Caper-fruited tropidocarpum	0	0	8	0	None

<sup>a</sup> This species actually occurs in upland woodland, a habitat that has not been mapped or quantified in the BDCP.

2

3 **Impact BIO-171: Effects on Habitat and Populations of Grassland Plant Species**

4 Alternative 4 could have adverse effects on modeled habitat for Carquinez goldenbush. It could also  
 5 have adverse effects on one occurrence of Carquinez goldenbush and one occurrence of Parry's  
 6 rough tarplant. Although Alternative 4 would have no expected effects on known occurrences of the  
 7 other special-status plant species that occur in grasslands, the loss of 2,857 acres of grassland would  
 8 have the potential to affect undocumented populations of special-status grassland species.

1 The individual effects of each relevant conservation measure are addressed below. A summary  
2 statement of the combined impacts and NEPA and CEQA conclusions follows the individual  
3 conservation measure discussions.

- 4 • *CM1 Water Facilities and Operations*: No modeled habitat for Carquinez goldenbush and no  
5 known occurrences of the 12 special-status grassland plants are within the proposed footprint  
6 for the Alternative 4 water conveyance facilities. About 580 acres of grassland habitat would be  
7 affected by construction of the water conveyance facilities. However, this grassland habitat  
8 consists of small patches of herbaceous ruderal vegetation along levees that do not provide  
9 habitat for special-status grassland species. Therefore, under Alternative 4, construction and  
10 operation of the water conveyance facilities would not affect the 12 special-status grassland  
11 plants.
- 12 • *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo Bypass fisheries  
13 enhancements would remove 627 acres of grassland habitat. Yolo Bypass operations would  
14 result in more frequent and longer inundation of 1,597 acres of grasslands in the Yolo Bypass  
15 (CZ 2) that include habitat for one occurrence of Parry's rough tarplant. Parry's rough tarplant is  
16 a summer-blooming plant that occurs in areas subject to occasional inundation during the wet  
17 season, such as swales and seasonal wetlands. Increasing the frequency or duration of  
18 inundation may decrease the distribution in some areas by making some conditions too wet but  
19 would also expand the distribution into areas that may currently be too dry. Overall, changing  
20 the frequency and duration of inundation in the area of this occurrence should not result in a  
21 substantial change in the range of numbers of Parry's rough tarplant. Construction and  
22 operation of the Yolo Bypass Fisheries enhancements would not affect modeled habitat for  
23 Carquinez goldenbush or known occurrences of other special-status grassland plants.
- 24 • *CM3 Natural Communities Protection and Restoration*: Alternative 4 would preserve 8,000 acres  
25 of grassland habitat, some of which may contain modeled habitat for Carquinez goldenbush.  
26 Protection of grassland habitat may also protect undiscovered occurrences of special-status  
27 plant species.
- 28 • *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration would permanently  
29 remove 1,122 acres of grassland habitat, including 4 acres of modeled habitat for Carquinez  
30 goldenbush along the eastern side of Suisun Marsh. One occurrence of Carquinez goldenbush  
31 would be partially affected by tidal restoration. No other known occurrences of special-status  
32 grassland plants are within the hypothetical footprint of tidal restoration. Therefore, tidal  
33 restoration would have impacts on only one known occurrence of special-status grassland  
34 plants.
- 35 • *CM5 Seasonally Inundated Floodplain Restoration*: Construction of new floodplain levees would  
36 result in the loss of 85 acres of grassland habitat, periodic inundation of the floodplain would  
37 affect 513 acres of grassland habitat, and another 399 acres of grassland habitat would be  
38 converted to riparian habitat. However, no modeled habitat for Carquinez goldenbush or known  
39 occurrences of special-status grassland plants are present within areas proposed for floodplain  
40 restoration, and the affected grassland habitat consists of herbaceous ruderal vegetation that  
41 does not support special-status grassland plants. Therefore, floodplain restoration and  
42 construction of new floodplain levees would have no impacts on covered and noncovered  
43 grassland plants.
- 44 • *CM6 Channel Margin Enhancement*: No known occurrences of special-status grassland plants are  
45 present within areas proposed for channel margin habitat enhancement. Areas mapped as

1 grassland along levees that would be affected by channel margin habitat enhancement are small  
2 patches of ruderal vegetation along levees that do not provide habitat for special-status  
3 grassland species and are not modeled habitat for Carquinez goldenbush. Therefore, channel  
4 margin habitat enhancement would have no impacts on covered and noncovered grassland  
5 plants.

- 6 • *CM7 Riparian Natural Community Restoration*: No modeled habitat for Carquinez goldenbush or  
7 known occurrences of special-status grassland plants are present within areas proposed for  
8 riparian habitat enhancement. Therefore, riparian habitat enhancement would have no impacts  
9 on covered and noncovered grassland plants.
- 10 • *CM8 Grassland Natural Community Restoration*: Grassland restoration would restore 2,000 acres  
11 of grassland habitat. Restoration activities would take place in non-grasslands (ruderal habitat,  
12 cultivated land) or degraded grasslands. These areas do not currently provide habitat for  
13 special-status grassland plants. Therefore, grassland communities restoration would have no  
14 impacts on covered and noncovered grassland plants.
- 15 • *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*: Vernal pool complex includes  
16 vernal pools as well as the surrounding grassland matrix. Because the habitat to be restored  
17 would consist of areas of former vernal pool complex that have been leveled for cultivation,  
18 special-status grassland plants would not be present. Therefore, vernal pool complex  
19 restoration would not affect special-status grassland plants.
- 20 • *CM10 Nontidal Marsh Restoration*: Nontidal marsh restoration would take place through  
21 conversion of cultivated lands. Therefore, nontidal marsh restoration would avoid grassland  
22 habitat and would have no impacts on covered and noncovered grassland plants.
- 23 • *CM18 Conservation Hatcheries*: Construction of the conservation hatcheries would remove 35  
24 acres of grassland habitat. The removed habitat would consist of ruderal herbaceous vegetation  
25 that would not be likely to provide habitat for special-status grassland plants. Therefore,  
26 construction of the conservation hatcheries would not be expected to affect special-status  
27 grassland plants.
- 28 • *CM22 Avoidance and Minimization Measures*: Effects on Carquinez goldenbush potentially  
29 resulting from implementation of CM4 and potential effects on undiscovered populations of  
30 special-status grassland plants would be avoided or minimized through *AMM11 Covered Plant*  
31 *Species*, *AMM2 Construction Best Management Practices and Monitoring*, and *AMM37 Recreation*.  
32 Under AMM11, surveys for covered plant species would be performed during the planning  
33 phase of projects, and any impacts on populations of covered species would be avoided through  
34 project design or subsequently minimized through AMM2. AMM37 requires that new recreation  
35 trails would avoid populations of Carquinez goldenbush.

36 The primary effect of Alternative 4 on special-status grassland plants is the loss of potential (i.e.,  
37 modeled) habitat for Carquinez goldenbush, including part of one occurrence. Adverse effects on the  
38 occurrence will be minimized through AMM11. Protecting three unprotected occurrences of  
39 Carquinez goldenbush (Objective CGB1.1, associated with CM3) and maintaining and enhancing  
40 occupied habitat for Carquinez goldenbush (Objective CGB1.2, associated with CM11) would  
41 compensate for any residual effects. One occurrence of Parry's rough tarplant would be affected by  
42 CM2, but the effect is not expected to be adverse. No known occurrences of the other special-status  
43 grassland plants would be affected.

1 The BDCP would have a potential beneficial effect on special-status grassland plants by protecting  
2 8,000 acres of grassland habitat. To ensure that this habitat preservation would specifically benefit  
3 Carquinez goldenbush, the Plan proposes to protect at least three Carquinez goldenbush  
4 occurrences in CZs 1 and 11 that are currently not protected and to maintain and enhance occupied  
5 Carquinez goldenbush habitat. The preservation of modeled or potential habitat, together with  
6 avoidance and minimization of impacts on species occurrences, would reduce any effects of BDCP  
7 implementation on covered grassland plants to a level that is no longer adverse.

8 **NEPA Effects:** The loss of modeled and occupied habitat for Carquinez goldenbush would be offset  
9 through CM3, CM8, and CM11. Therefore, implementation of Alternative 4 would result in no  
10 adverse effects on special-status grassland plants.

11 **CEQA Conclusion:** Because adverse effects on special-status grassland plant species would be  
12 avoided or compensated for, Alternative 4 would not result in substantially reducing the numbers or  
13 restricting the range of one covered or 11 noncovered special-status grassland plants, and this  
14 impact would be less than significant. No mitigation is required.

### 15 **Valley/Foothill Riparian Plants**

16 Two covered plants and two noncovered special-status plants occur in valley/foothill riparian  
17 habitat in the study area (Tables 12-2, 12-3, summarized in Table 12-4-65). The valley/foothill  
18 riparian habitat model for Delta button-celery and slough thistle was mapped as all of the study area  
19 along the flood plain of the San Joaquin River between the levees from the Mossdale Bridge to  
20 Vernalis. Whether or not this modeled habitat is actually occupied by Delta button-celery and slough  
21 thistle is unknown; all known occurrences of these species within the area of modeled habitat are  
22 believed to be extirpated.

23 Full implementation of Alternative 4 would include the following conservation actions over the term  
24 of the BDCP to benefit covered valley/foothill riparian plants (BDCP Chapter 3.3, Conservation  
25 Strategy).

- 26 ● Protect and enhance two occurrences of delta button celery. If occurrences are not found in the  
27 Plan Area, establish self-sustaining occurrences of delta button celery for a total of two  
28 occurrences within the restored floodplain habitat on the mainstem of the San Joaquin River in  
29 Conservation Zone 7 between Mossdale and Vernalis. (Objective DBC1.1, associated with CM3  
30 and CM11).
- 31 ● Protect and enhance two occurrences of slough thistle. If occurrences are not found in the Plan  
32 Area, establish self-sustaining occurrences of slough thistle for a total of two occurrences within  
33 the 10,000 acres of restored floodplain on the mainstem of the San Joaquin River in  
34 Conservation Zone 7 between Mossdale and Vernalis (Objective ST1.1: associated with CM3 and  
35 CM11).

36 Of 17,966 acres of valley/foothill riparian habitat in the study area, Alternative 4 would adversely  
37 affect 869 acres, including 15 acres that are modeled habitat for Delta button-celery and 11 acres  
38 that are modeled habitat for slough thistle. Table 12-4-65 summarizes the acreage of modeled  
39 habitat for Delta button-celery and slough thistle and the number of occurrences of each special-  
40 status riparian plant in the study area.

1 **Table 12-4-65. Summary of Impacts on Valley/Foothill Riparian Plants under Alternative 4**

	Acres in Study Area	Acres Affected	Occurrences in Study Area	Occurrences Affected	Impacts
<b>Habitat</b>					
Delta button-celery modeled habitat	3,361a	15	0	0	Habitat loss from floodplain restoration
Slough thistle modeled habitat	1,834	11	0	0	Habitat loss from floodplain restoration
Valley/foothill riparian habitat	17,966	869	0	0	Habitat loss from construction of water conveyance facilities, tidal restoration, Yolo Bypass fisheries enhancements, and floodplain restoration
<b>Covered Species</b>					
Delta button-celery	0	0	1b	1	Occurrence potentially affected by floodplain restoration
Slough thistle	0	0	2	2	Occurrences potentially affected by floodplain restoration
<b>Noncovered Species</b>					
Northern California black walnut	0	0	1	0	None
Wright's trichocoronis	0	0	1	0	None
<sup>a</sup> A portion of this acreage consists of alkali seasonal wetland <sup>b</sup> A second occurrence is in alkali seasonal wetland					

2

3 **Impact BIO-172: Effects on Habitat and Populations of Valley/Foothill Riparian Plants**

4 No extant occurrences of Delta button-celery, slough thistle, Northern California black walnut, or  
 5 Wright's trichocoronis are present in the study area. Therefore, no impacts on special-status  
 6 valley/foothill riparian plants are expected. Modeled habitat for Delta button-celery and slough  
 7 thistle, which may support undocumented occurrences of these species, would be affected by  
 8 restoration of seasonally inundated floodplain.

9 The individual effects of each relevant conservation measure are addressed below. A summary  
 10 statement of the combined impacts and NEPA and CEQA conclusions follows the individual  
 11 conservation measure discussions.

- 12
- 13 • *CM1 Water Facilities and Operations*: Construction of the water conveyance facilities would  
 14 remove 43 acres of valley-foothill riparian habitat under Alternative 4. However, no modeled  
 15 habitat and no known occurrences of the four special-status valley/foothill riparian plants are  
 16 within the proposed footprint for the Alternative 4 water conveyance facilities. Therefore, under  
 17 Alternative 4, construction and operation of the water conveyance facilities would not affect  
 covered or noncovered special-status valley/foothill riparian plants.

- 1       • *CM2 Yolo Bypass Fisheries Enhancement*: Construction and operation of the Yolo Bypass fisheries  
2       enhancements would adversely affect 378 acres of valley/foothill riparian habitat. However, no  
3       modeled habitat and no known occurrences of the four special-status valley/foothill riparian  
4       plants are within the hypothetical footprint for construction or operation of the Yolo Bypass  
5       fisheries enhancements. Therefore, construction and operation of the Yolo Bypass Fisheries  
6       enhancements would not affect the covered or noncovered valley/foothill riparian plants.
- 7       • *CM3 Natural Communities Protection and Restoration*: Alternative 4 would protect 552 acres of  
8       existing valley/foothill riparian forest in CZ 7. This action would have no substantial effects on  
9       special-status valley/foothill plants because no extant occurrences of special-status  
10      valley/foothill plants are present in the study area.
- 11      • *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration would inundate 552 acres  
12      of valley/foothill riparian habitat. However, no modeled habitat and no known occurrences of  
13      the four special-status valley/foothill riparian plants are within the hypothetical footprint for  
14      tidal restoration. Therefore, tidal restoration would not affect the covered or noncovered  
15      valley/foothill riparian plants.
- 16      • *CM5 Seasonally Inundated Floodplain Restoration*: Floodplain restoration levee construction  
17      would remove 78 acres of valley/foothill riparian habitat, including 15 acres of modeled habitat  
18      for Delta button-celery along the San Joaquin River in CZ 7. In addition, floodplain restoration  
19      would result in more frequent and longer inundation of 18 acres of modeled habitat for Delta  
20      button-celery in this area. The area affected contains one historic occurrence of Delta button  
21      celery. This occurrence is considered to be extirpated, because all habitat for Delta button-celery  
22      at his location has been converted to agriculture (California Department of Fish and Wildlife  
23      2013). Therefore, Alternative 4 would not have an adverse effect on Delta button celery in CZ 7.

24      The BDCP proposes to benefit Delta button-celery at this location by restoring 5,000 acres of  
25      valley/foothill riparian habitat and re-introducing two occurrences of Delta button-celery.  
26      Although Delta button celery occurs in riparian habitat, it is not associated with woodland or  
27      scrub habitats; rather, it occurs in alkali seasonal wetlands in floodplains, which may or may not  
28      also contain adjacent woody riparian habitat. Restoring habitat for Delta button-celery may not  
29      be compatible with restoring woody riparian habitat. In addition, establishing new populations  
30      of Delta button-celery is an untried, unproven procedure and may not be feasible. Therefore, any  
31      beneficial effects on Delta button-celery would be speculative.

32      Floodplain restoration levee construction would remove 11 acres of modeled habitat for slough  
33      thistle and would result in more frequent and longer inundation of 6 acres of modeled habitat  
34      for slough thistle along the San Joaquin River in CZ 7. However, the BDCP would allow up to 50  
35      acres of modeled habitat to be converted to riparian habitat. Whether the affected modeled  
36      habitat is actually occupied by slough thistle is not known; however, of two historic occurrences  
37      of slough thistle present in the study area, only one is considered to be extirpated (California  
38      Department of Fish and Wildlife 2013). The BDCP would protect and enhance two occurrences  
39      of slough thistle. If occurrences are not found in the study area, then two, self-sustaining  
40      occurrences of slough thistle would be established using locally-sourced genetic material for a  
41      total of two occurrences within the restored floodplain habitat on the main stem of the San  
42      Joaquin River in Conservation Zone 7 between Mossdale and Vernalis. Establishing new  
43      populations of slough thistle is an untried, unproven procedure and may not be feasible.  
44      Therefore, any beneficial effects on slough thistle would be speculative.

1 One historic occurrence of Wright's trichocoronis in the study area near Lathrop (CZ 7) could  
2 also be affected by floodplain restoration. The occurrence is presumed to be extant because the  
3 presence or absence of suitable habitat has not been verified by field surveys (California  
4 Department of Fish and Wildlife 2013). However, the species has not been observed at this  
5 location for nearly a century, and habitat for Wright's trichocoronis, which would have been  
6 similar to that for Delta button celery and slough thistle, no longer appears to be present in  
7 aerial photographs of the area. Therefore, Alternative 4 would not be expected to have an  
8 adverse effect on Wright's trichocoronis.

- 9 • *CM6 Channel Margin Habitat Enhancement*: No modeled habitat or occurrences of special-status  
10 valley/foothill riparian plants are present within areas proposed for channel margin habitat  
11 enhancement. Therefore, channel margin habitat enhancement would have no impacts on  
12 covered and noncovered valley/foothill riparian plants.
- 13 • *CM7 Riparian Natural Community Restoration*: No extant occurrences of special-status  
14 valley/foothill riparian plants are present within areas proposed for riparian habitat  
15 restoration. Therefore, riparian habitat restoration would have no impacts on covered and  
16 noncovered valley/foothill riparian plants.
- 17 • *CM8 Grassland Natural Community Restoration*: No occurrences of special-status valley/foothill  
18 riparian plants are present within areas proposed for grassland communities restoration.  
19 Therefore, grassland communities restoration would have no impacts on covered and  
20 noncovered valley/foothill riparian plants.
- 21 • *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*: No occurrences of special-  
22 status valley/foothill riparian plants are present within areas proposed for vernal pool and  
23 alkali seasonal wetland complex restoration. Therefore, vernal pool complex restoration would  
24 have no impacts on covered and noncovered valley/foothill riparian plants.
- 25 • *CM10 Nontidal Marsh Restoration*: Nontidal marsh restoration would take place through  
26 conversion of cultivated lands. Therefore, nontidal marsh restoration would avoid  
27 valley/foothill riparian habitat and would have no impacts on covered and noncovered  
28 valley/foothill riparian plants.
- 29 • *CM22 Avoidance and Minimization Measures*: Effects on Delta button-celery and slough thistle  
30 potentially resulting from implementation of CM5 would be avoided or minimized through  
31 *AMM11 Covered Plant Species* and *AMM2 Construction Best Management Practices and*  
32 *Monitoring*. Under AMM11, surveys for covered plant species would be performed during the  
33 planning phase of projects, and any impacts on populations of covered species would be avoided  
34 through project design or subsequently minimized through AMM2.

35 Because no extant occurrences of special-status valley/foothill riparian plants are known to occur in  
36 the study area, Alternative 4 is not expected to adversely affect any special-status valley/foothill  
37 riparian plants. Modeled habitat for both Delta button-celery and slough thistle would be affected.  
38 Under AMM11, surveys for covered plants would be performed during the planning phase for  
39 floodplain restoration. If Delta button-celery or slough thistle were found to be present in the  
40 floodplain restoration area, then the project would be designed to avoid impacts on the populations.  
41 Therefore, Alternative 4 would not have an adverse effect on these species.

42 The BDCP proposes to benefit Delta button-celery and slough thistle by restoring 5,000 acres of  
43 valley/foothill riparian habitat and re-introducing two occurrences of both species. Establishing

1 new populations of Delta-button-celery or slough thistle would be a beneficial effect. However,  
2 establishing new populations is an untried, unproven procedure and may not be feasible.

3 **NEPA Effects:** Implementation of the BDCP under Alternative 4 would not have an adverse effect on  
4 special-status valley/foothill riparian plant species.

5 **CEQA Conclusion:** Under Alternative 4, the BDCP would not result in a reduction in the range and  
6 numbers of covered and noncovered valley/foothill riparian plants. This impact would be less than  
7 significant. No mitigation is required.

## 8 **Tidal Wetland Plants**

9 Seven covered plants and one noncovered special-status plant occur in tidal wetlands in the study  
10 area (Tables 12-2, 12-3, summarized in Table 12-4-66). Five tidal wetland habitat models were  
11 developed for the seven covered plant species occurring in tidal wetland habitat.

12 Modeled habitat for Mason's lilaepsis and Delta mudwort was mapped as areas within 10 feet (3  
13 meters) on either side of the landward boundary of tidal perennial aquatic land cover type, which  
14 was obtained from the BDCP GIS vegetation data layer.

15 The side-flowering skullcap model mapped the distribution of suitable habitat in the study area  
16 according to the species' habitat association with woody riparian habitat. The model selected Delta  
17 riparian vegetation types providing the habitat characteristics that side-flowering skullcap seems to  
18 require, namely, woody substrate in freshwater tidal areas. The model included vegetation subunits  
19 of the BDCP Valley Riparian natural community characterized by California dogwood, white alder,  
20 and arroyo willow.

21 The modeled habitat for soft bird's-beak consisted of pickleweed- and saltgrass-dominated  
22 vegetation units located west of the Antioch Bridge. Modeled habitat for these two plant species was  
23 mapped as areas within 10 feet (3 meters) on either side of the landward boundary of tidal  
24 perennial aquatic land cover types. The model used all Tidal Brackish Emergent Wetland polygons  
25 that were limited by specific vegetation units that are known to be closely associated with soft  
26 bird's-beak habitat.

27 Habitat for Delta tule pea and Suisun Marsh aster was modeled separately based on the salinity of  
28 the water. For the tidal freshwater emergent wetland BDCP land cover type, modeled habitat was  
29 mapped as the area within 10 feet (3 meters) of the landward side of the landward boundary,  
30 exclusively where this land cover type is adjacent to grassland, vernal pool complex, valley/foothill  
31 riparian, or cultivated land habitats cover types. For brackish water areas in and near Suisun Marsh,  
32 the model used all tidal brackish emergent wetland polygons within an elevation range of 7 to 10  
33 feet (2 to 3 meters) to capture elevations 1 foot (30 centimeters) below intertidal to 2 feet (60  
34 centimeters) above intertidal.

35 The modeled habitat for Suisun thistle in and near Suisun Marsh consists of all tidal brackish  
36 emergent wetland polygons with the appropriate vegetation. This included vegetation units  
37 dominated by saltscale, saltgrass, pickleweed, and broad-leaved peppergrass.

38 Full implementation of Alternative 4 would include the following conservation actions over the term  
39 of the BDCP to benefit covered tidal wetland plants (BDCP Chapter 3.3, Conservation Strategy).

- 1       • No net loss of Mason’s lilaopsis and delta mudwort occurrences within restoration sites, or  
2       within the area of affected tidal range of restoration projects (Objective DMW/ML1.1, associated  
3       with CM4 and CM11).
- 4       • No net loss of Delta tule pea and Suisun Marsh aster occurrences within restoration sites  
5       (Objective DTP/SMA1.1, associated with CM4 and CM11).
- 6       • Restore tidal inundation to wetlands in the Hill Slough Ecological Reserve and to the ponded  
7       area at Rush Ranch (Objective SBB/SuT1.1, associated with CM4).
- 8       • Complete seed banking of all existing Suisun Marsh populations and the representative genetic  
9       diversity using accepted seed banking protocols (Objective SBB/SuT1.2, associated with CM11).
- 10      • Establish a cultivated population of Suisun thistle from wild seed using accepted seed collection  
11      protocols (Objective SBB/SuT1.3, associated with CM11).
- 12      • Establish two occurrences of Suisun thistle in Conservation Zone 11 (Objective SBB/SuT1.4,  
13      associated with CM11).

14      Of 17,357 acres of tidal wetlands in the study area, Alternative 4 would affect 25 acres, including  
15      areas that are modeled habitat for Mason’s lilaopsis, Delta mudwort, side-flowering skullcap, Delta  
16      tule pea, Suisun Marsh aster, soft bird’s-beak, and Suisun thistle. Known occurrences of all of these  
17      species would be affected. In addition, three occurrences of Bolander’s water-hemlock, a noncovered  
18      special-status plant, could be affected by tidal habitat restoration. Table 12-4-66 summarizes the  
19      acreage of modeled habitat for covered tidal wetland species and the number of occurrences of each  
20      special-status tidal wetland plants in the study area.

1 **Table 12-4-66. Summary of Impacts on Tidal Wetland Plants under Alternative 4**

	Acres in Study Area	Acres Affected	Occurrences in Study Area	Occurrences Affected	Impacts
<b>Habitat</b>					
Delta mudwort/ Mason's lilaepsis modeled habitat	6,081	43	0	0	Habitat loss from construction of water conveyance facilities, tidal habitat restoration, Yolo Bypass fisheries enhancements, and floodplain restoration
Side-flowering skullcap modeled habitat	2,497	13	0	0	Habitat loss from construction of water conveyance facilities, tidal habitat restoration, and floodplain restoration
Soft bird's-beak modeled habitat	1,228	73	0	0	Habitat loss from tidal habitat restoration
Delta tule pea/Suisun Marsh aster modeled habitat	5,853	5	0	0	Habitat loss from construction of water conveyance facilities, tidal habitat restoration, Yolo Bypass fisheries enhancements, and floodplain restoration
Suisun thistle modeled habitat	1,281	73	0	0	Habitat loss from tidal habitat restoration
Tidal brackish emergent wetland	8,501	1	0	0	Habitat loss from tidal habitat restoration
Tidal freshwater emergent wetland	8,856	24	0	0	Habitat loss from construction of water conveyance facilities, tidal habitat restoration, Yolo Bypass fisheries enhancements, and floodplain restoration
<b>Covered Species</b>					
Delta mudwort	0	0	58	3	Occurrences affected by tidal habitat restoration
Delta tule pea	0	0	106	28	Occurrences affected by tidal habitat restoration
Mason's lilaepsis	0	0	181	22	Occurrences affected by construction of water conveyance facilities and tidal habitat restoration
Side-flowering skullcap	0	0	12	2	Occurrences affected by construction of water conveyance facilities
Soft bird's-beak	0	0	13	7	Occurrences affected by tidal habitat restoration
Suisun Marsh aster	0	0	164	29	Occurrences affected by construction of water conveyance facilities and tidal habitat restoration
Suisun thistle	0	0	4	0	None
<b>Noncovered Species</b>					
Bolander's water hemlock	0	0	8	3	Occurrences affected by tidal habitat restoration

2

1 **Impact BIO-173: Effects on Habitat and Populations of Tidal Wetland Plants**

2 Alternative 4 would have adverse effects on tidal marsh special-status plants through  
3 implementation of CM1, CM2, CM4, and CM5. No adverse effects are expected from implementation  
4 of CM3, or CM6–CM9.

5 The individual effects of each relevant conservation measure are addressed below. A summary  
6 statement of the combined impacts and NEPA and CEQA conclusions follows the individual  
7 conservation measure discussions.

- 8
- 9 • *CM1 Water Facilities and Operations:* Construction of the Alternative 4 water conveyance  
10 facilities would remove 34 acres of modeled habitat for delta mudwort and Mason’s lilaepsis, 4  
11 acres of modeled habitat for side-flowering skullcap, and 2 acres of modeled habitat for Delta  
12 tulle pea and Suisun Marsh aster. The extent to which modeled habitat is actually occupied by  
13 these species is not known; however, two occurrences of Delta tulle pea, seven occurrences of  
14 Mason’s lilaepsis, three occurrences of Suisun Marsh aster, and two occurrences of side-  
15 flowering skullcap in the study area could be affected by construction impacts. No known  
16 occurrences of the other covered and noncovered tidal wetland species would be affected by  
construction of the water conveyance facilities.
  - 17 • *CM2 Yolo Bypass Fisheries Enhancement:* Construction of the Yolo Bypass fisheries  
18 enhancements would remove 5 acres of modeled habitat for Mason’s lilaepsis and delta  
19 mudwort. The extent to which modeled habitat is actually occupied by these species is not  
20 known; however, no known occurrences in the study area would be affected. Yolo Bypass  
21 operations would result in more frequent and longer inundation of 8 acres of modeled habitat  
22 Delta tulle peas and Suisun Marsh aster. Two occurrences of Suisun Marsh aster could be affected  
23 by Yolo Bypass operations. Habitat for these species is normally periodically inundated or  
24 saturated; therefore, a small increase in the frequency and duration of periodic inundation of the  
25 habitat would not be expected to have a substantial effect.
  - 26 • *CM3 Natural Communities Protection and Restoration:* The BDCP proposes restoring or creating  
27 20 linear miles of transitional tidal areas within other natural communities that would be  
28 created or restored, including 3,000 acres of tidal brackish emergent wetland and 13,900 acres  
29 of tidal freshwater emergent wetland. In addition, the habitat and ecosystem functions of these  
30 areas would be maintained and enhanced. The BDCP does not specifically propose to protect  
31 any occurrences of tidal wetland plants nor does it propose active restoration of affected habitat  
32 or occurrences. Instead, the BDCP assumes that the 20 linear miles of restored transitional tidal  
33 areas will be passively colonized by the covered tidal wetland plants.
  - 34 • *CM4 Tidal Natural Communities Restoration:* Tidal habitat restoration would permanently  
35 remove 6 acres of modeled habitat for Mason’s lilaepsis and Delta mudwort. Habitat loss would  
36 occur through conversion of the species habitat (at and immediately above the tidal zone in  
37 marshes and along rivers and streams) to inundated tidal habitat. The extent to which modeled  
38 habitat is actually occupied by the species is not known; however, 14 of 181 known occurrences  
39 of Mason’s lilaepsis and three of 58 known occurrences of delta mudwort in the study area  
40 could be affected by tidal habitat restoration.
- 41 Tidal habitat restoration would remove 4 acres of modeled habitat for side-flowering skullcap.  
42 Whether the affected modeled habitat is actually occupied by side-flowering skullcap is not  
43 known; however, none of the 12 known occurrences in the study area would be affected.

1 Tidal habitat restoration would remove 2 acres of modeled habitat for Delta tule pea and Suisun  
2 Marsh aster. Habitat loss would result from conversion of the species habitat (at and  
3 immediately above the tidal zone in marshes and along rivers and streams) to inundated tidal  
4 habitat. However, the BDCP would allow up to 50 acres of modeled habitat to be converted to  
5 inundated tidal habitat. The extent to which modeled habitat is actually occupied by the species  
6 is not known; however, 26 of 112 known occurrences of Delta tule pea and 23 of 145  
7 occurrences of Suisun Marsh aster in the study area could be affected.

8 Tidal habitat restoration could affect 73 acres of modeled habitat for soft bird's-beak and Suisun  
9 thistle, including 1.3 acres of critical habitat. The extent to which modeled habitat is actually  
10 occupied by the species is not known; however, seven of 13 known occurrences of soft bird's-  
11 beak in the study area could be affected. None of the four known occurrences of Suisun thistle in  
12 the study area would be affected.

13 Tidal habitat restoration could affect three of eight known occurrences of Bolander's water-  
14 hemlock, a noncovered special-status species in the study area. Because Bolander's water-  
15 hemlock occurs in tidal marsh, it may benefit from tidal marsh restoration. However, site  
16 preparation, earthwork, and other site activities could adversely affect Bolander's water-  
17 hemlock through direct habitat removal.

- 18 • *CM5 Seasonally Inundated Floodplain Restoration*: Floodplain restoration levee construction  
19 would remove 3 acres of modeled habitat for Mason's lilaepsis and delta mudwort and 2 acres  
20 of modeled habitat for side-flowering skullcap. No known occurrences of these species in the  
21 study area would be affected by floodplain restoration.

22 Floodplain restoration would result in more frequent and longer inundation of 2 acres of  
23 modeled habitat for Mason's lilaepsis and delta mudwort, 18 acres of modeled habitat for side-  
24 flowering skullcap, and 1 acre of modeled habitat for Delta tule peas and Suisun Marsh aster. No  
25 known occurrences of these species in the study area would be affected by periodic inundation  
26 of restored floodplain habitat. Habitat for these species is normally periodically inundated or  
27 saturated; therefore, a small increase in the frequency and duration of periodic inundation of the  
28 habitat would not be expected to have a substantial effect.

- 29 • *CM6 Channel Margin Enhancement*: Effects of channel margin enhancement were not analyzed  
30 separately from the effects of tidal habitat restoration. Channel margin enhancement would  
31 have adverse effects on tidal wetland plants through direct removal and habitat modification.  
32 However, it would have beneficial effects on these species by improving the habitat functions for  
33 these species as a result of riprap removal and creation of floodplain benches. Side-flowering  
34 skullcap would benefit from installation of large woody material, which it appears to colonize.
- 35 • *CM7 Riparian Natural Community Restoration*: Riparian habitat restoration is not expected to  
36 adversely affect special-status tidal wetland plants. Preparatory work that involves habitat  
37 disturbance would occur during implementation of CM4 and CM5. Riparian plantings carried out  
38 for CM7 would be placed in floodplain areas, not in tidal wetlands.
- 39 • *CM8 Grassland Natural Community Restoration*: No tidal wetlands or occurrences of special-  
40 status tidal wetland plants are present within areas proposed for grassland communities  
41 restoration. Therefore, grassland communities restoration would have no impacts on covered  
42 and noncovered tidal wetland plants.
- 43 • *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*: No tidal wetlands or  
44 occurrences of special-status tidal wetland plants are present within areas proposed for vernal

1 pool complex restoration. Therefore, vernal pool complex restoration would have no impacts on  
2 covered and noncovered tidal wetland plants.

- 3 • *CM10 Nontidal Marsh Restoration*: Nontidal marsh restoration would take place through  
4 conversion of cultivated lands. Therefore, nontidal marsh restoration would avoid tidal wetland  
5 habitat and would have no impacts on covered and noncovered tidal wetland plants.
- 6 • *CM22 Avoidance and Minimization Measures*: Effects on covered tidal wetland plants potentially  
7 resulting from implementation of CM1, CM2, CM4, and CM5 would be avoided or minimized  
8 though *AMM11 Covered Plant Species*, *AMM2 Construction Best Management Practices and*  
9 *Monitoring*, *AMM30 Transmission Line Design and Alignment Guidelines*, and *AMM37 Recreation*.  
10 Under AMM11, surveys for covered plant species would be performed during the planning  
11 phase of projects, and any impacts on populations of covered species would be avoided through  
12 project design or subsequently minimized through AMM2. In addition, AMM11 contains specific  
13 guidance to avoid adverse modification of any of the primary constituent elements for Suisun  
14 thistle or soft bird's-beak critical habitat. AMM30, which specifies that the alignment of  
15 proposed transmission lines will be designed to avoid sensitive terrestrial and aquatic habitats  
16 when siting poles and towers, to the maximum extent feasible, would avoid some impacts on  
17 Mason's lilaepsis and side-flowering skullcap. AMM37 requires that new recreation trails avoid  
18 populations of covered tidal wetland plants.

19 In summary, the GIS analysis indicates that Alternative 4 would result in the loss of modeled habitat  
20 for all of the covered species and result in adverse effects on known occurrences of all of the special-  
21 status plants occurring in tidal wetlands. However, the BDCP predicts that habitat restoration  
22 activities would greatly expand the amount of habitat available to each of these species, offsetting  
23 any potential loss of habitat or occurrences resulting from covered activities.

24 Delta mudwort could lose 43 acres of modeled habitat (0.7%), including all or part of three  
25 occurrences. The BDCP predicts that tidal habitat restoration activities proposed under CM4  
26 (Objectives TBEWNC1.1 and TFEWNC1.1) would increase the extent of habitat available for  
27 colonization by Delta mudwort, which could offset this habitat loss. Channel margin enhancement  
28 (CM6) and riparian natural community restoration (CM7) will also consider the potential for  
29 creating habitat for Delta mudwort; creation of suitable habitat under these measures could also  
30 help offset this habitat loss. Although active restoration of this species is not proposed, the BDCP  
31 predicts that natural expansion of populations into the restored habitat would take place and result  
32 in no net loss of occurrences (Objective DMW/ML1.1, associated with CM11). Post-implementation  
33 monitoring of affected occurrences and occurrences in reserve lands would be done to confirm that  
34 no net loss of occurrences has been achieved (Monitoring Action CM11-21, associated with CM11).

35 Mason's lilaepsis could lose 43 acres of modeled habitat (0.7%), including all or part of 22  
36 occurrences. The BDCP predicts that tidal habitat restoration activities proposed under CM4  
37 (Objectives TBEWNC1.1 and TFEWNC1.1) would increase the extent of habitat available for  
38 colonization by Mason's lilaepsis, which could offset this habitat loss. Channel margin enhancement  
39 (CM6) and riparian natural community restoration (CM7) will also consider the potential for  
40 creating habitat for Mason's lilaepsis; creation of suitable habitat under these measures could also  
41 help offset this habitat loss. Although active restoration of this species is not proposed, the BDCP  
42 predicts that natural expansion of populations into the restored habitat would take place and result  
43 in no net loss of occurrences (Objective DMW/ML1.1, associated with CM11). Post-implementation  
44 monitoring of affected occurrences and occurrences in reserve lands would be done to confirm that  
45 no net loss of occurrences has been achieved (Monitoring Action CM11-21, associated with CM11).

1 Delta tule pea could lose 5 acres of modeled habitat (0.08%), including all or part of 28 occurrences.  
2 The BDCP predicts that tidal habitat restoration activities proposed under CM4 (Objectives  
3 TBEWNC1.1 and TFEWNC1.1) would increase the extent of habitat available for colonization by  
4 Delta tule pea, which could offset this habitat loss. Channel margin enhancement (CM6) and riparian  
5 natural community restoration (CM7) will also consider the potential for creating habitat for Delta  
6 tule pea; creation of suitable habitat under these measures could also help offset this habitat loss.  
7 Although active restoration of this species is not proposed, the BDCP predicts that natural expansion  
8 of populations into the restored habitat would take place and result in no net loss of occurrences  
9 (Objective DTP/SMA1.1, associated with CM11). Post-implementation monitoring of affected  
10 occurrences and occurrences in reserve lands would be done to confirm that no net loss of  
11 occurrences has been achieved (Monitoring Action CM11-22, associated with CM11).

12 Suisun Marsh aster could lose 5 acres of modeled habitat (0.08%), including all or part of 29  
13 occurrences. The BDCP predicts that tidal habitat restoration activities proposed under CM4  
14 (Objectives TBEWNC1.1 and TFEWNC1.1) would increase the extent of habitat available for  
15 colonization by Suisun Marsh aster, which could offset this habitat loss. Channel margin  
16 enhancement (CM6) and riparian natural community restoration (CM7) will also consider the  
17 potential for creating habitat for Suisun marsh aster; creation of suitable habitat under these  
18 measures could also help offset this habitat loss. Although active restoration of this species is not  
19 proposed, the BDCP predicts that natural expansion of populations into the restored habitat would  
20 occur and result in no net loss of occurrences (Objective DTP/SMA1.1, associated with CM11). Post-  
21 implementation monitoring of affected occurrences and occurrences in reserve lands would be done  
22 to confirm that no net loss of occurrences has been achieved (Monitoring Action CM11-22,  
23 associated with CM11).

24 All four of these species (Delta mudwort, Mason's lilaepsis, Delta tule pea, and Suisun Marsh aster)  
25 are widespread in the study area with many occurrences. Habitat modification and loss are the  
26 primary stressors that are responsible for their decline and that currently limit their distribution  
27 and abundance. Therefore, restoring large areas of habitat and improving habitat functions for these  
28 species would provide a reasonable expectation that the distribution and abundance of these  
29 species would also improve. Because a relatively small amount of modeled habitat would be  
30 adversely affected (less than 1% of the total), it is likely that the initial adverse effects of covered  
31 activities on these species would be offset and that the overall effect of Alternative 4 on these  
32 species would not be adverse.

33 Side-flowering skullcap could lose 13 acres of modeled habitat (0.5%), including all or part of two  
34 occurrences. One occurrence would be avoided through implementation of AMM30. The location of  
35 a second potentially affected occurrence, which was last observed in 1892, is not known precisely.  
36 Under AMM11, this occurrence would be surveyed for, and because this is a tidal freshwater  
37 wetland species, avoidance of the habitat during project construction would be highly likely. The  
38 BDCP predicts that tidal habitat restoration activities proposed under CM4 (Objectives TBEWNC1.1  
39 and TFEWNC1.1) would increase the extent of habitat available for colonization by side-flowering  
40 skullcap, which could offset this habitat loss. Channel margin enhancement (CM6) and riparian  
41 natural community restoration (CM7) will also consider the potential for creating habitat for side-  
42 flowering skullcap; creation of suitable habitat under these measures could also help offset this  
43 habitat loss. No active restoration of this species is proposed, and no post-implementation  
44 monitoring of affected occurrences and occurrences in reserve lands would be done. Because  
45 impacts on occurrences of side-flowering skullcap would be avoided, and because loss of modeled

1 habitat for the species would be offset through restoration, the overall effect of Alternative 4 on this  
2 species would not be adverse.

3 Soft bird's-beak could lose 73 acres of modeled habitat (6%), including all or part of seven  
4 occurrences. The BDCP predicts that tidal habitat restoration activities proposed under CM4  
5 (Objectives TBEWNC1.1 and TFEWNC1.1) would increase the extent of habitat available for  
6 colonization by soft bird's-beak, which could offset this habitat loss. Tidal restoration in the Hill  
7 Slough Ecological Reserve would be done to increase potential habitat there for soft bird's-beak  
8 (Objective SBB/SuT1.1, associated with CM4). In addition, activities to control invasive plants and  
9 manage livestock in tidal marsh habitat under CM11 could enhance habitat for soft bird's-beak.  
10 Although no active restoration of this species is proposed, post-implementation monitoring of soft  
11 bird's-beak occurrences in proximity to tidal restoration sites would be done to confirm that  
12 occurrences are stable or increasing (Monitoring Action CM11-22, associated with CM11). Soft  
13 bird's-beak has a restricted distribution in the study area with highly localized occurrences, and  
14 habitat modification is the primary factor responsible for the species' decline and limiting the  
15 species' distribution and abundance. Improving habitat functions for this species would provide a  
16 reasonable expectation that the distribution and abundance of soft bird's-beak would also improve.  
17 Although a substantial amount of modeled habitat could be affected, the primary habitat for soft  
18 bird's-beak is high tidal brackish marsh, and the affected habitat is low tidal brackish marsh.  
19 Therefore, it is likely that the overall effect of Alternative 4 on this species would not be adverse.

20 Suisun thistle could lose 73 acres of modeled habitat (6%), although no occurrences would be  
21 affected. The BDCP predicts that tidal habitat restoration activities proposed under CM4 (Objectives  
22 TBEWNC1.1 and TFEWNC1.1) would increase the extent of habitat available for colonization by  
23 Suisun thistle, which could offset this habitat loss. Tidal restoration in the Hill Slough Ecological  
24 Reserve and at Rush Ranch would be done to increase potential habitat there for Suisun thistle  
25 (Objective SBB/SuT1.1, associated with CM4). In addition, activities to control invasive plants and  
26 manage livestock in tidal marsh habitat under CM11 could enhance habitat for Suisun thistle. In  
27 addition, two new occurrences of Suisun thistle would be established in CZ 11 (Objective  
28 SBB/SuT1.4, associated with CM11). Post-implementation monitoring of Suisun thistle occurrences  
29 in proximity to tidal restoration sites would be done to confirm that occurrences are stable or  
30 increasing (Monitoring Action CM11-22, associated with CM11). Habitat restoration, enhancement  
31 of habitat functions, and establishment of new occurrences would offset any potential loss of  
32 modeled habitat for Suisun Marsh thistle.

33 Three occurrences of Bolander's water-hemlock could be affected. Although the extent of potential  
34 habitat affected was not determined, it would be comparable to that for Delta tule pea and Suisun  
35 Marsh aster (5 acres). Tidal habitat restoration activities proposed under CM4 (Objectives  
36 TBEWNC1.1 and TFEWNC1.1) could increase the extent of habitat available for colonization by  
37 Bolander's water-hemlock, which could offset this habitat loss. Because only a few scattered  
38 occurrences of Bolander's water-hemlock are present in the study area, there is no reasonable  
39 expectation that habitat restoration without active species-specific restoration activities would  
40 result in the establishment of new occurrences to offset the losses. Also, because Bolander's water-  
41 hemlock is a noncovered species, the species protections and occurrence monitoring afforded to  
42 covered species under the BDCP would not apply to this species. Therefore, the effects of Alternative  
43 4 on Bolander's water hemlock could be adverse.

44 **NEPA Effects:** The loss of modeled and occupied habitat for special-status tidal wetland plants  
45 would be offset through tidal habitat restoration (CM4). Therefore, implementation of Alternative 4

1 would result in no adverse effects on seven of eight special-status grassland plants in the study area.  
2 Alternative 4 would result in a reduction in the range and numbers of Bolander’s water-hemlock,  
3 which would be an adverse effect. Adverse effects on Bolander’s water-hemlock could be avoided or  
4 offset through implementation of Mitigation Measure BIO-170.

5 **CEQA Conclusion:** Because loss of occurrences and modeled habitat for covered tidal habitat plant  
6 species would be offset through habitat restoration, impacts on covered tidal wetland plants as a  
7 result of implementing Alternative 4 would not be significant. However, the loss of Bolander’s  
8 water-hemlock populations in CZ 11 would result in a reduction in the range and numbers of this  
9 species and would be a significant impact. Implementation of Mitigation Measure BIO-170 would  
10 reduce this impact to a less-than-significant level.

11 **Mitigation Measure BIO-170: Avoid, Minimize, or Compensate for Impacts on Noncovered**  
12 **Special-Status Plant Species**

13 Please see Mitigation Measure BIO-170 under Impact BIO-170.

14 **Inland Dune Plants**

15 Five special-status plants occur in inland dune habitat in the study area. None of the species is  
16 covered under the BDCP, and no habitat models were prepared for inland dune habitat. Table 12-4-  
17 67 summarizes the acreage of inland dune habitat in the study area and the number of occurrences  
18 of each special-status inland dune plant in the study area.

19 **Table 12-4-67. Summary of Impacts on Inland Dune Plants under Alternative 4**

	Acres in Study Area	Acres Affected	Occurrences in Study Area	Occurrences Affected	Impacts
<b>Habitat</b>					
Inland Dunes	19	0	0	0	None
<b>Noncovered Species</b>					
Hoover’s cryptantha	0	0	1	0	None
Antioch Dunes buckwheat	0	0	1	0	None
Mt. Diablo buckwheat	0	0	1	0	None
Contra Costa wallflower	0	0	3	0	None
Antioch Dunes evening-primrose	0	0	9	0	None

21 **Impact BIO-174: Effects on Habitat and Populations of Inland Dune Plants**

22 Alternative 4 would have no adverse effects on inland dune plants (Table 12-4-67). No construction  
23 activities or habitat restoration would take place where the species occur. No specific actions to  
24 benefit inland dune species are proposed.

25 **NEPA Effects:** Implementation of the BDCP under Alternative 4 would not affect special-status  
26 inland dune species.

27 **CEQA Conclusion:** Because the BDCP would not affect inland dune habitat, implementation of  
28 Alternative 4 would have no significant impacts on inland dune species. No mitigation is required.

1 **Nontidal Wetland Plants**

2 No covered plant species occur in nontidal wetlands in the study area; however, six noncovered  
3 special-status plant species occur in nontidal wetlands in the study area. Table 12-4-68 summarizes  
4 the acreage of nontidal wetland habitat in the study area and the number of occurrences of each  
5 special-status nontidal wetland plant in the study area.

6 **Table 12-4-68. Summary of Impacts on Nontidal Wetland Plants under Alternative 4**

	Acres in Study Area	Acres Affected	Occurrences in Study Area	Occurrences Affected	Impacts
<b>Habitat</b>					
Nontidal freshwater aquatic	5,489	333	0	0	Loss of habitat from construction of water conveyance facilities, tidal habitat restoration, and floodplain restoration
Nontidal freshwater perennial emergent wetland	1,385	133	0	0	Loss of habitat from construction of water conveyance facilities, tidal habitat restoration, Yolo Bypass Fisheries enhancements, and floodplain restoration
<b>Noncovered Species</b>					
Watershield	0	0	3	1	Loss of habitat from construction of water conveyance facilities
Bristly sedge	0	0	18	2	Loss of habitat from construction of water conveyance facilities
Woolly rose-mallow <sup>a</sup>	0	0	121	13	Loss of habitat from construction of water conveyance facilities and tidal habitat restoration
Eel grass pondweed	0	0	1	0	None
Sanford's arrowhead	0	0	23	3	Loss of habitat from construction of water conveyance facilities and tidal habitat restoration
Marsh skullcap <sup>a</sup>	0	0	1	0	None

<sup>a</sup> Also occurs in valley/foothill riparian habitat.

7

8 **Impact BIO-175: Effects on Habitat and Populations of Nontidal Wetland Plants**

9 Under Alternative 4, known occurrences watershield, bristly sedge, woolly rose-mallow, and  
10 Sanford's arrowhead would be within the proposed footprint for the water conveyance facilities or  
11 within the hypothetical footprint for restoration activities and would be adversely affected.  
12 Alternative 4 would have no adverse effects on eel-grass pondweed or marsh skullcap.

1 The individual effects of each relevant conservation measure are addressed below. A summary  
2 statement of the combined impacts and NEPA and CEQA conclusions follows the individual  
3 conservation measure discussions.

- 4 • *CM1 Water Facilities and Operations*: Construction of the Alternative 4 water conveyance  
5 facilities would adversely affect four noncovered special-status plants occurring in nontidal  
6 wetlands. One of three watershield occurrences in CZ 5 on Bouldin Island could be affected by  
7 construction of the water conveyance facilities. This is a historical occurrence that has not been  
8 observed since 1893, and it may be extirpated (California Department of Fish and Wildlife  
9 2013). Two occurrences of bristly sedge in CZ 4 and CZ 5, including approximately 1.54 acres of  
10 occupied habitat, would be affected by construction of the water conveyance facilities. Thirteen  
11 occurrences of woolly rose-mallow would be affected. Six occurrences in CZ 4 would be  
12 removed during construction of the intake facilities and disposal of reusable tunnel material,  
13 and five occurrences in CZ 6 and one occurrence in CZ 8 would be affected by construction of  
14 other facilities. Construction of the water conveyance facilities would remove occupied habitat  
15 at two occurrences of Sanford's arrowhead in CZ 4.
- 16 • *CM2 Yolo Bypass Fisheries Enhancement*: No known occurrences of special-status nontidal  
17 wetland plants are present in the hypothetical footprint for construction or operation of the  
18 Yolo Bypass fisheries enhancements. Therefore, construction and operation of the Yolo Bypass  
19 Fisheries enhancements would not affect special-status nontidal marsh plants.
- 20 • *CM3 Natural Communities Protection and Restoration*: No specific natural communities  
21 protection is proposed for nontidal wetlands under the BDCP. Therefore, no occurrences of  
22 special-status nontidal plants are proposed for protection.
- 23 • *CM4 Tidal Natural Communities Restoration*: One known occurrence of Sanford's arrowhead is  
24 present within areas that could be affected by tidal habitat restoration in CZ 2. One known  
25 occurrence of woolly rose-mallow is present within areas that could be affected by tidal habitat  
26 restoration in CZ 7. No other known occurrences of special-status nontidal wetland plants are  
27 present within areas proposed for tidal habitat restoration. Therefore, tidal habitat restoration  
28 could have adverse effects on two special-status nontidal wetland plants.
- 29 • *CM5 Seasonally Inundated Floodplain Restoration*: No known occurrences of special-status  
30 nontidal wetland plants are present within areas proposed for floodplain restoration. Therefore,  
31 floodplain restoration and construction of new floodplain levees would have no impacts on  
32 special-status nontidal wetland plants.
- 33 • *CM6 Channel Margin Enhancement*: No known occurrences of special-status nontidal wetland  
34 plants are present within areas proposed for channel margin habitat enhancement. Therefore,  
35 channel margin habitat enhancement would have no impacts on known occurrences of special-  
36 status nontidal wetland plants.
- 37 • *CM7 Riparian Natural Community Restoration*: No known occurrences of special-status nontidal  
38 wetland plants are present within areas proposed for riparian habitat restoration. Therefore,  
39 riparian habitat restoration would have no impacts on known occurrences of special-status  
40 nontidal wetland plants.
- 41 • *CM8 Grassland Natural Community Restoration*: No known occurrences of special-status nontidal  
42 wetland plants are present within areas proposed for grassland communities restoration.  
43 Therefore, grassland communities restoration would have no impacts on special-status nontidal  
44 wetland plants.

- 1 • *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*: No known occurrences of  
2 special-status nontidal wetland plants are present within areas proposed for vernal pool  
3 complex restoration. Therefore, vernal pool complex restoration would have no impacts on  
4 special-status nontidal wetland plants.
- 5 • *CM10 Nontidal Marsh Restoration*: Nontidal marsh restoration would take place through  
6 conversion of cultivated lands. Therefore, nontidal marsh restoration would avoid existing  
7 nontidal marsh and would have no adverse effects on special-status nontidal wetland plants.  
8 The BDCP may benefit nontidal wetland species by creating 400 acres of nontidal freshwater  
9 marsh, including components of nontidal perennial aquatic and nontidal freshwater perennial  
10 emergent wetland communities, and by maintaining and enhancing the habitat functions of  
11 protected and created nontidal wetland habitats for covered and other native species. However,  
12 no specific actions to benefit noncovered species are proposed.

13 Under Alternative 4, 1,500 acres of nontidal marsh would be restored (Objective NFEW/NPANC1.1,  
14 addressed under CM10). However, these wetlands would be restored primarily as habitat for giant  
15 garter snake. These habitat restoration activities would be unlikely to expand the amount of habitat  
16 available to watershield, bristly sedge, woolly rose-mallow, and Sanford's arrowhead, potential loss  
17 of habitat or occurrences resulting from covered activities would not be compensated for. Moreover,  
18 because special-status nontidal wetland plant species are not covered under the BDCP, the species  
19 protections afforded to covered species under CM22 do not apply to these species, and the effects of  
20 Alternative 4 on these species would be adverse. Implementation of Mitigation Measure BIO-170,  
21 *Avoid, Minimize, or Compensate for Impacts on Noncovered Special-Status Plant Species*, would reduce  
22 these effects.

23 **NEPA Effects:** Implementation of the BDCP under Alternative 4 could result in a reduction in the  
24 range and numbers of watershield, bristly sedge, woolly rose-mallow, and Sanford's arrowhead, four  
25 noncovered nontidal wetland species, which would be an adverse effect. Adverse effects on these  
26 species could be avoided or offset through implementation of Mitigation Measure BIO-170.

27 **CEQA Conclusion:** Under Alternative 4, construction of the water conveyance facilities could result  
28 in a reduction in the range and numbers of watershield, bristly sedge, woolly rose-mallow, and  
29 Sanford's arrowhead. Tidal habitat restoration could result in a reduction in the range and numbers  
30 of woolly rose-mallow and Sanford's arrowhead. These impacts would be significant.  
31 Implementation of Mitigation Measure BIO-170 would reduce these impacts to a less-than-  
32 significant level.

### 33 **Mitigation Measure BIO-170: Avoid, Minimize, or Compensate for Impacts on Noncovered** 34 **Special-Status Plant Species**

35 Please see Mitigation Measure BIO-170 under Impact BIO-170.

## 36 **General Terrestrial Biology**

### 37 **Wetlands and Other Waters of the United States**

38 Alternative 4 actions would both permanently and temporarily remove or convert wetlands and  
39 open water that is potentially jurisdictional as regulated by USACE under Section 404 of the CWA.  
40 The following two impacts address the project-level effects of CM1 on these potential wetlands and  
41 waters, and the programmatic-level effects of other relevant conservation actions (CM2–CM10).

1 CM11–CM22 would not directly result in loss or conversion of wetlands or other waters of the  
2 United States. The methods used to conduct these analyses are described in Section 12.3.2.4 of this  
3 chapter.

4 **Impact BIO-176: Effects of Constructing Water Conveyance Facilities (CM1) on Wetlands and**  
5 **Other Waters of the United States**

6 Construction of the Alternative 4 water conveyance facilities would both temporarily and  
7 permanently remove potential wetlands and other waters of the United States as regulated by  
8 Section 404 of the CWA (Table 12-4-69). Based on the methodology used to conduct this analysis,  
9 the losses would occur at intake, tunnel, pipeline, canal, and RTM and borrow/spoil storage sites,  
10 transmission corridors, and multiple temporary work areas associated with the construction  
11 activity. The permanent wetland or other waters of the United States loss (244–389 acres) would  
12 occur at various locations along the modified pipeline/tunnel alignment. The majority of the loss  
13 would occur due to construction of Alternative 4's three intake structures along the eastern bank of  
14 the Sacramento River between Clarksburg and Courtland in the north Delta, and at the RTM storage  
15 sites associated with tunnel construction at various locations, including at Scribner's Bend, sites  
16 between Lambert Road and Twin Cities Road, on Staten and Bouldin Islands, and on Byron Tract,  
17 adjacent to Clifton Court Forebay. Effects for two configurations of the RTM storage sites were  
18 calculated. One configuration uses 6-foot-high piles and one configuration uses 10-foot-high piles  
19 (see Chapter 3, Section 3.6.1.2). Therefore, a range of acreages is shown for permanent effects in  
20 Table 12-4-69. The permanent effect assuming the use of 10-foot high RTM storage sites would be  
21 244 acres; assuming 6-foot-high sites, the permanent effect would be 389 acres. Through  
22 implementation of an environmental commitment to reuse RTM or dispose of it at appropriate  
23 facilities, as described in Appendix 3B, *Environmental Commitments*, it is anticipated that the  
24 material would be removed from these areas and applied, as appropriate, as bulking material for  
25 levee maintenance or as fill material for habitat restoration projects, or would be put to other  
26 beneficial means of reuse identified for the material.

27 The temporary effects on wetlands and waters of the United States (94 acres) would also occur  
28 mainly at the three intake construction sites along the eastern bank of the Sacramento River, and at  
29 barge unloading facilities in the San Joaquin and Middle Rivers. An additional temporary effect  
30 would result from dredging of 2,026 acres of Clifton Court Forebay.

1 **Table 12-4-69. Potential Wetlands and Other Waters of the United States Filled by Construction of**  
2 **Alternative 4 Water Conveyance Facilities**

Wetland/Other Water Type <sup>a</sup>	Permanent <sup>b</sup>	Temporary	Total
<b>Open Water</b>			
Nontidal Flow	46-72	15	61-87
Muted Tidal Flow	1	0	1
Tidal Flow	13	46	59
Pond or Lake (nontidal)	0-54	2	2-56
Clifton Court Forebay	162	8	170
<b>Wetland</b>			
Nontidal Wetland	13-36	15	28-51
Tidal Wetland	3-4	7	10-11
Seasonal Wetland	6-47	1	7-48
<b>Total Impact Acres</b>	<b>244-389</b>	<b>94</b>	<b>338-484</b>

<sup>a</sup> Wetland types are described in the methods section of this chapter (Section 12.2.3.4).

<sup>b</sup> A range of values is shown where effects include fill from construction of 10-foot and 6-foot high RTM storage sites, respectively, as described in Chapter 3, Section 3.6.1.2, *Conveyance Facilities*.

Source: California Department of Water Resources 2013b

3  
4 **NEPA Effects:** The permanent and temporary loss of these potential jurisdictional wetlands as a  
5 result of constructing Alternative 4 water conveyance facilities would be a substantial effect if not  
6 compensated by wetland protection and/or restoration. This loss would represent a removal of  
7 federally protected wetlands as defined by Section 404 of the CWA. However, Alternative 4 includes  
8 conservation measures (CM4 and CM10) that would restore and protect large acreages of both tidal  
9 and nontidal wetlands and open water in the study area. Through the course of the BDCP  
10 restoration program, this alternative would restore 65,000 acres of tidal and 1,200 acres of nontidal  
11 wetland or open water. Impacts on wetlands from CM1 construction would occur in the first 10  
12 years after BDCP approval. Approximately 19,550 acres of this wetland restoration would occur  
13 during this time period, thereby offsetting the impacts of CM1 construction. These acreages greatly  
14 exceed the no net loss (1:1 replacement ratio) requirement for Alternative 4 with either 10-foot-  
15 high RTM storage sites (338 acres) or 6-foot-high sites (484 acres). Therefore, there would be an  
16 overall beneficial effect on potential jurisdictional wetlands and other waters of the United States  
17 from Alternative 4 implementation.

18 **CEQA Conclusion:** The permanent and temporary loss of potential jurisdictional wetlands as a result  
19 of constructing Alternative 4 water conveyance facilities would be substantial if not compensated  
20 for by wetland protection and/or restoration. This loss would represent either temporary or  
21 permanent removal of federally protected wetlands or other waters of the United States as defined  
22 by Section 404 of the CWA. However, Alternative 4 includes conservation measures (CM4 and  
23 CM10) that would restore and protect large acreages of both tidal and nontidal wetlands and open  
24 water. Through the course of the BDCP restoration program, this alternative would result in  
25 restoration of 65,000 acres of tidal and 1,200 acres of nontidal wetlands and open water. Impacts on  
26 wetlands from CM1 construction would occur in the first 10 years after BDCP approval.  
27 Approximately 19,550 acres of this wetland restoration would occur during this time period,  
28 thereby offsetting the impacts of CM1 construction. These acreages greatly exceed the no net loss

1 (1:1 replacement ratio) requirement for Alternative 4 with either 10-foot-high RTM storage sites  
2 (338 acres) or 6-foot-high sites (484 acres). Therefore, there would be a beneficial impact on  
3 potential jurisdictional wetlands and waters of the United States resulting from Alternative 4  
4 implementation.

5 **Impact BIO-177: Effects of Implementing Other Conservation Measures (CM2–CM10) on**  
6 **Wetlands and Other Waters of the United States**

7 The habitat protection and restoration activities associated with Alternative 4's other conservation  
8 measures (CM2–CM10) would alter the acreages and functions and values of wetlands and waters of  
9 the United States in the study area over the course of BDCP conservation action implementation.  
10 Because these conservation measures have not been defined to the level of site-specific footprints, it  
11 is not possible to delineate and quantify these effects in detail. Several of the conservation measures  
12 (CM2, CM4, and CM5) have been described with theoretical footprints for purposes of the effects  
13 analysis contained in BDCP Chapter 5,

14 **Effects Analysis.** These theoretical footprints have been used to predict the acres of natural  
15 communities that would be affected through loss or conversion, which gives some indication of  
16 jurisdictional wetland effects. Any CM2–CM10 effects ascribed to tidal perennial aquatic, tidal  
17 brackish emergent, tidal freshwater emergent, other natural seasonal, nontidal freshwater perennial  
18 emergent, and nontidal perennial aquatic wetlands natural communities are likely to also be effects  
19 on wetlands and other waters of the United States. Effects ascribed to other natural communities  
20 and land cover types with small jurisdictional wetland components (valley/foothill riparian, alkali  
21 seasonal wetland complex, vernal pool complex, managed wetland, grassland and cultivated land)  
22 are not easily converted to effects on wetlands and other waters of the United States by the use of  
23 theoretical footprints. Because of this lack of detail, a programmatic assessment is provided for  
24 these other conservation measures.

25 **NEPA Effects:** The conversion of existing wetland natural communities to other types of wetland  
26 natural communities through implementation of CM2–CM10 for Alternative 4 would be in the range  
27 of 5,500 to 6,000 acres, assuming that 100% of the predominantly wetland natural communities  
28 listed in Table 12-4-69 and that 10% of all of the non-wetland natural communities listed in that  
29 table would qualify as wetlands or other waters of the United States under the CWA. Most of these  
30 wetlands would be converted to tidal and nontidal wetlands and open water through  
31 implementation of CM4, and CM10. The wetlands and open water created by these two restoration  
32 actions would be approximately 66,200 acres, far exceeding what is required under the no net loss  
33 policy used by the USACE in considering Section 404 permits, even if one were to assume that all  
34 conversions represented a functional wetland loss. Therefore, there would be a beneficial effect on  
35 potential jurisdictional wetlands and other waters of the United States from implementing CM2-  
36 CM10.

37 **CEQA Conclusion:** The permanent and temporary loss of potential jurisdictional wetlands as a result  
38 of implementing the other conservation measures (CM2–CM10) of Alternative 4 would be a  
39 substantial effect if not compensated for by wetland protection and/or restoration. This loss would  
40 represent a removal of federally protected wetlands or other waters of the United States as defined  
41 by Section 404 of the CWA. However, Alternative 4 includes conservation measures (CM4 and  
42 CM10) that would restore large acreages of both tidal and nontidal wetlands and open water in the  
43 study area. Over the life of the BDCP restoration program, this alternative would result in  
44 restoration of 66,200 acres of tidal and nontidal wetlands and open water, of which 19,550 acres

1 would be restored in the first 10 years. These acreages greatly exceed the no net loss (1:1  
2 replacement ratio) requirement for Alternative 4 (5,500–6,000 acres). Therefore, there would be a  
3 beneficial impact on potential jurisdictional wetlands and other waters of the United States from  
4 implementing CM2–CM10 under Alternative 4.

### 5 **Shorebirds and Waterfowl**

6 Managed wetlands, tidal natural communities, and cultivated lands (including grain and hay crops,  
7 pasture, field crops, rice, and idle lands) provide freshwater nesting, feeding, and resting habitat for  
8 a large number of Pacific flyway waterfowl and shorebirds. The primary effects of concern for  
9 shorebirds and waterfowl are related to the conversion of managed wetland and cultivated lands to  
10 tidal marsh associated with habitat restoration. Ducks Unlimited (2013) conducted an analysis to  
11 determine the effects of BDCP conservation measures on waterfowl, as well as to determine whether  
12 BDCP actions would impede attainment of the goals established by the Central Valley Joint Venture  
13 (CVJV) Implementation Plan for the Delta, Yolo, and Suisun Marsh drainage basins. The CVJV efforts  
14 are guided by its 2006 Implementation Plan, which is founded on the principles of strategic habitat  
15 conservation (Central Valley Joint Venture 2006). Those principles emphasize the establishment of  
16 population abundance objectives and the use of species-habitat models to link population objectives  
17 to habitat needs. The CVJV has used species-habitat models to translate bird abundance objectives  
18 into habitat objectives, while explicitly identifying the biological assumptions that underpin these  
19 models and the data used to populate them. As a result, the CVJV's biological planning provides a  
20 framework for evaluating the effects of the BDCP on waterfowl.

21 The Ducks Unlimited waterfowl analysis focused primarily on dabbling ducks. Less than 5% of all  
22 geese in the Central Valley occur in the Yolo, Delta, and Suisun Marsh drainage basins. Moreover,  
23 geese in the Central Valley rely mostly on agricultural habitats to meet their food energy needs. The  
24 BDCP's effect on agricultural habitats is limited to the Delta Basin where about 2500 acres of corn  
25 now available to geese would be converted to other habitats (Ducks Unlimited 2013: Table 5). Food  
26 supplies for geese would still be well in excess of demand even with the loss of these agricultural  
27 habitats (Central Valley Joint Venture 2006, Ducks Unlimited 2013). The duck population objectives  
28 used in the analysis were taken directly from the CVJV Plan. Dabbling duck species make up 92% of  
29 this objective, while diving duck species make up the remaining 8%. Thus, the results were mostly  
30 driven by dabbling duck needs and largely interpreted in the context of dabbling duck foraging  
31 ecology. The 55,000 acres of Tidal Natural Communities Restoration (CM4) would be expected to  
32 benefit diving ducks by providing deep water foraging habitat. Refer to the Ducks Unlimited Report  
33 (Ducks Unlimited 2013) for details of the analysis and methods with respect to the TRUMET model  
34 used to quantify effects on food biomass and food quality.

35 An analysis was conducted to determine the effects of the BDCP covered activities on wintering and  
36 breeding shorebird habitat (ICF International 2013). This analysis evaluated the relative increase  
37 and decrease in natural communities known to provide important foraging, roosting, and breeding  
38 habitat. Similar to the waterfowl analysis, the results were broken up into the three Central Valley  
39 Joint Venture Basins that overlap with the BDCP study area: Yolo, Delta, and Suisun. Natural  
40 community losses and gains were then translated into species-specific outcomes, comparing the  
41 relative habitat value of each BDCP natural community for each Central Valley shorebird species  
42 (Table 1, ICF International 2013). The shorebird species ranking system displayed in Table 1 (ICF  
43 International 2013) was modified from a table in Stralberg et. al (2011). The table was created using  
44 survey data and experts' species-specific habitat rankings. The survey data included fall, winter, and  
45 spring density data. This resulted in an overall, cross-season representation of habitat requirements.

1 **Impact BIO-178: Loss or Conversion of Habitat for Waterfowl and Shorebirds as a Result of**  
2 **Water Conveyance Facilities Construction**

3 Development of the water conveyance facilities (CM1) would result in the permanent removal of  
4 approximately 7 acres of managed wetland, 6 acres of tidal wetlands, 59 acres of nontidal wetlands,  
5 and 3,729 acres of suitable cultivated lands (including grain and hay crops, pasture, field crops, rice,  
6 and idle lands). In addition, 28 acres of managed wetland, 10 acres of tidal wetlands, 12 acres of  
7 nontidal wetlands and 843 acres of suitable cultivated lands would be temporarily impacted. No rice  
8 would be impacted as a result of constructing the water conveyance facilities. These losses of habitat  
9 would occur within the first 10 years of Alternative 4 implementation in the Delta Basin. The BDCP  
10 has committed to the near-term protection of 15,400 acres of non-rice cultivated lands, 200 acres of  
11 rice, and 700 acres of rice or “rice equivalent” natural communities including nontidal wetlands in  
12 the near-term. In addition, 4,100 acres of managed wetlands would be created, protected, and  
13 enhanced, 8,850 acres of freshwater tidal wetlands would be restored, and 2,000 acres of tidal  
14 brackish emergent wetland would be restored (Table 3-4, Chapter 3).

15 Construction activities could have an adverse effect on nesting shorebirds or waterfowl if they were  
16 present in or adjacent to work areas and could result in destruction of nests or disturbance of  
17 nesting and foraging behaviors. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird*  
18 *Surveys and Avoid Disturbance of Nesting Birds*, would be available to minimize adverse effects on  
19 nesting birds.

20 **NEPA Effects:** Habitat loss from construction of the Alternative 4 water conveyance facilities would  
21 not result in an adverse effect on shorebirds and waterfowl because of the acres of natural  
22 communities and cultivated lands that would be restored and protected in the near-term timeframe.  
23 If waterfowl were present in or adjacent to work areas, construction activities could result in  
24 destruction of nests or disturbance of nesting and foraging behaviors, which would be an adverse  
25 affect on nesting shorebirds and waterfowl. Mitigation Measure BIO-75, *Conduct Preconstruction*  
26 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to minimize adverse  
27 effects on nesting birds.

28 **CEQA Conclusion:** Habitat loss from construction of the Alternative 4 water conveyance facilities  
29 would have a less-than-significant impact on shorebirds and waterfowl because of the acres of  
30 natural communities and cultivated lands that would be restored and protected in the near-term  
31 timeframe. If waterfowl were present in or adjacent to work areas, construction activities could  
32 result in destruction of nests or disturbance of nesting and foraging behaviors, which would be a  
33 significant impact. Implementation of Mitigation Measure BIO-75, *Conduct Preconstruction Nesting*  
34 *Bird Surveys and Avoid Disturbance of Nesting Birds*, would reduce this impact on nesting birds to a  
35 less-than-significant level.

36 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**  
37 **Disturbance of Nesting Birds**

38 See Mitigation Measure BIO-75 under Impact BIO-75.

39 **Impact BIO-179: Loss or Conversion of Habitat for Wintering Waterfowl as a Result of**  
40 **Implementation of Conservation Components**

41 **Suisun Marsh:** Managed seasonal wetlands in Suisun Marsh would be reduced by an estimated  
42 8,818 acres as a result of implementing Alternative 4. This would represent a 25% decrease in

1 managed seasonal wetlands compared with long-term conditions without Alternative 4 (Ducks  
2 Unlimited 2013, Table 5; ICF International 2013). There is considerable uncertainty about the  
3 biomass and nutritional quality of waterfowl foods produced in Suisun Marsh's managed wetlands,  
4 which makes it difficult to identify the amount of mitigation needed. To address this uncertainty,  
5 three levels of food biomass and three levels of nutritional quality were modeled for these existing  
6 habitats (Ducks Unlimited 2013, Table 7). Three mitigation scenarios were based on these energetic  
7 assumptions of biomass and food quality were then run to determine a minimum acreage of  
8 managed seasonal wetlands to be protected and enhanced to compensate for the loss of productivity  
9 from habitat conversion to tidal wetlands.

- 10 • Scenario 1) Assume that existing managed seasonal wetlands provide low food biomass and low  
11 food quality. Under this assumption, the managed seasonal wetlands in Suisun Marsh produce  
12 50% of the seed biomass of seasonal wetlands elsewhere in the Central Valley, and these seeds  
13 have 60% of the metabolizable energy of seeds produced outside of Suisun Marsh. Given the  
14 assumption that managed seasonal wetlands in Suisun Marsh could be enhanced to provide high  
15 food biomass and high food quality (equal to wetlands in the Central Valley), 5,000 acres of  
16 managed wetlands protected and managed for high biomass and high food quality would  
17 mitigate the conversion of 8,857 acres of managed seasonal wetland to tidal marsh.
- 18 • Scenario 2) Assume that the managed seasonal wetlands lost provide medium food biomass and  
19 medium food quality. Under this assumption, the managed seasonal wetlands in Suisun Marsh  
20 produce 75% of the seed biomass of seasonal wetlands elsewhere in the Central Valley, and  
21 these seeds have 80% of the metabolizable energy of seeds produced outside of Suisun Marsh.  
22 Given the assumption that managed seasonal wetlands in Suisun Marsh could be enhanced to  
23 provide high food biomass and high food quality (equal to wetlands in the Central Valley),  
24 13,300 acres of managed wetlands protected and managed for high biomass and high food  
25 quality would mitigate the conversion of 8,857 acres of managed seasonal wetland to tidal  
26 marsh.
- 27 • Scenario 3) Assume that existing managed seasonal wetlands provide low food biomass and low  
28 food quality. Given the assumption that managed seasonal wetlands in Suisun Marsh could only  
29 be enhanced to provide medium food biomass and medium food quality (produce 75% of the  
30 seed biomass of seasonal wetlands elsewhere in the Central Valley, and these seeds have 80% of  
31 the metabolizable energy of seeds produced outside of Suisun Marsh), 8,800 acres of managed  
32 wetlands protected and managed for medium biomass and medium food quality would mitigate  
33 the conversion of 8,857 acres of managed seasonal wetland to tidal marsh.

34 The BDCP has committed to protecting and enhancing a minimum of 5,000 acres of managed  
35 seasonal wetlands in Suisun Marsh to compensate for the loss of productivity from habitat  
36 conversion to tidal marsh. This minimum commitment of 5,000 acres would mitigate the reduced  
37 productivity from conversion of managed seasonal wetlands under the assumptions that 1) existing  
38 managed seasonal wetlands on average in Suisun Marsh provide low biomass and low-quality food  
39 to wintering waterfowl and 2) protected seasonal wetlands can be managed to produce high  
40 biomass and high food quality. However, the food biomass and productivity in Suisun Marsh would  
41 need to be quantified in order to determine if the 5,000 acres was sufficient to avoid an adverse  
42 effect on wintering waterfowl in the Suisun Marsh, or if additional mitigation would be needed.  
43 Mitigation Measure BIO-179a, *Conduct Food Studies and Monitoring for Wintering Waterfowl in*  
44 *Suisun Marsh*, would be available to address this adverse effect.

1 **Yolo and Delta Basins:** The replacement of 1,400 acres of managed seasonal wetland with 19,000  
2 acres of palustrine tidal wetlands in the Delta Watershed, and the replacement of 600 acres of  
3 managed seasonal wetlands with 2,000 acres of palustrine tidal wetlands in the Yolo Watershed  
4 would not be expected to have an adverse effect on food productivity, under the assumption that  
5 these wetlands would provide adequate food sources. However, a monitoring component and a food  
6 study in these tidal habitats would be necessary order to demonstrate that there is a less-than-  
7 significant loss of food value in these habitats for wintering waterfowl. If it is determined from  
8 monitoring, that there is in fact a significant loss in food productivity from habitat conversion to  
9 tidal wetlands, the protection and enhancement of managed wetlands in these watersheds would be  
10 required to mitigate the change in food biomass and quality. Mitigation Measure BIO-179b, *Conduct*  
11 *Food Studies and Monitoring to Demonstrate Food Quality of Palustrine Tidal Wetlands in the Yolo and*  
12 *Delta Basins*, would be available to address this uncertainty.

13 **NEPA Effects:** There is considerable uncertainty about the biomass and nutritional quality of  
14 waterfowl foods produced in Suisun Marsh's managed wetlands, which makes it difficult to identify  
15 the level of effect that Alternative 4 habitat loss or conversion would have. The BDCP has committed  
16 to protecting and enhancing a minimum of 6,600 acres of managed seasonal wetlands in Suisun  
17 Marsh to compensate for the loss of productivity resulting from habitat conversion to tidal marsh. Of  
18 this 6,600 acres, at least 5,000 acres would be managed to benefit wintering waterfowl. This  
19 minimum commitment of 5,000 acres for wintering waterfowl would mitigate the reduced  
20 productivity from conversion of managed seasonal wetlands under the assumptions that 1) existing  
21 managed seasonal wetlands on average in Suisun Marsh provide low biomass and low-quality food  
22 to wintering waterfowl and 2) protected seasonal wetlands can be managed to produce high  
23 biomass and high-quality food. However, the food biomass and productivity in Suisun Marsh would  
24 need to be quantified to determine if the 5,000 acres would be sufficient for Alternative 4 to avoid an  
25 adverse effect on wintering waterfowl in the Suisun Marsh. Mitigation Measure BIO-179a, *Conduct*  
26 *Food Studies and Monitoring for Wintering Waterfowl in Suisun Marsh*, would be available to address  
27 this adverse effect.

28 The replacement of 1,400 acres of managed seasonal wetlands with 19,000 acres of palustrine tidal  
29 wetlands in the Delta watershed, and the replacement of 600 acres of managed seasonal wetlands  
30 with 2,000 acres of palustrine tidal wetlands in the Yolo watershed would not be expected to alter  
31 food productivity for wintering waterfowl. However, the conclusion that these new wetlands would  
32 provide adequate food sources is entirely dependent on assumptions about food production in  
33 palustrine tidal habitats. Mitigation Measure BIO-179b, *Conduct Food Studies and Monitoring to*  
34 *Demonstrate Food Quality of Palustrine Tidal Wetlands in the Yolo and Delta Basins*, would be  
35 available to address this uncertainty and avoid an adverse effect on wintering waterfowl.

36 **CEQA Conclusion:** There is considerable uncertainty about the biomass and nutritional quality of  
37 waterfowl foods produced in Suisun Marsh's managed wetlands, which makes it difficult to identify  
38 the level of impact that Alternative 4 habitat loss or conversion would have. The BDCP has  
39 committed to protecting and enhancing a minimum of 6,600 acres of managed seasonal wetlands in  
40 Suisun Marsh to compensate for the loss of productivity resulting from habitat conversion to tidal  
41 marsh. Of this 6,600 acres, at least 5,000 acres would be managed to benefit wintering waterfowl.  
42 This minimum commitment of 5,000 acres for wintering waterfowl would mitigate the reduced  
43 productivity resulting from conversion of managed seasonal wetlands under the assumptions that  
44 1) existing managed seasonal wetlands on average in Suisun Marsh provide low biomass and low-  
45 quality food for wintering waterfowl and 2) protected seasonal wetlands can be managed to  
46 produce high biomass and high-quality food. However, the food biomass and productivity in Suisun

1 Marsh would need to be quantified to determine if the 5,000 acres would be sufficient for  
2 Alternative 4 to avoid having a significant impact on wintering waterfowl in the Suisun Marsh, or if  
3 additional mitigation would be needed. Implementation of Mitigation Measure BIO-179a, *Conduct*  
4 *Food Studies and Monitoring for Wintering Waterfowl in Suisun Marsh*, would address this potential  
5 significant impact.

6 The replacement of 1,400 acres of managed seasonal wetlands with 19,000 acres of palustrine tidal  
7 wetlands in the Delta watershed, and the replacement of 600 acres of managed seasonal wetlands  
8 with 2,000 acres of palustrine tidal wetlands in the Yolo watershed would not be expected to alter  
9 food productivity. However, the conclusion that these tidal wetlands would provide adequate food  
10 sources for wintering waterfowl is entirely dependent on assumptions about food production in  
11 palustrine tidal habitats. Studies of food biomass and food quality in palustrine tidal habitats are  
12 needed to confirm that no mitigation for wintering waterfowl would be required in the Yolo and  
13 Delta Basins. Implementation of Mitigation Measure BIO-179b, *Conduct Food Studies and Monitoring*  
14 *to Demonstrate Food Quality of Palustrine Tidal Wetlands in the Yolo and Delta Basins*, would address  
15 this uncertainty and would reduce this impact on wintering waterfowl to a less-than-significant  
16 level.

17 **Mitigation Measure BIO-179a: Conduct Food Studies and Monitoring for Wintering**  
18 **Waterfowl in Suisun Marsh**

19 Poorly managed wetlands (considered low biomass and food quality) will be identified and  
20 managed by BDCP proponents to improve food quality and biomass. Studies will be required to  
21 quantify 1) food production of existing managed wetlands in Suisun Marsh and 2) energetic  
22 productivity of brackish and tidal marsh habitats. Protected wetlands will be monitored to  
23 measure changes in the energetic productivity of these sites. Based on the food studies and  
24 monitoring results, BDCP proponents will determine if the minimum commitment of 5,000 acres  
25 is sufficient to meet the goal of 1:1 compensation for loss of wintering waterfowl habitat with  
26 the protection and management of managed wetlands in perpetuity. If monitoring demonstrates  
27 that additional acreage is needed to meet this goal, additional acreage of protection or creation  
28 of managed wetlands and management will be required.

29 **Mitigation Measure BIO-179b: Conduct Food Studies and Monitoring to Demonstrate**  
30 **Food Quality of Palustrine Tidal Wetlands in the Yolo and Delta Basins**

31 In order to address the uncertainty of the impact of loss of managed wetlands in the Yolo and  
32 Delta Basins on wintering waterfowl, BDCP proponents will conduct food studies and  
33 monitoring to demonstrate the food quality of palustrine tidal habitats in these basins. If studies  
34 show that the assumption of no effect was inaccurate, and the food quality goal of 1:1  
35 compensation for wintering waterfowl food value is not met, additional acreage of protection or  
36 creation of managed wetland and management will be required.

37 **Impact BIO-180: Loss or Conversion of Habitat for Breeding Waterfowl from Implementation**  
38 **of Conservation Components**

39 **Yolo and Delta Basins:** Implementation of Alternative 4 would reduce managed wetlands in the  
40 Yolo and Delta basins by 437 acres and 1,155 acres respectively. Under the assumption that 15% of  
41 these wetlands are managed as semi-permanent wetlands, Alternative 4 would reduce  
42 semipermanent wetlands in the Yolo and Delta drainage basins by 77 acres and 203 acres

1 respectively. While a reduction in these semipermanent habitats would represent a habitat loss for  
2 breeding waterfowl, with the restoration of 24,000 acres of palustrine tidal wetlands (Table 3-4,  
3 Chapter 3) in the Yolo and Delta basins there would be a less than adverse effect on breeding  
4 waterfowl. These palustrine habitats would presumably contain water during the breeding period  
5 (i.e., March through July), and would be expected to compensate for the loss of 280 acres of managed  
6 semi-permanent wetlands in the Yolo and Delta watersheds attributed to Alternative 4.

7 **Suisun Marsh:** Total managed wetlands in Suisun Marsh would decline from 41,012 acres to 30,640  
8 acres from the conversion of managed seasonal and semi-permanent wetlands to tidal habitats.  
9 Some of the remaining seasonal wetlands could be managed as semi-permanent wetlands to offset  
10 the loss of breeding habitat, but this could further reduce food supplies available to wintering  
11 waterfowl under the assumption that semi-permanent wetlands provide few food resources  
12 compared to seasonally managed habitats (Central Valley Joint Venture 2006).

13 The BDCP includes a commitment to protect and enhance 1,600 acres of permanently flooded  
14 managed wetlands in Suisun Marsh to provide habitat for breeding waterfowl. In addition, 5,000  
15 acres of semipermanent wetlands that would be protected and enhanced for wintering and  
16 migratory waterfowl (Table 3-4, Chapter 3; Objective MWNC1.1 in BDCP Chapter 3, *Conservation*  
17 *Strategy*).

18 Food studies and monitoring would be necessary to determine how increases in tidal marsh and  
19 salinity levels would affect the overall reproductive capacity of the marsh. These studies would be  
20 needed in order to quantify impacts to breeding waterfowl in Suisun Marsh and to determine not  
21 only the number of acres that would compensate for loss of breeding habitat at a ratio of 1:1 for  
22 habitat value, but how those acres should be managed. Mitigation Measure BIO-180, *Conduct Food*  
23 *and Monitoring Studies of Breeding Waterfowl in Suisun Marsh*, would be available to address the  
24 uncertainty of this effect.

25 In addition to providing semipermanent wetlands to breeding waterfowl, the Suisun Marsh contains  
26 several key upland areas that have significant nesting value. The largest block of upland habitat in  
27 the region is the core area on the Grizzly Island Wildlife Area. This area does not overlap with the  
28 hypothetical footprint for *CM4 Tidal Natural Communities Restoration*. However, this core area  
29 includes over 2,000 acres of upland grasslands that have some of the highest duck nesting densities  
30 in California (Central Valley Joint Venture 2006). A few small wetland areas are scattered within this  
31 core grassland mosaic that provide necessary freshwater brooding habitat. If restoration footprints  
32 were changed during the implementation process of BDCP to overlap with this area, the effects on  
33 breeding waterfowl would likely be greatly increased.

34 **NEPA Effects:** Implementation of Alternative 4 would reduce managed wetlands in the Yolo and  
35 Delta basins by 437 acres and 1,155 acres respectively. Under the assumption that 15% of these  
36 wetlands are managed as semi-permanent wetlands, Alternative 4 would reduce semi-permanent  
37 wetlands in the Yolo and Delta drainage basins by 77 acres and 203 acres, respectively. The  
38 reduction in these semi-permanent habitats would represent a habitat loss for breeding waterfowl.  
39 However, with the restoration of 24,000 acres of palustrine tidal wetlands in the Yolo and Delta  
40 basins, Alternative 4 would not have an adverse effect on breeding waterfowl. These palustrine  
41 habitats would presumably contain water during the breeding period (March through July), and  
42 would be expected to compensate for the loss of 280 acres of managed semi-permanent wetlands in  
43 the Yolo and Delta watersheds attributed to Alternative 4 implementation. Total managed wetlands  
44 in Suisun Marsh would decline from 41,012 acres to 30,640 acres with the conversion of managed

1 seasonal and semi-permanent wetlands to tidal habitats. Some of the remaining seasonal wetlands  
2 could be managed as semi-permanent wetlands to offset the loss of breeding habitat, but such  
3 management could further reduce food supplies available to wintering waterfowl under the  
4 assumption that semi-permanent wetlands provide few food resources compared with seasonally  
5 managed habitats. The protection and enhancement of 1,600 acres of permanently flooded managed  
6 wetlands would provide habitat for breeding waterfowl. However, food studies and monitoring  
7 would be necessary to determine how increases in tidal marsh and salinity levels would affect the  
8 overall reproductive capacity of the marsh. Therefore, the loss of breeding waterfowl habitat  
9 resulting from implementation of Alternative 4 could have an adverse effect. Mitigation Measure  
10 BIO-180, *Conduct Food and Monitoring Studies of Breeding Waterfowl in Suisun Marsh*, would be  
11 available to address the uncertainty of model assumptions and the potential adverse effect of habitat  
12 conversion on breeding waterfowl in Suisun Marsh.

13 **CEQA Conclusion:** Implementation of Alternative 4 would reduce managed wetlands in the Yolo and  
14 Delta basins by 437 acres and 1,155 acres respectively. Under the assumption that 15% of these  
15 wetlands are managed as semi-permanent wetlands, Alternative 4 would reduce semipermanent  
16 wetlands in the Yolo and Delta drainage basins by 77 acres and 203 acres respectively. The  
17 reduction in these semi-permanent habitats would represent a habitat loss for breeding waterfowl.  
18 However, with the restoration of 24,000 acres of palustrine tidal wetlands in the Yolo and Delta  
19 basins, Alternative 4 would have a less-than-significant impact on breeding waterfowl. These  
20 palustrine habitats would presumably contain water during the breeding period (March through  
21 July), and would be expected to compensate for the loss of 280 acres of managed semi-permanent  
22 wetlands in the Yolo and Delta watersheds attributed to Alternative 4.

23 Total managed wetlands in Suisun Marsh would decline from 41,012 acres to 30,640 acres with the  
24 conversion of managed seasonal and semi-permanent wetlands to tidal habitats. Some of the  
25 remaining seasonal wetlands could be managed as semi-permanent wetlands to offset the loss of  
26 breeding habitat, but this management could further reduce food supplies available to wintering  
27 waterfowl under the assumption that semi-permanent wetlands provide few food resources  
28 compared with seasonally managed habitats. The protection and enhancement of 1,600 acres of  
29 permanently flooded managed wetlands would provide habitat for breeding waterfowl. However,  
30 food studies and monitoring would be necessary to determine how increases in tidal marsh and  
31 salinity levels would affect the overall reproductive capacity of the marsh. Therefore, the loss or  
32 conversion of habitat from implementation of Alternative 4 could have a significant impact on  
33 breeding waterfowl in Suisun Marsh. Implementation of Mitigation Measure BIO-180, *Conduct Food  
34 and Monitoring Studies of Breeding Waterfowl in Suisun Marsh*, would address the uncertainty of  
35 model assumptions and reduce the impact to a less-than-significant level.

36 **Mitigation Measure BIO-180: Conduct Food and Monitoring Studies of Breeding**  
37 **Waterfowl in Suisun Marsh**

38 To address the uncertainty of the impact of loss of managed wetlands in Suisun Marsh on  
39 breeding waterfowl, BDCP proponents will conduct food studies and monitoring to determine  
40 how increases in tidal marsh and salinity levels will affect the overall reproductive capacity of  
41 the marsh.

42 The required studies will examine how increases in tidal marsh and salinity levels will affect the  
43 overall reproductive capacity of the Marsh. Reproductive studies will address but will not be  
44 limited to the following questions:

- 1 • How does the distribution of breeding waterfowl in Suisun Marsh differ in tidal versus  
2 managed habitats and across salinity gradients?
- 3 • How does waterfowl nest success and nest density vary with respect to tidal versus  
4 managed habitats and across salinity gradients?
- 5 • What are the patterns of habitat selection and movements by waterfowl broods in relation  
6 to tidal vs. managed habitats, and are there impacts on duckling survival?
- 7 • What is the current relationship between waterfowl reproductive success and interactions  
8 with alternate prey and predators, and how is tidal restoration likely to alter these  
9 relationships?

## 10 **Impact BIO-181: Loss or Conversion of Habitat for Shorebirds from the Implementation of** 11 **Conservation Components**

12 Shorebird use of the study area varies by species and fluctuates both geographically and by habitat  
13 type throughout the year. Shallow flooded agricultural fields and wetlands support large numbers of  
14 wintering and migrating shorebirds (Shuford et al. 1998), particularly least and western sandpipers,  
15 dunlin, greater yellowlegs and long-billed dowitcher. Rice lands of the Sacramento Valley provide  
16 important breeding habitat for shorebirds such as American avocet and black-necked stilt (Shuford  
17 et al. 2004) and have been designated as a Western Hemisphere Shorebird Reserve Network Site of  
18 International Importance (Hickey et al. 2003). Managed wetlands provide suitable foraging and  
19 roosting habitat for shorebirds; black-necked stilts, avocets, and yellowlegs use this habitat type  
20 almost exclusively. Water depth in all of these habitat types is an important habitat variable as the  
21 majority of shorebird species require water depths of approximately 10–20 cm for foraging (Isola et  
22 al. 2000, Hickey et al. 2003).

### 23 **Managed Wetlands**

24 **Yolo Basin:** Primarily as a result of *CM4 Tidal Natural Communities Restoration* within the Yolo  
25 Basin, 1,185 acres of managed wetland habitat would be permanently converted; 1,066 acres of  
26 which are protected. In addition, 42 acres of managed wetland habitat would be temporarily lost by  
27 construction-related activities associated with tidal restoration (CM4) and Fisheries Enhancement  
28 activities (CM2) (Table 2, ICF International 2013). Increased inundation frequency, depth and  
29 duration associated with the ongoing operation of a modified Fremont Weir (CM2) could  
30 periodically affect managed wetlands ranging from an estimated 643 acres during a notch flow of  
31 1,000 cfs to an estimated 2,055 acres during a notch flow of 4,000 cfs in the Yolo Basin (Table 5.4-2,  
32 in BDCP Chapter 5, *Effects Analysis*).

33 **Delta Basin:** Within the Delta Basin, 90 acres of managed wetland habitat would be permanently  
34 converted, as a result of tidal restoration (CM4). Thirteen of the 90 acres are protected (Table 3, ICF  
35 International 2013). Periodic flooding would not affect this natural community type in Delta Basin.

36 **Suisun Basin:** Within the Suisun Basin, 11,532 acres of managed wetland habitat would be  
37 permanently converted as a result of tidal restoration (CM4); 10,354 of which are protected. (Table  
38 4, ICF International 2013). Periodic flooding would not affect this natural community type in Suisun  
39 Basin.

40 According to Stralberg et al. 2011, the following species of shorebirds had a rank 1 designation for  
41 managed wetland habitat suitability (Table 1, ICF International 2013): black-necked stilt  
42 (*Himantopus mexicanus*), greater yellowlegs (*Tringa melanoleuca*), and long-billed dowitcher

1 (*Limnodromus scolopaceus*). Dunlin (*Calidris alpina*), least sandpiper (*Calidris minutilla*),  
2 semipalmated plover (*Charadrius semipalmatus*), and western sandpiper (*Calidris mauri*), had a rank  
3 2 for managed wetland habitat suitability. Black-bellied plover (*Pluvialis squatarola*) and whimbrel  
4 (*Numenius phaeopus*) both had rank 3 for managed wetland habitat suitability.

5 Managed wetlands would decrease in overall extent by 20% (Table 5, ICF International 2013). Most  
6 of this loss would occur in Suisun with some additional acreage loss in the Yolo Basin. The loss of  
7 managed wetland habitat for covered species and waterfowl would be compensated for with 8,200  
8 acres remaining managed wetland protection in Suisun Marsh. Of these 8,200 acres, the 5,000 acres  
9 of seasonal wetland protected, enhanced, and managed to provide overwintering waterfowl foraging  
10 habitat would be the habitat type most likely to benefit overwintering shorebirds. However, the  
11 1,600 acres of semi-permanent and permanent managed wetlands for breeding waterfowl and 1,500  
12 acres of managed wetlands for salt marsh harvest mouse would also be expected to have some  
13 benefit to wintering and breeding shorebirds.

#### 14 **Cultivated Lands**

15 **Yolo Basin:** Primarily as a result of tidal restoration (CM4) and Fisheries Enhancement activities  
16 (CM2) within the Yolo Basin, 8,309 acres of cultivated lands would be permanently converted; 1,272  
17 acres of which are protected. Also within the Yolo Basin, increased inundation frequency, depth and  
18 duration associated with the ongoing operation of a modified Fremont Weir (CM2) could affect an  
19 estimated 3,219 acres of cultivated lands during a notch flow of 1,000 cfs to an estimated 5,512  
20 acres during a notch flow of 6,000 cfs (Table 5.4-2, in BDCP Chapter 5, *Effects Analysis*).

21 **Delta Basin:** Within the Delta Basin, as a result of tidal restoration (CM4) and floodplain restoration  
22 (CM5), 25,633 acres of cultivated lands would be permanently converted. There would also be an  
23 additional 112 acres lost temporarily due to CM5 activities. Of the total permanently converted  
24 lands, 3,925 acres are protected (Table 3, ICF International 2013). Seasonal flooding (CM5) on the  
25 restored floodplain would periodically affect 738 acres of cultivated lands in Delta.

26 According to Stralberg et al. 2011, the following species of shorebirds had a rank 1 designation for  
27 cultivated lands habitat suitability (Table 1, ICF International 2013): killdeer (*Charadrius*  
28 *vociferous*), long-billed curlew, and whimbrel within pasture habitat and sandhill crane was ranked  
29 1 for grain and hay crops. Long-billed dowitcher and killdeer both had a rank 2 for idle crop habitat  
30 suitability and black-bellied plover was ranked 2 for pasture habitat. Red-necked phalarope  
31 (*Phalaropus lobatus*) and Wilson's phalarope (*Phalaropus tricolor*) were both ranked 2 for grain and  
32 hay crops. Long-billed dowitcher, dunlin, least sandpiper, and long-billed curlew were all ranked 3  
33 for rice habitat suitability and killdeer was ranked 3 for field crop habitat suitability.

34 Cultivated land loss would occur in all three basins, but the majority of acreage loss would occur in  
35 the Delta basin. Pasture crop types would decrease in overall extent by 15% over baseline (Table 5,  
36 ICF International 2013), but would increase in protection by 135%. More than half of all cultivated  
37 lands within the 48,000-acre BDCP cultivated lands reserve would be in pasture production  
38 (primarily alfalfa) and enhanced and managed to benefit Swainson's hawk. Idle crop types are not  
39 identified as a specific conservation target in the BDCP, are expected to occur within the reserve and  
40 are recognized in the BDCP as having "moderate" foraging habitat value for Swainson's hawk, white-  
41 tailed kite, and greater sandhill crane.

42 Grain and hay crop would be expected to decrease by 13% (Table 5, ICF International 2013) while  
43 protection, enhancement and management would be expected to increase by 28% (Table 6, ICF

1 International 2013). These crop types would be managed for a tricolored blackbirds, Swainson's  
2 hawk, white-tailed kite, greater sandhill crane, and burrowing owls.

3 Rice would decrease in overall extent by 2% (Table 5, ICF International 2013) but increase in total  
4 protection by 57%. Rice lands would be protected, enhanced, and managed for the benefit for giant  
5 garter snake.

### 6 **Tidal Wetlands**

7 **Yolo Basin:** As a result of tidal restoration (CM4) and Fisheries Enhancement activities (CM2)  
8 within the Yolo Basin, 194 acres of tidal wetland habitat would be permanently converted; 180 acres  
9 of which are protected. In addition, 12 acres of tidal wetland habitat would be temporarily lost by  
10 construction-related activities associated with Fisheries Enhancement activities (CM2) (Table 2, ICF  
11 International 2013). Periodic flooding in Yolo Bypass would affect 3,957 acres of tidal wetlands in  
12 Yolo Basin.

13 **Delta Basin:** Within the Delta Basin, 54 acres of tidal wetlands would be permanently converted as  
14 a result of tidal restoration (CM4) (Table 3, ICF International 2013). Of the total permanently  
15 converted lands, 26 acres are protected. Periodic flooding in Yolo Bypass would affect 26 acres of  
16 tidal wetlands in Delta Basin.

17 **Suisun Basin:** Within the Suisun Basin, 219 acres of tidal wetland habitat would be permanently  
18 converted as a result of tidal restoration (CM4); 215 of which are protected. (Table 4, ICF  
19 International 2013). Periodic flooding would not affect this natural community type in Suisun Basin.

20 According to Stralberg et al. 2011, the following species of shorebirds had a rank 1 designation for  
21 tidal mudflat habitat suitability (Table 6, ICF International 2013): black-bellied plover, dunlin, least  
22 sandpiper, marbled godwit (*Limosa fedoa*), semipalmated plover, short-billed dowitcher  
23 (*Limnodromus griseus*), western sandpiper, and willet (*Tringa semipalmata*). Long-billed curlew  
24 (*Numenius americanus*) and whimbrel both had a rank 2 for tidal mudflat habitat suitability.  
25 American avocet (*Recurvirostra americana*) was ranked 3 for tidal mudflat habitat suitability. For  
26 tidal brackish emergent wetland/tidal freshwater emergent wetland, willet was ranked 2 and long-  
27 billed curlew and whimbrel were both ranked 3 for habitat suitability.

28 Tidal mudflat habitat would be estimated to increase in extent by 1,780 acres. This extremely large  
29 increase in tidal mudflat habitat would occur almost exclusively in Suisun Marsh as the result of  
30 tidal restoration and the conversion of existing mid- and high-marsh types to low marsh and tidal  
31 mudflats in response to sea level rise. BDCP Appendix 3.B, *BDCP Tidal Habitat Evolution Assessment*,  
32 details the methods and assumptions modeled to come about this result. Tidal mudflat habitats  
33 would be expected to require management, however, sediment augmentation has been discussed as  
34 an experimental method that could be employed in places like Suisun to combat the loss of intertidal  
35 marshes in the face of sea level rise and reduced sediment supplies.

36 Tidal emergent wetland habitat would increase in extent by 152% (Table 5, ICF International 2013).  
37 Of the 30,000 acres of emergent wetland restoration, 6,000 acres would be in the Suisun Basin and  
38 the rest would be distributed between the Yolo and Delta Basins. Enhancement and management on  
39 these lands would be likely to be focused on nonnative, invasive species management. Any  
40 additional actions in Suisun would be focused on salt marsh harvest mouse, Suisun shrew, California  
41 clapper rail, black rail, Suisun thistle, and soft bird's-beak. In freshwater marshes, enhancement and  
42 management would be likely to focus on black rail, western pond turtle, and, in some cases, giant  
43 garter snake.

1       **Nontidal Wetlands**

2       **Yolo Basin:** As a result of tidal restoration (CM4) and fisheries enhancement activities (CM2) within  
3       the Yolo Basin, 313 acres of nontidal wetland habitat would be permanently converted; 119 acres of  
4       which are protected. In addition, 11 acres of nontidal wetland habitat would be temporarily lost by  
5       construction-related activities associated with fisheries enhancement activities (CM2) (Table 2, ICF  
6       International 2013). Periodic flooding in Yolo Bypass associated with ongoing Fremont Weir  
7       operation (CM2) would affect 305 acres of nontidal wetlands in Yolo Basin, specifically nontidal  
8       perennial aquatic habitat.

9       **Delta Basin:** Within the Delta Basin, 99 acres of nontidal wetlands would be permanently converted  
10       as a result of tidal restoration (CM4) and floodplain restoration (CM5) (Table 3, ICF International  
11       2013). There would also be 8 acres of nontidal perennial aquatic habitat temporarily lost from CM5  
12       activities. Of the total permanently converted lands, 29 acres are protected. Periodic flooding from  
13       CM5 would affect 4 acres of nontidal perennial aquatic habitat in Delta Basin.

14       **Suisun Basin:** Within the Suisun Basin, 1 acre of nontidal wetland habitat, specifically vernal pool  
15       complex, would be permanently converted as a result of tidal restoration (CM4); and is not  
16       protected. (Table 4, ICF International 2013). Periodic flooding would not affect this natural  
17       community type in Suisun Basin.

18       According to Stralberg et al. 2011, the following species of shorebirds had a rank 1 designation for  
19       nontidal wetland habitat suitability (Table 6, ICF International 2013): red-necked phalarope and  
20       Wilson's phalarope for nontidal freshwater perennial emergent wetland and American avocet for  
21       alkali seasonal wetland complex. Greater yellowlegs had a rank 2 for vernal pool complex habitat  
22       suitability. Red-necked phalarope and western sandpiper were both ranked 3 for alkali seasonal  
23       wetland habitat suitability and greater yellowlegs was ranked 3 for nontidal freshwater perennial  
24       emergent wetland habitat suitability.

25       Nontidal freshwater emergent wetland would increase in extent by 88% as a result of BDCP  
26       implementation (Table 5, ICF International 2013). These lands would be managed to benefit giant  
27       garter snake and located within the Delta Basin (likely in the vicinity of White Slough) and the Yolo  
28       Basin (in the Cache Slough area).

29       Impacts on wetted acres of vernal pool complex and alkali seasonal wetland complex would be  
30       avoided and thus loss of this community is not expected. However, up to 10 acres of wetted acre loss  
31       could be permitted under the Plan. Protection of vernal pool complex natural community would  
32       increase by 13% and by 6% for alkali seasonal wetlands (Table 6, ICF International 2013).  
33       Protection of these two community types would enhance and manage habitat for vernal pool  
34       crustaceans and alkali-related plant species.

35       The protection and restoration of natural communities would also include management and  
36       enhancement actions under *CM11 Natural Communities Enhancement and Management*. The  
37       following management activities to benefit shorebirds would be considered for implementation  
38       under CM11 in areas where they would not conflict with covered species management.

- 39       ● Managed wetlands:
  - 40           ○ Managed wetlands can be potentially manipulated to provide the optimum water depths for
  - 41           foraging shorebirds and islands for nesting (Hickey et al. 2003).

- 1 ○ During fall and spring, stagger the timing and location of draining and flooding to optimize  
2 the extent of shallow-water habitat; varying depths within the wetland unit helps to create  
3 temporal variation in foraging opportunities. During warm, dry springs when wetland units  
4 dry quickly, wetland units can be re-supplied with water to extend habitat availability for  
5 shorebirds.
- 6 ○ Provide open, shallow water habitat adjacent to minimally vegetated, shallowly sloped  
7 edges for nesting shorebirds between April and July.
- 8 ○ Provide islands with little to no vegetation to increase the likelihood of shorebird roosting  
9 and nesting.
- 10 ○ Create low slopes on islands and levees; gradual angles (10-12:1) are better than steep  
11 angles.
- 12 ○ Limit levee maintenance during the nesting season (April through July). However, mowing  
13 the center of levees is fine.
- 14 ○ Potentially add material to levees or to islands to encourage nesting for some species.
- 15 ● Cultivated Lands:
  - 16 ○ Maintaining a mosaic of dry and flooded crop types, and varying water depths will promote  
17 a diverse community of waterbirds, including shorebirds, during fall migration and winter  
18 (Shuford et al. 2013).
  - 19 ○ To provide wintering habitat for multiple waterbird guilds, including shorebirds, use a  
20 combination of flooding practices that include one-time water application and maintenance  
21 flooding while also providing unflooded habitat (Strum et al. *in review*).
  - 22 ○ The post-harvest flooding of winter wheat and potato fields in early fall (July- September)  
23 can provide substantial benefits to shorebirds at a time of very limited shallow-water  
24 habitat on the landscape (Shuford et al. 2013).
  - 25 ○ Stagger the drawdown of flooded rice and other winter-flooded agricultural fields to  
26 prolong the availability of flooded habitat (Iglecia et al. 2012). Be aware of soil type because  
27 this practice may not be as effective on soils that drain quickly.
  - 28 ○ Remove as much stubble as possible in rice and other agricultural fields after harvest to  
29 increase the potential shorebird habitat on intentionally flooded or unflooded fields that  
30 may passively gather rain water (Iglecia et al. 2012).
  - 31 ○ Shallowly flood available agricultural fields during July, August, and September to provide  
32 early fall migration habitat for shorebirds. Fields should be free of vegetation prior to  
33 flooding, have minimal micro-topography (e.g. no large clods), and should remain flooded  
34 for up to three week periods (after three weeks, vegetation encroachment reduces habitat  
35 value for shorebirds; ICF International 2013).
  - 36 ○ Manage levee habitats to have minimal vegetation but do not spray herbicide directly or  
37 drive on levees during the nesting season (April- July, Iglecia et al. 2012).
  - 38 ○ Maintain a minimum top-width of 30 inches for levees, based on increased avocet use of  
39 wider levees (Iglecia et al. 2012).
  - 40 ○ When possible, flood fields with nesting habitat (modified levees and islands) in late April to  
41 provide nesting habitat for American avocets (Iglecia et al. 2012).

- 1           ○ Finer grained substrate (clods smaller than a fist) in rice and other agricultural fields may be
- 2           more appealing for nesting shorebirds (Iglecia et al. 2012).
- 3           ○ Maintain gently sloping levees and island sides (10-12:1; Iglecia et al. 2012).
- 4           ○ Islands should be disked along with the rest of the field after harvest to help inhibit
- 5           vegetation growth (Iglecia et al. 2012).

6           **NEPA Effects:** Alternative 4 implementation would result in the conversion of managed wetland and  
7           cultivated lands to tidal natural communities, including tidal mudflat. The result would be  
8           substantial loss of the primary habitat of black-necked stilt, American avocet, greater yellowlegs,  
9           and long-billed dowitcher and a gain in the primary habitat of black-bellied plover, dunlin, least  
10          sandpiper, marbled godwit, semipalmated plover, short-billed dowitcher, western sandpiper, and  
11          willet. While substantial losses of cultivated lands would be incurred, protection, enhancement, and  
12          management of the remaining acres would likely have substantial benefits for select species of  
13          wintering and breeding shorebirds. This is because impacts on crop types would be distributed  
14          across all crop types, while protection would focus primarily on pasture lands, grain and hay, corn,  
15          and rice types. While the protection, enhancement, and management of these crop types are being  
16          driven by covered species, these management actions would also benefit shorebirds. The protection,  
17          enhancement, and management of remaining managed wetlands in Suisun Marsh, in compensation  
18          for the loss of substantial acreage, would have some incremental benefits for shorebirds, but would  
19          be unlikely to compensate for the overall loss. However, with the protection and restoration of acres  
20          in the Delta and Yolo watersheds, in addition to the implementation of the management actions  
21          outlined in *CM11 Natural Communities Enhancement and Management*, habitat conversion would not  
22          be expected to result in an adverse effect on shorebird populations in the study area.

23          **CEQA Conclusion:** Alternative 4 implementation would result in the conversion of managed wetland  
24          and cultivated lands to tidal natural communities, including tidal mudflat. The result would be  
25          significant loss of the primary habitat of black-necked stilt, American avocet, greater yellowlegs, and  
26          long-billed dowitcher and a gain in the primary habitat of black-bellied plover, dunlin, least  
27          sandpiper, marbled godwit, semipalmated plover, short-billed dowitcher, western sandpiper, and  
28          willet. While significant losses of cultivated lands would be incurred, protection, enhancement, and  
29          management of the remaining acres would likely have substantial benefits for select species of  
30          wintering and breeding shorebirds. This is because impacts on crop types would be distributed  
31          across all crop types, while protection would focus primarily on pasture lands, grain and hay, corn,  
32          and rice types. While the protection, enhancement, and management of these types are being driven  
33          by covered species, these management actions would also benefit shorebirds. The protection,  
34          enhancement, and management of remaining managed wetlands in Suisun Marsh, in compensation  
35          for substantial acreage loss, would have some incremental benefits for shorebirds, but would be  
36          unlikely to compensate for the overall loss. However, with the protection and restoration of acres in  
37          the Delta and Yolo watersheds, in addition to the implementation of the management actions  
38          outlined in *CM11 Natural Communities Enhancement and Management*, habitat conversion would be  
39          expected to have a less-than-significant impact on shorebird populations in the study area.

40          **Impact BIO-182: Effects on Shorebirds and Waterfowl Associated with Electrical**  
41          **Transmission Facilities**

42          New transmission lines installed in the study area would increase the risk for bird-power line  
43          strikes, which could result in injury or mortality of shorebirds and waterfowl. The existing network  
44          of power lines in the study currently poses a risk for shorebirds and waterfowl in the Delta. New

1 transmission lines would increase this risk and have an adverse effect on shorebird and waterfowl  
2 species in the absence of other conservation actions. The implementation of *AMM20 Greater Sandhill*  
3 *Crane* would reduce potential effects through the installation of flight-diverters on new transmission  
4 lines, and selected existing transmission lines in the study area.

5 **NEPA Effects:** New transmission lines would increase the risk for shorebird and waterfowl power  
6 line strikes. With the implementation of *AMM20 Greater Sandhill Crane*, the potential effect of the  
7 construction of new transmission lines on shorebird and waterfowl would not be adverse.

8 **CEQA Conclusion:** New transmission lines would increase the risk for shorebird and waterfowl  
9 power line strikes. The implementation of *AMM20 Greater Sandhill Crane* would reduce the potential  
10 impact of the construction of new transmission lines on shorebirds and waterfowl to a less-than-  
11 significant level.

### 12 **Impact BIO-183: Indirect Effects of Plan Implementation on Shorebirds and Waterfowl**

13 **Indirect construction- and operation-related effects:** Noise and visual disturbances associated  
14 with construction-related activities could result in temporary disturbances that affect shorebird and  
15 waterfowl use of modeled habitat. Indirect effects associated with construction include noise, dust,  
16 and visual disturbance caused by grading, filling, contouring, and other ground-disturbing  
17 operations. Construction-related noise and visual disturbances could disrupt nesting and foraging  
18 behaviors, and reduce the functions of suitable habitat which could result in an adverse effect on  
19 these species. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid*  
20 *Disturbance of Nesting Birds*, would be available to minimize adverse effects on active nests. The use  
21 of mechanical equipment during water conveyance construction could cause the accidental release  
22 of petroleum or other contaminants that could affect shorebirds and waterfowl or their prey in the  
23 surrounding habitat. AMM1–AMM7, including *AMM2 Construction Best Management Practices and*  
24 *Monitoring*, would minimize the likelihood of such spills from occurring. The inadvertent discharge  
25 of sediment or excessive dust adjacent to shorebirds and waterfowl in the study area could also have  
26 a negative effect on these species. AMM1–AMM7 would ensure that measures were in place to  
27 prevent runoff from the construction area and the negative effects of dust on wildlife adjacent to  
28 work areas.

29 **Methylmercury Exposure:** Covered activities have the potential to exacerbate bioaccumulation of  
30 mercury in avian species, including shorebird and waterfowl species. Marsh (tidal and nontidal) and  
31 floodplain restoration have the potential to increase exposure to methylmercury. Mercury is  
32 transformed into the more bioavailable form of methylmercury in aquatic systems, especially areas  
33 subjected to regular wetting and drying such as tidal marshes and flood plains (Alpers et al. 2008).  
34 Thus, BDCP restoration activities that create newly inundated areas could increase bioavailability of  
35 mercury (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Species sensitivity  
36 to methylmercury differs widely and there is a large amount of uncertainty with respect to species-  
37 specific effects. Increased methylmercury associated with natural community and floodplain  
38 restoration could indirectly affect shorebirds and waterfowl, via uptake in lower trophic levels (as  
39 described in the BDCP Appendix 5.D, *Contaminants*).

40 In addition, the potential mobilization or creation of methylmercury within the Plan Area varies  
41 with site-specific conditions and would need to be assessed at the project level. Measures described  
42 in BDCP Chapter 3, Section 3.4.12, *Conservation Measure 12 Methylmercury Management*, include  
43 provisions for project-specific Mercury Management Plans. Site-specific restoration plans that  
44 address the creation and mobilization of mercury, as well as monitoring and adaptive management

1 as described in CM12 would be available to address the uncertainty of methylmercury levels in  
2 restored tidal marsh and potential impacts on shorebirds and waterfowl.

3 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in  
4 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,  
5 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,  
6 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz  
7 2009). The effect of selenium toxicity differs widely between species and also between age and sex  
8 classes within a species. In addition, the effect of selenium on a species can be confounded by  
9 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith  
10 2009).

11 The primary source of selenium bioaccumulation in birds is through their diet (Ackerman and  
12 Eagles-Smith 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the  
13 trophic level at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At  
14 Kesterson Reservoir in the San Joaquin Valley, selenium concentrations in invertebrates have been  
15 found to be two to six times the levels in rooted plants. Furthermore, bivalves sampled in the San  
16 Francisco Bay contained much higher selenium levels than crustaceans such as copepods (Stewart et  
17 al. 2004). Studies conducted at the Grasslands in Merced County recorded higher selenium levels in  
18 black-necked stilts which feed on aquatic invertebrates than in mallards and pintails, which are  
19 primarily herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which  
20 forage on bivalves) have much higher levels of selenium levels than shorebirds that prey on aquatic  
21 invertebrates (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high  
22 levels of selenium have a higher risk of selenium toxicity.

23 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations  
24 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to  
25 exacerbate bioaccumulation of selenium in avian species, including shorebird and waterfowl  
26 species. Marsh (tidal and nontidal) and floodplain restoration have the potential to mobilize  
27 selenium, and therefore increase avian exposure from ingestion of prey items with elevated  
28 selenium levels. Thus, BDCP restoration activities that create newly inundated areas could increase  
29 bioavailability of selenium (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration).  
30 Changes in selenium concentrations were analyzed in Chapter 8, *Water Quality*, and it was  
31 determined that, relative to Existing Conditions and the No Action Alternative, CM1 would not result  
32 in substantial, long-term increases in selenium concentrations in water in the Delta under any  
33 alternative. However, it is difficult to determine whether the effects of potential increases in  
34 selenium bioavailability associated with restoration-related conservation measures (CM4 and CM5)  
35 would lead to adverse effects on shorebirds and waterfowl species.

36 Because of the uncertainty that exists at this programmatic level of review, there could be a  
37 substantial effect on shorebirds and waterfowl from increases in selenium associated with  
38 restoration activities. This effect would be addressed through the implementation of *AMM27*  
39 *Selenium Management* (BDCP Appendix 3.C, *Avoidance and Minimization Measures*) which would  
40 provide specific tidal habitat restoration design elements to reduce the potential for  
41 bioaccumulation of selenium and its bioavailability in tidal habitats. Furthermore, the effectiveness  
42 of selenium management to reduce selenium concentrations and/or bioaccumulation would be  
43 evaluated separately for each restoration effort as part of design and implementation. This  
44 avoidance and minimization measure would be implemented as part of the tidal habitat restoration  
45 design schedule.

1 **NEPA Effects:** Noise and visual disturbances from the construction of Alternative 4 water  
2 conveyance facilities could reduce shorebird and waterfowl use of modeled habitat adjacent to work  
3 areas. Moreover, operation and maintenance of the water conveyance facilities, including the  
4 transmission facilities, could result in ongoing but periodic postconstruction disturbances that could  
5 affect shorebird and waterfowl use of the surrounding habitat. AMM1–AMM7 would minimize these  
6 effects, and Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid*  
7 *Disturbance of Nesting Birds*, would be available to address adverse effects on nesting individuals.  
8 Tidal habitat restoration could result in increased exposure of shorebirds and waterfowl to  
9 selenium. This effect would be addressed through the implementation of *AMM27 Selenium*  
10 *Management*, which would provide specific tidal habitat restoration design elements to reduce the  
11 potential for bioaccumulation of selenium and its bioavailability in tidal habitats. Therefore, the  
12 indirect effects associated with noise and visual disturbances, and increased exposure to selenium  
13 from Alternative 4 implementation would not have an adverse effect on shorebirds and waterfowl.  
14 Tidal habitat restoration is unlikely to have an adverse effect on shorebirds and waterfowl through  
15 increased exposure to methylmercury, as these species currently nest and forage in tidal marshes  
16 with elevated methylmercury levels. However, it is unknown what concentrations of methylmercury  
17 are harmful to species of waterfowl and shorebirds, and the potential for increased exposure would  
18 vary substantially within the study area. Site-specific restoration plans in addition to monitoring and  
19 adaptive management, described in *CM12 Methylmercury Management*, would address the  
20 uncertainty of methylmercury levels in restored tidal marsh. Once site-specific sampling and other  
21 information is developed, the site-specific planning phase of marsh restoration would be the  
22 appropriate place to assess the potential risk of shorebird and waterfowl exposure to  
23 methylmercury.

24 **CEQA Conclusion:** Noise, potential hazardous spills, and increased dust and sedimentation as a  
25 result of Alternative 4 water conveyance facilities construction and operation and maintenance  
26 would have a significant impact on shorebirds and waterfowl. AMM1–AMM7 would minimize these  
27 impacts, and implementation of Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird*  
28 *Surveys and Avoid Disturbance of Nesting Birds*, would reduce the impacts to a less-than-significant  
29 level. Tidal habitat restoration is unlikely to have a significant impact on shorebirds and waterfowl  
30 species through increased exposure to methylmercury, as these species currently nest and forage in  
31 tidal marshes with elevated methylmercury levels. However, it is unknown what concentrations of  
32 methylmercury are harmful to species of waterfowl and shorebirds. Site-specific restoration plans  
33 that address the creation and mobilization of mercury, as well as the monitoring and adaptive  
34 management described in *CM12*, would be the appropriate place to assess the potential risk of  
35 shorebird and waterfowl exposure to methylmercury in the study area. Tidal habitat restoration  
36 could result in increased exposure of shorebirds and waterfowl to selenium. This effect would be  
37 addressed through the implementation of *AMM27 Selenium Management*, which would provide  
38 specific tidal habitat restoration design elements to reduce the potential for bioaccumulation of  
39 selenium and its bioavailability in tidal habitats. Therefore, the indirect effects of Alternative 4  
40 implementation would have a less-than-significant impact on shorebirds and waterfowl.

41 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**  
42 **Disturbance of Nesting Birds**

43 See Mitigation Measure BIO-75 under Impact BIO-75.

1 **Common Wildlife and Plants**

2 Common wildlife and plants are widespread, often abundant, species that are not covered under  
3 laws or regulations that address conservation or protection of individual species. Examples of  
4 common wildlife and plants occurring in the study area are provided within the discussion for each  
5 natural community type in Section 12.1.2.2, *Special-Status and Other Natural Communities*. Impacts  
6 on common wildlife and plants would occur through the same mechanisms discussed for natural  
7 communities and special-status wildlife and plants for each alternative.

8 **Impact BIO-184: Effects on Habitat and Populations of Common Wildlife and Plants**

9 Effects on habitat of common wildlife and plants, including habitat removal and conversion, are  
10 discussed the analysis of Alternative 4 effects on natural communities (Impacts BIO-1 through BIO-  
11 31). In general, effects on habitat of common wildlife and plants would not be adverse. Through the  
12 course of implementing the Plan over a 50-year time period, several natural communities and land  
13 cover types would be reduced in size, primarily from restoration of other natural communities.  
14 Grassland, managed wetland and cultivated lands would be reduced in acreage, so the common  
15 species that occupy these habitats would be affected. However, the losses in acreage and value of  
16 these habitats would be offset by protection, restoration, enhancement, and management actions  
17 contained in the BDCP, including *CM3 Natural Communities Protection and Restoration*, *CM4 Tidal*  
18 *Natural Communities Restoration*, *CM5 Seasonally Inundated Floodplain Restoration*, *CM6 Channel*  
19 *Margin Enhancement*, *CM7 Riparian Natural Community Restoration*, *CM8 Grassland Natural*  
20 *Community Restoration*, *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*, *CM10*  
21 *Nontidal Marsh Restoration*, and *CM11 Natural Communities Enhancement and Management*. In  
22 addition, the AMMs contained in Appendix 3.C of the BDCP would be in place to reduce or eliminate  
23 the potential to adversely affect both special-status and common wildlife and plants.

24 Direct effects on common wildlife and plants from constructing water conveyance facilities and  
25 implementing BDCP conservation measures would include construction or inundation-related  
26 disturbances that result in injury or mortality of wildlife or plants and the immediate displacement  
27 of wildlife. Indirect effects include project-related disturbances to nearby wildlife and plants during  
28 construction (e.g., disruption of breeding and foraging behaviors from noise and human activity,  
29 habitat degradation from fugitive dust and runoff) and effects occurring later in time (e.g., collisions  
30 of birds with transmission lines, habitat fragmentation, vegetation management). Indirect effects  
31 could result both from construction and from operations and maintenance (e.g., ground  
32 disturbances could result in the spread and establishment of invasive plants).

33 **NEPA Effects:** The direct and indirect effects associated with implementing the conservation  
34 measures of Alternative 4 would not be adverse because the conservation measures and AMMs also  
35 expand and protect natural communities, avoid or minimize effects on special-status species,  
36 prevent the introduction and spread of invasive species, and enhance natural communities. These  
37 actions would result in avoiding and minimizing effects on common wildlife and plants as well.

38 **CEQA Conclusion:** Construction and operation of the water conveyance facilities and habitat  
39 restoration activities would have impacts on common wildlife and plants in the study area through  
40 habitat loss and through direct or indirect loss or injury of individuals. The loss of habitat would not  
41 be substantial, because habitat restoration would increase the amount and extent of habitat  
42 available for use by most common wildlife and plant species. Conservation measures to avoid or  
43 minimize effects on special-status species, to prevent the introduction and spread of invasive  
44 species, and to enhance natural communities also would result in avoiding and minimizing effects on

1 common wildlife and plants. Consequently, implementation of the BDCP is not expected to cause any  
2 populations of common wildlife or plants to drop below self-sustaining levels, and this impact would  
3 be less than significant. No mitigation would be required.

#### 4 **Wildlife Corridors**

5 Essential Connectivity Areas (ECAs) are lands likely to be important to wildlife movement between  
6 large, mostly natural areas at the state wide level. The ECAs form a functional network of wildlands  
7 that are considered important to the continued support of California's diverse natural communities.  
8 Four general areas were identified within the study area that contain ECAs (Figure 12-2). The BDCP  
9 also identified important landscape linkages in the Plan Area to guide reserve design, which can also  
10 be seen on Figure 12-2.

#### 11 **Impact BIO-185: Effect of BDCP Conservation Measures on Wildlife Corridors**

12 Alternative 4 water conveyance facilities would cross two of the ECAs identified during the analysis,  
13 the Stone Lake-Yolo Bypass ECA and the Mandeville Island-Statens Island ECA. The conveyance  
14 facilities would also cross two landscape linkages identified in the BDCP, the *Middle River* linkage  
15 (#6 in Figure 12-2) and the *Cosumnes to Stone Lakes* linkage (#10 in Figure 12-2). Though the  
16 conveyance facilities shown on Figure 12-2 overlap with the line representing the *Sacramento River*  
17 linkage (#9 in Figure 12-2) this line generally represents the course of the Sacramento River and is  
18 intended to address the needs of aquatic species and will thus not be addressed in this chapter.

19 The construction of Intakes 2 and 3, and associated borrow and RTM areas, just east of Clarksburg,  
20 would occur within the Stone Lake-Yolo Bypass ECA. These activities would result in the permanent  
21 loss of narrow strips of riparian vegetation along the Sacramento River and the permanent and  
22 temporary loss of cultivated lands. Alternative 4 would not substantially increase impediments to  
23 movement of any nonavian wildlife that could move from Stone Lakes to Yolo Bypass because the  
24 Sacramento River and Sacramento River Deep Water Ship Channel already create a barrier to  
25 dispersal for nonavian species. However, the conversion of riparian and cultivated lands and the  
26 presence of the intakes would locally constrict the north-south movement of nonavian terrestrial  
27 species in the area between the Sacramento River and the Southern Pacific Dredger Cut west of  
28 Stone Lakes, as well as the east-west movement between Stone Lakes and the east bank of the  
29 Sacramento River. No records of wildlife species were identified within these construction  
30 footprints, though there are several records for Swainson's hawk in the vicinity. Though there would  
31 be losses in Swainson's hawk foraging habitat and potential nesting habitat in these areas, these  
32 losses would not substantially impede the movements of Swainson's hawks in the area. The loss in  
33 habitat is addressed in the Swainson's hawk effects analysis.

34 The addition of new permanent transmission lines within the Stone Lake-Yolo Bypass ECA and  
35 across the *Cosumnes to Stone Lakes* linkage could adversely affect birds during periods of low  
36 visibility. Sandhill cranes that are known to roost at Stone Lakes could particularly be adversely  
37 affected by the addition of the north-south running transmission line to the west of Stone Lakes and  
38 by the east-west transmission line between Stone Lakes and the Cosumnes Preserve; however this  
39 line would generally parallel an existing transmission line. The *Cosumnes to Stone Lakes* linkage was  
40 developed by BDCP for reserve planning to benefit greater sandhill crane movement from north to  
41 south in the Plan Area. Because the proposed east-west transmission line parallels an existing line it  
42 would not likely create a barrier to the future movement of cranes in this area (see impact  
43 discussions for greater and lesser sandhill cranes).

1 The Alternative 4 conveyance facilities would also pass through the Mandeville Island-Staten Island  
2 ECA, which also has several know roost locations for greater sandhill crane. Within this ECA,  
3 Alternative 4 would result in the construction of a temporary reusable tunnel material conveyor  
4 across Staten Island from north to south, RTM disposal areas on Staten and Bouldin Islands,  
5 permanent access roads on Bouldin and Mandeville Islands, and temporary transmission lines  
6 across most of the ECA. As discussed above, the temporary transmission lines could adversely affect  
7 the movement of cranes and other bird species during periods of low visibility. The RTM disposal  
8 area would not create a physical barrier to movement but could make this area unusable as wildlife  
9 habitat for at least 10 years during the tunnel construction. The reusable tunnel material conveyor  
10 would create a temporary north-south barrier down the length of Staten Island. The access roads  
11 are located on existing dirt and paved roads and would therefore not create any new physical  
12 barriers but could temporarily increase road mortality during periods of construction. The  
13 conveyance alignment at this location would be within the tunnel and thus not create a barrier to  
14 wildlife movement.

15 Alternative 4 temporary transmission lines would cross the *Middle River* linkage on Woodward  
16 Island. This linkage was established to guide riparian restoration along the Middle River to  
17 improve riparian connectivity for the benefit of riparian brush rabbit, riparian woodrat, least Bell's  
18 vireo, yellow-breasted chat, yellow-billed cuckoo, Swainson's hawk, and white-tailed kite. Because  
19 this transmission line is temporary it would only temporarily conflict with the future planning for  
20 and the current movement of the avian species that use riparian corridors.

21 Alternative 4 conveyance facilities would create some localized disruption in wildlife movement and  
22 the temporary and permanent transmission lines would create additional barriers to movement for  
23 avian species during periods of low visibility. However, overall the Alternative 4 alignment would  
24 not create substantial barriers to movement between ECAs because the majority of the alignment  
25 consists of a tunnel that would be beneath riparian corridors, which are the most likely dispersal  
26 routes for terrestrial animals in the majority of the study area, and because the large surface impacts  
27 (the intakes) are in areas that already have barriers to movement for nonavian terrestrial species  
28 (Sacramento River and Sacramento River Deep Water Ship Channel).

29 Restoration activities would occur in the ECAs within Yolo Bypass (*CM2 Yolo Bypass Fisheries*  
30 *Enhancement*) and within the Grizzly Island-Lake Marie ECA (*CM4 Tidal Natural Communities*  
31 *Restoration*). These activities would generally improve the movement of wildlife within and outside  
32 of the study area. In addition, the preservation of restored lands (CM3) and the enhancement and  
33 management of these areas (CM11) would improve and maintain wildlife corridors within the study  
34 area.

35 **NEPA Effects:** Alternative 4 conveyance facilities would create local barriers to dispersal but overall  
36 the restoration activities would improve opportunities for wildlife dispersal within the study area  
37 and between areas outside of the study area and therefore overall Alternative 4 would not adversely  
38 affect wildlife corridors.

39 **CEQA Conclusion:** Alternative 4 conveyance facilities would create some localized disruption in  
40 wildlife movement and the permanent and temporary transmission lines would create additional  
41 barriers to movement for avian species during periods of low visibility. However, overall the  
42 Alternative 4 alignment would not create substantial barriers to movement between ECAs because  
43 the majority of the alignment consists of a tunnel that would be beneath riparian corridors, which  
44 are the most likely dispersal routes for terrestrial animals in the majority of the study area, and

1 because the large surface impacts, (the intakes) are in areas that already have barriers to movement  
2 for nonavian terrestrial species (Sacramento River and Sacramento River Deep Water Ship Channel).

3 Restoration activities would occur in the ECAs within Yolo Bypass (*CM2 Yolo Bypass Fisheries*  
4 *Enhancement*) and within the Grizzly Island-Lake Marie ECA (*CM4 Tidal Natural Community*  
5 *Communities Restoration*). These activities would generally improve the movement of wildlife within  
6 and outside of the Plan Area. In addition, the preservation of restored lands (CM3) and the  
7 enhancement and management of these areas (CM11) would improve and maintain wildlife  
8 corridors within the study area.

9 Alternative 4 conveyance facilities would create local barriers to dispersal and create barriers to  
10 safe movement of avian species during periods of low visibility but overall the restoration activities  
11 would improve opportunities for wildlife dispersal within the study area and between areas outside  
12 of the study area and therefore overall Alternative 4 would result in less-than-significant impacts on  
13 wildlife corridors.

#### 14 **Invasive Plant Species**

15 The invasive plant species that primarily affect each natural community in the study area, which  
16 include water hyacinth, perennial pepperweed, giant reed, and Brazilian waterweed, are discussed  
17 in Section 12.1.4. Invasive species compete with native species for resources and can alter natural  
18 communities by altering fire regimes, hydrology (e.g., sedimentation and erosion), light availability,  
19 nutrient cycling, and soil chemistry but also have the potential to harm human health and the  
20 economy by adversely affecting natural ecosystems, water delivery, flood protection systems,  
21 recreation, agricultural lands, and developed areas (Randall and Hoshovsky 2000). The construction  
22 and restoration activities covered under the BDCP could result in the introduction or spread of  
23 invasive plant species by creating temporary ground disturbance that provides opportunities for  
24 colonization by invasive plants in the study area.

25 The primary mechanisms for the introduction of invasive plants as the result of implementation of  
26 the BDCP are listed here.

- 27 ● Grading, excavation, grubbing, and placement of fill material.
- 28 ● Breaching, modification, or removal of existing levees and construction of new levees.
- 29 ● Modification, demolition, and removal of existing infrastructure (e.g., buildings, roads, fences,  
30 electric transmission and gas lines, irrigation infrastructure).
- 31 ● Maintenance of infrastructure.
- 32 ● Removal of existing vegetation and planting/seeding of vegetation.
- 33 ● Maintaining vegetation and vegetation structure (e.g., grazing, mowing, burning, trimming).
- 34 ● Dredging waterways.

35 Clearing operations and the movement of vehicles, equipment, and construction materials in the  
36 study area would facilitate the introduction and spread of invasive plants by bringing in or moving  
37 seeds and other propagules. These effects would result from four activities.

- 38 ● Spreading chipped vegetative material from clearing operations over topsoil after earthwork  
39 operations are complete.

- 1 • Importing, distributing, storing, or disposing of fill, reusable tunnel material, borrow, spoil, or  
2 dredge material.
- 3 • Traffic from construction vehicles (e.g., water and cement trucks) and personal vehicles of  
4 construction staff.
- 5 • Transport of construction materials and equipment within the study area and to/from the study  
6 area.

7 Table 12-4-70 lists the acreages of temporary disturbance in each natural community in the study  
8 area that would result from implementation of Alternative 4.

9 **Table 12-4-70. Summary of Temporary Disturbance in Natural Communities under Alternative 4**

Natural Community	Temporary Impacts (acres)
Tidal perennial aquatic	2,116
Tidal brackish emergent wetland	0
Tidal freshwater emergent wetland	11
Valley foothill riparian	152
Grassland	431
Inland dune scrub	0
Alkali seasonal wetland complex	3
Vernal pool complex	16
Other natural seasonal wetland	0
Nontidal freshwater perennial emergent wetland	6
Nontidal perennial aquatic	34
Managed wetlands	72
Cultivated lands	2,753
<b>Total</b>	<b>5,594</b>

10

11 **Impact BIO-186: Adverse Effects on Natural Communities Resulting from the Introduction**  
12 **and Spread of Invasive Plant Species**

13 Under Alternative 4, the BDCP would have adverse effects on natural communities as a result of the  
14 introduction and spread of invasive plant species through implementation of CM1–CM10 and CM22  
15 (AMM6). No adverse effects are expected from implementation of CM11–CM21.

- 16 • *CM1 Water Facilities and Operations*: Construction of the Alternative 4 water conveyance  
17 facilities would result in the temporary disturbance of 3,752 acres that would provide  
18 opportunities for colonization by invasive plant species.
- 19 • *CM2 Yolo Bypass Fisheries Enhancements*: Construction of the Yolo Bypass fisheries  
20 enhancements would result in the temporary disturbance of 758 acres that would provide  
21 opportunities for colonization by invasive plant species. Vegetation maintenance activities for  
22 the Fremont Weir and Yolo Bypass improvements may include the removal of giant reed;  
23 however, the clearing of linear areas to facilitate water flow may also result in increased  
24 opportunities for invasion. Sediment removal, transportation, and application as a source  
25 material for restoration or levee projects as part of Fremont Weir and Yolo Bypass maintenance

1 activities could also result in the spread of invasives if the sediment contains viable invasive  
2 plant propagules.

- 3 • *CM3 Natural Communities Protection and Restoration*: The restoration activities in the natural  
4 communities located in the eleven CZs would result in the temporary disturbance of restoration  
5 areas that would provide opportunities for colonization by invasive plant species.
- 6 • *CM4 Tidal Natural Communities Restoration*: The activities associated with the restoration of  
7 tidal perennial aquatic, tidal mudflat, tidal freshwater emergent wetland, and tidal brackish  
8 emergent wetland in ROAs would result in the temporary disturbance of tidal areas that would  
9 provide opportunities for colonization by invasive plant species. These adverse effects would be  
10 reduced by designing restoration projects to minimize the establishment of nonnative  
11 submerged aquatic vegetation, and early restoration projects would be monitored to assess the  
12 response of nonnative species to restoration designs and local environmental conditions. If  
13 indicated by monitoring results, the BDCP Implementation Office would implement invasive  
14 plant control measures in restored natural communities to help ensure the establishment of  
15 native marsh plain plant species. Additionally, the BDCP Implementation Office would actively  
16 remove submerged and floating aquatic vegetation in subtidal portions of tidal natural  
17 community restoration sites.
- 18 • *CM5 Seasonally Inundated Floodplain Restoration*: Floodplain restoration levee construction  
19 would result in the temporary disturbance of 1,285 acres along channels in the north, east, and  
20 south Delta (San Joaquin, Old, and Middle Rivers) that would provide opportunities for  
21 colonization by invasive plant species.
- 22 • *CM6 Channel Margin Enhancement*: The temporary effects of channel margin enhancement were  
23 not estimated because specific locations for this activity and their areal extent have not been  
24 developed. Channel margin enhancement (Sacramento River between Freeport and Walnut  
25 Grove, San Joaquin River between Vernalis and Mossdale, Steamboat and Sutter Sloughs, and  
26 salmonid migration channels in the interior Delta) would result in the temporary disturbance of  
27 channel areas that would provide opportunities for colonization by invasive plant species.
- 28 • *CM7 Riparian Natural Community Restoration*: The restoration of valley/foothill riparian habitat  
29 would result in the temporary disturbance of riparian areas that would provide opportunities  
30 for colonization by invasive plant species.
- 31 • *CM8 Grassland Natural Community Restoration*: The restoration of grassland habitat in CZs 1, 8,  
32 and/or 11 would result in the temporary disturbance of degraded grassland or cultivated land  
33 that would provide opportunities for colonization by invasive plant species.
- 34 • *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*: The restoration of vernal pool  
35 and alkali seasonal wetland complexes in CZs 1, 8, or 11 would result in the temporary  
36 disturbance of grassland areas that would provide opportunities for colonization by invasive  
37 plant species.
- 38 • *CM10 Nontidal Marsh Restoration*: Nontidal marsh restoration, which would take place through  
39 conversion of agricultural lands in CZs 2 and 4, would result in the temporary disturbance of  
40 fallow agricultural areas that would provide opportunities for colonization by invasive plant  
41 species. These adverse effects would be reduced by monitoring the development of marsh  
42 vegetation to determine if nonnative vegetation needs to be controlled to facilitate the  
43 establishment of native marsh vegetation or if restoration success could be improved with

1 supplemental plantings of native species. If indicated by monitoring, nonnative vegetation  
2 control measures and supplemental plantings would be implemented.

- 3 • *CM22 Avoidance and Minimization Measures: AMM6 Spoils, Reusable Tunnel Material, and*  
4 *Dredged Material Disposal Plan* would have adverse effects if spoils, RTM, dredged material, or  
5 chipped vegetative materials containing viable invasive plant propagules are used as topsoil in  
6 uninfested areas.

7 The adverse effects that would result from the introduction and spread of invasive plants through  
8 colonization of temporarily disturbed areas would be minimized by implementation of CM11,  
9 AMM4, AMM10, and AMM11.

10 *CM11 Natural Communities Enhancement and Management* would reduce these adverse effects by  
11 implementing invasive plant control within the BDCP reserve system to reduce competition on  
12 native species, thereby improving conditions for covered species, ecosystem function, and native  
13 biodiversity. The invasive plant control efforts would target new infestations that are relatively easy  
14 to control or the most ecologically damaging nonnative plants for which effective suppression  
15 techniques are available. In aquatic and emergent wetland communities, Brazilian waterweed,  
16 perennial pepperweed, barbrgrass, and rabbitsfoot grass would be controlled (and tidal mudflats  
17 would be maintained). In riparian areas, invasive plant control would focus on reducing or  
18 eliminating species such as Himalayan blackberry, giant reed, and perennial pepperweed. In  
19 grassland areas, techniques such as grazing and prescribed burning may be used to decrease the  
20 cover of invasive plant species.

21 Implementation of AMM4, AMM10, and AMM11 would also reduce the adverse effects that could  
22 result from construction activities. The AMMs provide methods to minimize ground disturbance,  
23 guidance for developing restoration and monitoring plans for temporary construction effects, and  
24 measures to minimize the introduction and spread of invasive plants. AMM4 would involve the  
25 preparation and implementation of an erosion and sediment control plan that would control erosion  
26 and sedimentation and restore soils and vegetation in affected areas. The restoration and  
27 monitoring plans for implementation of AMM10 would involve methods for stockpiling, storing, and  
28 restoring topsoil, revegetating disturbed areas, monitoring and maintenance schedules, adaptive  
29 management strategies, reporting requirements, and success criteria. AMM10 would also include  
30 planting native species appropriate for the natural community being restored, with the exception of  
31 some borrow sites in cultivated lands that would be restored as grasslands.

32 AMM11 specifies that the BDCP Implementation Office would retain a qualified botanist or weed  
33 scientist prior to clearing operations to determine if affected areas contain invasive plants. If areas  
34 to be cleared do contain invasive plants, then chipped vegetation material from those areas would  
35 not be used for erosion control but would be disposed of to minimize the spread of invasive plant  
36 propagules (e.g., burning, composting). During construction of the water conveyance facilities and  
37 construction activities associated with the other CMs, construction vehicles and construction  
38 machinery would be cleaned prior to entering construction sites that are in or adjacent natural  
39 communities other than cultivated lands and prior to entering any BDCP restoration sites or  
40 conservation lands other than cultivated lands. Vehicles working in or travelling off paved roads  
41 through areas with infestations of invasive plant species would be cleaned before travelling to other  
42 parts of the Plan Area. Cleaning stations would be established at the perimeter of BDCP covered  
43 activities along construction routes as well as at the entrance to reserve system lands. Biological  
44 monitoring would include locating and mapping locations of invasive plant species within the  
45 construction areas during the construction phase and the restoration phase. Infestations of invasive

1 plant species would be targeted for control or eradication as part of the restoration and revegetation  
2 of temporarily disturbed construction areas.

3 **NEPA Effects:** The implementation of AMM4, AMM10, and AMM11, and CM11 would reduce the  
4 potential for the introduction and spread of invasive plants and avoid or minimize the potential  
5 effects on natural communities and special-status species; therefore, these effects would not be  
6 adverse.

7 **CEQA Conclusion:** Under Alternative 4, impacts on natural communities from the introduction or  
8 spread of invasive plants as a result of implementing the BDCP would not result in the long-term  
9 degradation of a sensitive natural community due to substantial alteration of site conditions and  
10 would, therefore, be considered less than significant. No mitigation would be required.

## 11 **Compatibility with Plans and Policies**

### 12 **Impact BIO-187: Compatibility of the Proposed Water Conveyance Facilities and Other** 13 **Conservation Measures with Federal, State, or Local Laws, Plans, Policies, or Executive Orders** 14 **Addressing Terrestrial Biological Resources in the Study Area**

15 Constructing the water conveyance facilities (CM1) and implementing CM2–CM22 for Alternative 4  
16 have the potential for being incompatible with plans and policies related to managing and protecting  
17 terrestrial biological resources of the study area. A number of laws, plans, policies, programs, and  
18 executive orders that are relevant to actions in the study area provide guidance for terrestrial  
19 biological resource issues as overviewed in Section 12.2, *Regulatory Setting*. This overview of plan  
20 and policy compatibility evaluates whether Alternative 4 would be compatible or incompatible with  
21 such enactments, rather than whether impacts would be adverse or not adverse, or significant or  
22 less than significant. If the incompatibility relates to an applicable plan, policy, or executive order  
23 adopted to avoid or mitigate terrestrial biological resource effects, then an incompatibility might be  
24 indicative of a related significant or adverse effect under CEQA and NEPA, respectively. Such  
25 physical effects of Alternative 4 on terrestrial biological resources are addressed in the impacts on  
26 natural communities and species. The following is a summary of compatibility evaluations related to  
27 terrestrial biological resources for laws, plans, policies, and executive orders relevant to the BDCP.

#### 28 **Federal and State Legislation**

- 29 • The federal *Clean Water Act*, *Endangered Species Act*, *Fish and Wildlife Coordination Act*,  
30 *Migratory Bird Treaty Act*, *Rivers and Harbors Act* and *Marine Mammal Protection Act* all contain  
31 legal guidance that either directly or indirectly promotes or stipulates the protection and  
32 conservation of terrestrial biological resources in the process of undertaking activities that  
33 involve federal decisionmaking. The biological goals and objectives contained in the BDCP that  
34 provide the major guidance for implementing the various conservation elements of Alternative  
35 4 are all designed to promote the long-term viability of the natural communities, special-status  
36 species, and common species that inhabit the Plan Area. While some of the conservation  
37 measures of the alternative involve permanent and temporary loss of natural communities and  
38 associated habitats during facilities construction and expansion of certain natural communities,  
39 the long-term guidance in the Plan would provide for the long-term viability and expansion of  
40 the habitats and special-status species populations in the Plan Area. Alternative 4 conservation  
41 actions would be compatible with the policies and directives for terrestrial biological resources  
42 contained in these federal laws.

- 1       • The *California Endangered Species Act*, *California Native Plant Protection Act*, *Porter-Cologne*  
2       *Water Quality Control Act*, and *Natural Communities Conservation Planning Act* are state laws  
3       that have relevance to the management and protection of terrestrial biological resources in the  
4       study area. Each of these laws promotes consideration of wildlife and native vegetation either  
5       through comprehensive planning or through regulation of activities that may have an adverse  
6       effect on the terrestrial and aquatic natural resources of the state. The BDCP, which is the basis  
7       for Alternative 4, contains biological goals and objectives that have been developed to promote  
8       the species protection and natural resource conservation that are directed by these state laws.  
9       Alternative 4 conservation actions would be compatible with the policies and directives  
10      contained in these laws.
- 11      • The *Johnston-Baker-Andal-Boatwright Delta Protection Act of 1992 (Delta Protection Act)* and the  
12      *Sacramento-San Joaquin Delta Reform Act*, which updated the Delta Protection Act, promote the  
13      maintenance and protection of natural resources and the protection of agricultural land uses in  
14      the Delta's primary zone through the goals and policies contained in the 2009 updated Land Use  
15      and Resources Management Plan (LURMP). While nothing in the LURMP is binding on state  
16      agencies that are BDCP proponents, the LURMP does promote restoration and enhancement of  
17      habitats for the terrestrial and aquatic species of the Delta on public land. The BDCP biological  
18      goals and objectives would be compatible with these LURMP goals (Delta Protection  
19      Commission 2010).
- 20      • The *Suisun Marsh Preservation Act* of 1974 was designed to protect the Suisun Marsh for long-  
21      term use as wildlife habitat, with a goal of preserving and enhancing the quality and diversity of  
22      the Marsh's aquatic and wildlife habitats. The BDCP and its plans for protection and restoration  
23      of tidal marsh habitats in Suisun Marsh would be compatible with the intent of the Suisun Marsh  
24      Preservation Act.

25      ***Plans, Programs, and Policies***

- 26      • *The Delta Plan*, which was developed by the Delta Stewardship Council in compliance with the  
27      2009 Sacramento-San Joaquin Delta Reform Act, is mandated to achieve two co-equal goals:  
28      provide for a more reliable water supply for California and protect, restore, and enhance the  
29      Delta ecosystem. The co-equal goals are to be achieved in a manner that protects and enhances  
30      the unique cultural, recreational, natural resource, and agricultural values of the Delta as an  
31      evolving place. The BDCP is intended to become a component of the Delta Plan. The Delta  
32      Stewardship Council will determine whether the BDCP is compatible with the goals and  
33      objectives of the Delta Plan prior to its incorporation into the Plan. The compatibility of the  
34      BDCP with the Delta Plan is considered in detail in Section 13.2.2.2 of Chapter 13, *Land Use*.
- 35      • *California Wetlands Conservation Policy*, which was adopted by Executive Order in 1993,  
36      promotes a long-term gain in the quantity, quality and permanence of wetlands acreages and  
37      values in California. The BDCP conservation measures that provide for a significant expansion of  
38      wetland acreage and quality in the Delta and Suisun Marsh are compatible with the intent of the  
39      California Wetlands Conservation Policy.
- 40      • *The North American Waterfowl Management Plan (NAWMP)* and *Central Valley Joint Venture*  
41      (*CVJV*) strive to maintain and expand wetlands and uplands for waterfowl and shorebirds in the  
42      major basins of California's Central Valley. The NAWMP is a management plan jointly approved  
43      by the United States and Canada in 1986. It contains general guidance from the principal wildlife  
44      management agencies of the two countries for sustaining abundant waterfowl populations by

1 conserving landscapes through self-directed partnerships (joint ventures) that are guided by  
2 sound science. The CVJV is the joint venture established for overseeing NAWMP implementation  
3 in the Central Valley. The CVJV is made up of 21 conservation organizations, state and federal  
4 government agencies, and one corporation that have formed a partnership to improve the  
5 habitat conditions for breeding and nonbreeding waterfowl, breeding and nonbreeding  
6 shorebirds, waterbirds, and riparian-dependent songbirds in the Central Valley. The CVJV's  
7 2006 Implementation Plan (Central Valley Joint Venture 2006) establishes conservation  
8 objectives and priorities for these bird groups within the basins of the Central Valley. The BDCP  
9 Plan Area includes all or portions of three Implementation Plan basins— the Delta, Yolo and  
10 Suisun basins. The 2006 Implementation Plan contains basin-specific objectives for wetland  
11 restoration, protection of existing wetland habitats, wetland enhancement, adequate power and  
12 water supplies for wetland management, agricultural land enhancement, farmland easements  
13 that maintain waterfowl food resources on agricultural land, and farmland easements that  
14 buffer existing wetlands from urban and residential growth.

15 Implementation of the Alternative 4 conservation measures would result in significant  
16 reductions in cultivated land and managed wetland acreage in the Delta, Yolo and Suisun basins;  
17 however, significant increases in tidal and nontidal wetlands in these basins would be another  
18 result. Because of the large conversion of managed wetland in the Suisun basin, the BDCP has  
19 included a large managed wetland conservation and enhancement goal for this area. For the  
20 Suisun basin conversions to be compatible with the 2006 Implementation Plan goals, this  
21 EIR/EIS has added mitigation that would require food production studies and adaptive  
22 management to ensure that the Suisun basin would continue to provide the waterfowl and  
23 shorebird habitat envisioned in the Implementation Plan.

- 24 • *Stone Lakes National Wildlife Refuge Comprehensive Conservation Plan, Cosumnes River Preserve*  
25 *Management Plan, Brannan Island and Franks Tract State Recreation Areas General Plan, Yolo*  
26 *Bypass Wildlife Area Land Management Plan, Grizzly Island Wildlife Area Management Plan, and*  
27 *the Lower Sherman Island Wildlife Area Land Management Plan* are primarily designed to  
28 preserve and enhance the natural resource and recreation qualities of these areas.  
29 Implementing Alternative 4, especially construction of CM1 and CM2 facilities, and land  
30 modification associated with CM4 restoration activities, could create temporary disruptions to  
31 the terrestrial biological resource management activities in these management areas. The  
32 ultimate goals of aquatic and terrestrial habitat enhancement and restoration contained in the  
33 BDCP would be compatible with the long-term management goals of these areas. Proposed  
34 restoration areas in the Yolo Bypass, on Sherman Island, and in Suisun Marsh would be designed  
35 to be compatible with and to complement the current management direction for these areas and  
36 would be required to adapt restoration proposals to meet current policy established for  
37 managing these areas.
- 38 • *Suisun Marsh Preservation Agreement* and *Suisun Marsh Plan* are the most recent efforts by the  
39 state and federal agencies responsible for Suisun Marsh (the Marsh) to maintain its long-term  
40 viability as managed wetlands and wildlife habitat, consistent with the Suisun Marsh  
41 Preservation Act. The Suisun Marsh Preservation Agreement (SMPA) was signed in 1987 and  
42 modified in 2005 by DWR, CDFW, Reclamation and the Suisun Resource Conservation District to  
43 establish the mitigation approach in the Marsh for effects of operating the SWP and CVP. The  
44 primary concerns were the effects of CVP and SWP Delta diversions on salinity in the Marsh. The  
45 SMPA focused on ways to ensure adequate water quality and quantity for the managed wetlands  
46 and wildlife habitats in the Marsh to assure equal waterfowl values in the Marsh. The Suisun

1 Marsh Plan (SMP), for which a Final EIS/EIR was released in 2010 by these agencies, provides  
2 for restoration of tidal marsh habitat and enhancement of managed wetland in the Marsh,  
3 maintenance of waterfowl hunting and recreational opportunities in the Marsh, maintenance  
4 and improvement of the Marsh levee system, and protection and enhancement of water quality  
5 for beneficial uses of the Marsh. An integral component of the SMP is balancing continued  
6 managed wetland operation with new tidal wetland restoration to provide improved and  
7 greater habitat for fish and wildlife species. The SMP is a programmatic, long-term plan and  
8 does not include specific projects, project proponents, or funding mechanisms. However, the  
9 SMP relies on tidal restoration to allow for managed wetland operations to continue. The BDCP  
10 would provide a funding mechanism and increased management potential relative to existing  
11 and restored habitats, assisting the SMP in meeting its broader ecological goals, consistent with  
12 long-term operation of the SWP and CVP water conveyance facilities. The conservation actions  
13 contained in the BDCP, which are designed to ensure the long-term protection and recovery of  
14 special-status fish and wildlife species dependent on the Marsh, would be compatible with the  
15 water quality and habitat restoration goals of the SMPA and SMP.

- 16 ● *California Aquatic Invasive Species Management Plan* does not address terrestrial invasive  
17 species. Implementation of the Plan's long-term control and management objectives affect  
18 terrestrial species that utilize study area aquatic habitats. These effects are positive in that Plan  
19 objectives are to control and remove invasive aquatic species that are detrimental to native  
20 aquatic and terrestrial species. Implementation of BDCP's conservation actions would be  
21 undertaken with the goal of avoiding any further spread of aquatic invasive species. Alternative  
22 4 would, therefore, be compatible with the objectives of the California Aquatic Invasive Species  
23 Management Plan.
- 24 ● *Habitat Conservation Plans and Natural Community Conservation Plans* are the subject of a  
25 detailed analysis at the end of this chapter. The analysis considers the compatibility of the BDCP  
26 with all HCPs and NCCPs that share planning area with the BDCP Plan Area.

#### 27 ***Executive Orders***

- 28 ● *Executive Order 11990: Protection of Wetlands* requires all federal agencies to consider wetland  
29 protection in their policies and actions. The BDCP proposes to protect, enhance and expand the  
30 wetlands of the Plan Area, and, therefore, would be compatible with Executive Order 11990.
- 31 ● *Executive Order 13112: Invasive Species* directs federal agencies to prevent and control the  
32 introduction and spread of invasive species in a cost-effective and environmentally sound  
33 manner. Alternative 4 construction and restoration actions have the potential to both introduce  
34 and spread invasive species in the study area. Implementation of mitigation measures described  
35 in this chapter would be capable of making Alternative 4 implementation compatible with  
36 Executive Order 13112.
- 37 ● *Executive Order 113443: Facilitation of Hunting Heritage and Wildlife Conservation* directs  
38 federal agencies whose activities affect public land management, outdoor recreation, and  
39 wildlife management to facilitate the expansion and enhancement of hunting opportunities, and  
40 the management of game species and their habitat. Alternative 4 conservation measures that  
41 involve conversion of cultivated land and managed wetland to tidal and nontidal wetlands and  
42 other natural communities would conflict with the hunting expansion and enhancement aspects  
43 of this executive order. Refer to Chapter 15, *Recreation*, for a detailed analysis of the effects of  
44 alternatives on hunting opportunities. The habitat protection and expansion conservation

1           measures of Alternative 4 would be compatible with the executive order's goal of facilitating the  
2           management of habitats for some game species.

3           **CEQA Conclusion:** The potential plan and policy incompatibilities of implementing Alternative 4  
4           identified in the analysis above indicate the potential for a physical consequence to the environment.  
5           The primary physical consequence of concern is the conversion of large acreages of cultivated land  
6           and managed wetland to natural wetland and riparian habitat in the study area. The physical effects  
7           are discussed in the Shorebirds and Waterfowl analysis above, and no additional CEQA conclusion is  
8           required related to the compatibility of the alternative with relevant plans and polices. The reader is  
9           referred to Section 13.2.3 of Chapter 13, *Land Use*, for a further discussion of the responsibilities of  
10          state and federal agencies to comply with local regulations, and a discussion of the relationship  
11          between plan and policy consistency and physical consequences to the environment.

1 **12.3.3.10 Alternative 5—Dual Conveyance with Pipeline/Tunnel and**  
2 **Intake 1 (3,000 cfs; Operational Scenario C)**

3 Alternative 5 proposes construction of only one Sacramento River intake in the north Delta (see  
4 Section 3.5.10 in Chapter 3, *Description of Alternatives*, for a complete description of this  
5 alternative). Intake 1 would be constructed just across the river and upstream of Clarksburg. A  
6 tunnel would be constructed to connect this lone intake and pump station to the forebay located  
7 immediately east of Courtland (see Figure 3-2). The remainder of the construction associated with  
8 Alternative 5 would be the same as Alternatives 1A, 2A, 3, 6A, 7, and 8 that rely on a western tunnel  
9 alignment under Andrus and Tyler Islands to transport Sacramento River water across the Delta to  
10 the south Delta canals (see Table 12-5-1). For this reason, Alternative 5 is considered here in a  
11 summary fashion; the reader is referred to Alternative 1A for a detailed description of impacts that  
12 would be associated with implementing Alternative 5. The impacts associated with Alternatives 1A  
13 and 5 were derived by comparing the alternatives to the No Action Alternative for NEPA purposes,  
14 and to Existing Conditions for CEQA purposes.

15 Alternative 5 would be operated under Operational Scenario C, which involves north Delta  
16 operations as proposed for Alternative 1A and south Delta operations directed by existing biological  
17 opinions from USFWS and NMFS. Scenario C includes the additional Delta outflow requirements  
18 associated with Scenarios B, D, E, F, and G. These requirements result in larger Delta outflows during  
19 September through November of certain water years.

20 Alternative 5 proposes a significant deviation in the re-establishment of tidal marsh as compared  
21 with all of the other alternatives. Tidal marsh restoration (CM4) would be limited to 25,000 acres for  
22 Alternative 5 as opposed to the 65,000 acres proposed for all other alternatives. The restoration  
23 activities would be limited to what is proposed during the first 15 years for the other options. The  
24 40,000-acre reduction would have significant implications for cultivated lands and managed  
25 wetland conversion (see Table 12-5-2).

26 Note that the acres of habitat affected by CM1, as listed in Table 12-5-1, would be acres affected in  
27 the near-term timeframe, or the first 10 years of Plan implementation. The acres represented in  
28 Table 12-5-2 and Table 12-5-3 for the late long-term timeframe are acres that would be affected  
29 cumulatively over the entire 50-year period of the Plan. Table 3-4 in Chapter 3, *Description of*  
30 *Alternatives*, describes the schedule for implementation of natural community restoration and  
31 protection conservation measures.

32 **Comparative Differences in CM1 Construction Effects for Alternatives 5 and 1A**

33 With only one intake and pump station located in the north Delta, Alternative 5 would create  
34 significant differences in the permanent and temporary loss of natural communities and cultivated  
35 lands during water conveyance facilities construction when compared with alternatives having five  
36 intakes along the Sacramento River (Alternatives 1A, 1B, 1C, 2A, 2B, 2C, 6A, 6B, and 6C). The relative  
37 differences in direct loss of habitat between Alternative 5 and Alternative 1A are included in Table  
38 12-5-1. All of these differences would occur during the near-term timeframe associated with water  
39 conveyance facilities construction along and just east of the Sacramento River between Clarksburg  
40 and Courtland. Alternative 5 would permanently remove 13 fewer acres of tidal perennial aquatic  
41 habitat in the Sacramento River, 12 fewer acres of valley/foothill riparian habitat along the eastern  
42 bank of the Sacramento River, 21 fewer acres of grassland along and behind the levees of the river,

1 and 166 fewer acres of cultivated land immediately east of the river (Table 12-5-1). Alternative 5  
2 would also permanently affect a smaller acreage of potential jurisdictional waters (including  
3 wetlands) as regulated by Section 404 of the CWA, when compared to Alternative 1A (15 acres  
4 fewer). Refer to Table 12-1A-69 for a summary of Alternative 1A permanent and temporary impacts  
5 on jurisdictional waters and wetlands.

6 Alternative 5 also would result in significantly fewer temporary losses of natural communities,  
7 including reduced losses of tidal perennial aquatic (49 acres less), valley/foothill riparian (11 acres  
8 less), grassland (27 acres less), tidal freshwater emergent wetland (3 acres less), and cultivated  
9 lands (461 acres less) when compared with Alternative 1A (Table 12-5-1). Alternative 5 would  
10 temporarily affect a smaller acreage of potential jurisdictional waters (including wetlands) as  
11 regulated by Section 404 of the CWA, when compared to Alternative 1A (57 acres fewer). Refer to  
12 Table 12-1A-69 for a summary of Alternative 1A permanent and temporary jurisdictional waters  
13 and wetlands impacts.

14 These differences in loss of natural communities associated with CM1 construction would create  
15 differences in effects on covered and noncovered wildlife species. The reduced level of  
16 valley/foothill riparian habitat loss would be a positive influence on valley elderberry longhorn  
17 beetle, breeding habitat for raptors, herons and egrets (great egret, snowy egret, great blue heron,  
18 Swainson's hawk, Cooper's hawk, white-tailed kite, and black-crowned night heron), and migratory  
19 habitat for species that use the river corridor, such as western yellow-billed cuckoo. Species that  
20 would benefit from smaller permanent losses of grassland and cultivated land would include  
21 foraging raptors (Swainson's hawk, short-eared owl, northern harrier, merlin and white-tailed kite),  
22 greater sandhill crane, mountain plover, California horned lark, tricolored blackbird and several  
23 species of bats. Alternative 5 would result in a smaller permanent loss (116 acres less) of crane  
24 foraging habitat compared to Alternative 1A. The significantly smaller temporary habitat  
25 conversions associated with Alternative 5 would have comparable benefits to these species during  
26 the construction period. There would be 323 fewer acres of foraging habitat temporarily lost under  
27 Alternative 5 for greater sandhill crane than under Alternative 1A because of the lower acreage of  
28 cultivated land loss.

29 The differences in effects that construction of the water conveyance facilities associated with  
30 Alternatives 1A and 5 could have on special-status plant species are extremely minor. Habitat  
31 modeling indicates that Alternative 5 would result in smaller permanent losses of habitat associated  
32 with side-flowering skullcap (1 acre less), Mason's lilaopsis (5 acres less) and delta mudwort  
33 (5 acres less), when compared with Alternative 1A. Similar small differences would result from  
34 temporary construction effects (6 acres less effect on Mason's lilaopsis and delta mudwort habitat  
35 with Alternative 5).

36 The near-term conservation activities described in Appendix 12D, *Feasibility Assessment of*  
37 *Conservation Measures Offsetting Water Conveyance Facilities Construction Impacts on Terrestrial*  
38 *Biological Resources*, would provide for conservation, enhancement and replacement of habitats  
39 affected by the early water conveyance facility construction activities. This conservation activity,  
40 which is part of the early implementation of the BDCP, would offset water conveyance facilities  
41 construction effects on both covered and noncovered special-status species in the study area.

1 **Table 12-5-1. Alternative 5 Near-Term Effects of Water Conveyance Facilities (CM1) on Natural**  
2 **Communities (acres)**

Natural Community	Total Existing Habitat in Study Area	Conveyance Option		Conveyance Option	
		Alternative 5 Removed Habitat (Permanent) <sup>b</sup>	Difference from Alternative 1A	Alternative 5 Removed Habitat (Temporary) <sup>c</sup>	Difference from Alternative 1A
Tidal perennial aquatic <sup>a</sup>	86,263	35	-13	84	-49
Tidal brackish emergent wetland	8,501	0	0	0	0
Tidal freshwater emergent wetland	8,856	6	0	3	-3
Valley/foothill riparian	17,966	47	-11	17	-11
Nontidal perennial aquatic	5,567	12	0	9	0
Nontidal freshwater perennial emergent wetland	1,509	1	0	1	0
Alkali seasonal wetland complex	3,723	0	0	0	0
Vernal pool complex	12,133	3	0	0	0
Managed wetland	70,798	3	0	83	0
Other natural seasonal wetland	842	0	0	0	0
Grassland	78,047	294	-21	235	-27
Inland dune scrub	19	0	0	0	0
Cultivated lands	487,106	3,657	-179	1,730	-461

<sup>a</sup> Tidal mudflat has been included in the tidal perennial aquatic natural community.

<sup>b</sup> Features in this category include the following conveyance-related facilities: Forebay, Afterbay, Intake Facilities, Pump Stations, Permanent Access Roads, Shaft Locations, and Reusable Tunnel Material Storage Areas.

<sup>c</sup> Features in this category include the following conveyance features: Canal Work Area, Barge Unloading Facility, Control Structure Work Area, Intake Road Work Area, Intake Work Area, Pipeline, Pipeline Work Area, Road Work Area, Safe Haven Work Area, Temporary Access Road Work Area, Tunnel Work Area, and Borrow/Spoil Areas.

3

4 **Effects of Restoration-Related Conservation Actions of Alternative 5**

5 The natural communities and managed land conversions associated with the major restoration-  
6 related conservation measures under Alternative 5 (CM2, CM4, and CM5, CM7, CM8, CM10, and  
7 CM18) present the greatest potential to affect both covered and noncovered plants and wildlife in  
8 the study area. Most of these restoration-related conservation measures (CM2, CM7, CM8, and  
9 CM10) would be identical to the other alternatives described above. However, for *CM4 Tidal Natural*  
10 *Communities Restoration*, Alternative 5 would result in a much smaller conversion of natural  
11 habitats, managed wetlands and cultivated lands. Table 12-5-2 lists the permanent and temporary  
12 natural community and managed land conversions associated with CM2, CM4, and CM5 for  
13 Alternative 5. These losses would be a significant reduction in the acreage of managed wetland  
14 (6,445 acres fewer) and cultivated lands (28,142 acres fewer) that would be converted through tidal  
15 marsh (tidal perennial aquatic, tidal brackish emergent wetland, tidal freshwater emergent wetland)  
16 habitat restoration when compared with the other alternatives. There would be less dramatic  
17 reductions in the conversion of tidal (42 acres fewer) and nontidal (169 acres fewer) aquatic and  
18 wetland habitats, grassland (390 acres fewer) and valley/foothill riparian habitat (49 acres fewer).

1 Table 12-5-3 presents permanent and temporary natural community effects under other  
 2 conservation measures. These measures would restore large areas of grassland (CM8),  
 3 valley/foothill riparian (CM7), and nontidal marsh (CM10) habitats to compensate for the  
 4 conversions associated with tidal marsh and floodplain restoration, but these other measures would  
 5 be implemented through the course of the BDCP restoration program. None of these measures  
 6 includes subsequent expansions of cultivated lands.

7 **Table 12-5-2. Alternative 5 Late Long-Term Effects of Restoration Activities (CM2, CM4, CM5) that**  
 8 **Affect Most Natural Communities (acres)**

Natural Community	Conservation Measure					
	CM2 <sup>b</sup>		CM4 <sup>c</sup>		CM5 <sup>d</sup>	
	Permanent <sup>e</sup>	Temporary <sup>f</sup>	Permanent <sup>e</sup>	Temporary <sup>f</sup>	Permanent <sup>e</sup>	Temporary <sup>f</sup>
Tidal perennial aquatic <sup>a</sup>	8	11	16	0	2	5
Tidal brackish emergent wetland	0	0	0	0	0	0
Tidal freshwater emergent wetland	6	0	1	0	1	1
Valley/foothill riparian	89	88	403	0	43	35
Nontidal perennial aquatic	24	12	68	0	28	16
Nontidal freshwater perennial emergent wetland	25	1	51	0	0	0
Alkali seasonal wetland complex	45	0	13	0	0	0
Vernal pool complex	0	0	269	0	0	0
Managed wetland	24	44	7,301	0	0	0
Other natural seasonal wetland	0	0	0	0	0	0
Grassland	338	239	732	0	51	34
Inland dune scrub	0	0	0	0	0	0
Cultivated lands	629	363	11,423	0	2,087	1,194

<sup>a</sup> Tidal mudflat has been included in the tidal perennial aquatic natural community.

<sup>b</sup> Yolo Bypass Fisheries Enhancement.

<sup>c</sup> Tidal Natural Communities Restoration.

<sup>d</sup> Seasonally Inundated Floodplain Restoration.

<sup>e</sup> Features in this category include the following: construction of fish passage structures and infrastructure in the Yolo Bypass, construction of permanent structures and infrastructure associated with restoration, and loss of habitat associated with removal and replacement by other habitats.

<sup>f</sup> Features in this category include the following: temporary work areas associated with construction of permanent restoration features, and temporary grading/vegetation removal associated with restoration activities.

9

1 **Table 12-5-3. Alternative 5 Late Long-Term Effects of Restoration Activities (CM7, CM8, CM10, CM18)**  
2 **that Affect Only Grassland and Cultivated Lands (acres)**

Natural Community	Conservation Measure							
	CM7 <sup>a</sup>		CM8 <sup>b</sup>		CM10 <sup>c</sup>		CM18 <sup>d</sup>	
	Perm <sup>e</sup>	Temp <sup>f</sup>	Perm <sup>e</sup>	Temp <sup>f</sup>	Perm <sup>e</sup>	Temp <sup>f</sup>	Perm <sup>e</sup>	Temp <sup>f</sup>
Grassland	410	0	0	0	0	0	35	0
Cultivated lands	4,553	0	2,000	0	1,950	0	0	0

<sup>a</sup> Riparian Natural Community Restoration.

<sup>b</sup> Grassland Natural Community Restoration.

<sup>c</sup> Nontidal Marsh Restoration.

<sup>d</sup> Conservation Hatcheries.

<sup>e</sup> Features in this category include the following: construction of permanent structures and infrastructure associated with restoration, recreation facilities and hatcheries; and loss of habitat associated with removal and replacement by other habitats.

<sup>f</sup> Features in this category include the following: temporary work areas associated with construction of permanent restoration features, recreation facilities and hatcheries; and temporary grading/vegetation removal associated with restoration activities.

Perm = Permanent.

Temp = Temporary.

3

4 The 25,000-acre expansion of tidal wetland habitats would occur during the course of the BDCP  
5 restoration program. The conversions indicated in Table 12-5-2 include a permanent conversion of  
6 16 acres of tidal perennial aquatic, 1 acre of tidal freshwater emergent wetland, 403 acres of  
7 valley/foothill riparian, 732 acres of grassland, 13 acres of alkali seasonal wetland complex, 269  
8 acres of vernal pool complex, and 68 acres of nontidal perennial aquatic natural communities.  
9 Larger acreages of managed wetland (7,301 acres) and cultivated land of various types (11,423  
10 acres) would be converted. These conversions would occur in multiple conservation zones, but  
11 would be focused in CZs 1, 2, 4, 5 and 11 (see Figure 12-1). Suisun Marsh (CZ 11) would undergo  
12 significant conversion of managed wetland while the Cosumnes-Mokelumne area (CZ 4) would have  
13 mostly cultivated lands converted. Riparian habitat losses would occur in multiple conservation  
14 zones, while grassland conversion would occur primarily in the Yolo Bypass (CZ 2) and the west  
15 Delta (CZ 5). Vernal pool inundation would occur in the Cache Slough (CZ 1) and Suisun Marsh (CZ  
16 11) areas.

17 This removed habitat supports various life stages of many covered and noncovered species that are  
18 found in the study area (see Tables 12-2 and 12-3 in Section 12.1.3, *Special-Status Species*). The loss  
19 of managed wetland in the Suisun Marsh area would affect some common waterfowl that prefer  
20 freshwater wetlands and prefer the water depths associated with lands that are managed to attract  
21 waterfowl. Other species that occupy Suisun Marsh managed wetlands would also be able to occupy  
22 the tidal marsh habitats developed as part of CM4. The conversion of valley/ foothill riparian habitat  
23 would influence special-status species such as valley elderberry longhorn beetle, breeding habitat  
24 for raptors, herons and egrets (great egret, snowy egret, great blue heron, Swainson's hawk, Coopers  
25 hawk, and black-crowned night heron), and migratory habitat for species that use the riparian  
26 corridors, such as western yellow-billed cuckoo. The potential for loss of vernal pool complex  
27 through tidal inundation would affect numerous special status fairy shrimp and potentially western  
28 spadefoot and California tiger salamander. Grassland conversion would affect foraging for raptors  
29 and some passerines, such as loggerhead shrike, tricolored blackbird and grasshopper sparrow. The

1 large acres of converted cultivated land in Cosumnes-Mokelumne area, the west Delta and the Yolo  
2 Bypass would affect a variety of species, including raptors, greater sandhill crane, tricolored  
3 blackbird, and potentially giant garter snake and western pond turtle.

4 The reader is referred to the Alternative 1A impact analysis above for the broader discussion of  
5 overall terrestrial biological resources effects that would result from implementation of Alternative  
6 5, beyond only the effects of tidal marsh restoration. The principal effects of concern associated with  
7 both Alternative 1A and 5 are related to the conversion of large acreages of cultivated lands and  
8 managed wetland to tidal marsh and other habitat types during restoration activities. All of the  
9 permanent habitat loss associated with Alternative 5 would take place through the course of  
10 implementing the BDCP. The BDCP conservation components are designed to eventually replace and  
11 expand habitats that would have a positive influence on plant and animal species covered in the  
12 Plan. These conservation components would also have a positive effect on noncovered and common  
13 species that occupy the study area.

14 **NEPA Effects:** Alternative 5 would not have adverse effects on the terrestrial natural communities,  
15 special-status species and common species that occupy the study area. The alternative also would  
16 not disrupt wildlife movement corridors, significantly increase the risk of introducing invasive  
17 species, result in a net loss of wetlands and other waters of the United States, reduce the value of  
18 habitat for waterfowl and shorebirds, or conflict with plans and policies that affect the study area. As  
19 with Alternative 1A, there would be large acreages of existing habitat converted by the Plan's  
20 conservation actions, including the construction of water conveyance tunnels from the north Delta  
21 to Clifton Court Forebay in the south Delta. The temporarily affected habitat would be restored to its  
22 pre-project condition and the restoration conservation measures (CM2–CM10) would permanently  
23 replace primarily cultivated land and managed wetland with tidal and nontidal marsh, riparian  
24 vegetation, and grassland. The increases in acreage and value of the sensitive natural communities  
25 in the study area would have beneficial effects on covered and noncovered species. Where  
26 conservation actions would not fully offset effects, the Plan has developed AMMs and this document  
27 has included additional mitigation measures to avoid adverse effects. Alternative 5 would not  
28 require mitigation measures beyond what is proposed for Alternative 1A to offset effects.

29 **CEQA Conclusion:** Alternative 5 would not have significant and unavoidable impacts on the  
30 terrestrial natural communities, special-status species and common species that occupy the study  
31 area. The alternative also would not disrupt wildlife movement corridors, significantly increase the  
32 risk of introducing invasive species, result in a net loss of wetlands and other waters of the United  
33 States, reduce the value of habitat for waterfowl and shorebirds, or conflict with plans and policies  
34 that affect the study area. As with Alternative 1A, there would be large acreages of existing habitat  
35 converted by the Plan's conservation actions, including the construction of water conveyance  
36 tunnels from the north Delta to Clifton Court Forebay in the south Delta. The temporarily affected  
37 habitat would be restored to its pre-project condition and the restoration conservation measures  
38 (CM2–CM10) would permanently replace primarily cultivated land and managed wetland with tidal  
39 and nontidal marsh, riparian vegetation, and grassland. The increases in acreage and value of the  
40 sensitive natural communities in the study area would have beneficial effects on covered,  
41 noncovered, and common species. Where conservation actions would not fully offset impacts, the  
42 Plan has developed AMMs and this document has included additional mitigation measures to avoid  
43 significant impacts. Alternative 5 would not require mitigation measures beyond what is proposed  
44 for Alternative 1A to offset effects.

1 As with Alternative 1A, Alternative 5 would require several mitigation measures to be adopted to  
2 reduce all effects on terrestrial biological resources to less-than-significant levels. These mitigation  
3 measures would be needed beyond the impact offsets provided by Alternative 5 AMMs and CM2-  
4 CM22 conservation actions. The relevant mitigation measures, which are included in detail in the  
5 analysis of Alternative 1A, are as follows:

- 6 • Mitigation Measure BIO-42: Avoid Impacts on Delta Green Ground Beetle and its Habitat
- 7 • Mitigation Measure BIO-43: Avoid and Minimize Loss of Callippe Silverspot Butterfly Habitat
- 8 • Mitigation Measure BIO-55: Conduct Preconstruction Surveys for Noncovered Special-Status  
9 Reptiles and Implement Applicable CM22 Measures
- 10 • Mitigation Measure BIO-66: California Least Tern Nesting Colonies Shall Be Avoided and Indirect  
11 Effects on Colonies Will Be Minimized
- 12 • Mitigation Measure BIO-69a: Compensate for the Loss of Medium to Very High-Value Greater  
13 Sandhill Crane Foraging Habitat
- 14 • Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid  
15 Disturbance of Nesting Birds
- 16 • Mitigation Measure BIO-91: Compensate for Near-Term Loss of High-Value Western Burrowing  
17 Owl Habitat
- 18 • Mitigation Measure BIO-113: Compensate for the Near-Term Loss of Golden Eagle and  
19 Ferruginous Hawk Foraging Habitat
- 20 • Mitigation Measure BIO-117: Avoid Impacts on Rookeries
- 21 • Mitigation Measure BIO-125: Compensate for the Near-Term Loss of Mountain Plover Wintering  
22 Habitat
- 23 • Mitigation Measure BIO-129a: Compensate for Loss of Black Tern Nesting Habitat
- 24 • Mitigation Measure BIO-130: Compensate for the Near-Term Loss of California Horned Lark and  
25 Grasshopper Sparrow Habitat
- 26 • Mitigation Measure BIO-138: Compensate for the Near-Term Loss of High-Value Loggerhead  
27 Shrike Habitat
- 28 • Mitigation Measure BIO-146: Active Bank Swallow Colonies Shall Be Avoided and Indirect  
29 Effects on Bank Swallow Will Be Minimized
- 30 • Mitigation Measure BIO-147: Monitor Bank Swallow Colonies and Evaluate Winter and Spring  
31 Flows Upstream of the Study Area
- 32 • Mitigation Measure BIO-162: Conduct Preconstruction Survey for American Badger
- 33 • Mitigation Measure BIO-166: Conduct Preconstruction Surveys for Roosting Bats and Implement  
34 Protective Measures
- 35 • Mitigation Measure BIO-170: Avoid, Minimize, or Compensate for Impacts on Noncovered  
36 Special-Status Plant Species
- 37 • Mitigation Measure BIO-179a: Conduct Food Studies and Monitoring for Wintering Waterfowl in  
38 Suisun Marsh

- 1 • Mitigation Measure BIO-179b: Conduct Food Studies and Monitoring to Demonstrate Food  
2 Quality of Palustrine Tidal Wetlands in the Yolo and Delta Basins
- 3 • Mitigation Measure BIO-180: Conduct Food and Monitoring Studies of Breeding Waterfowl in  
4 Suisun Marsh

### 5 **12.3.3.11 Alternative 6A—Isolated Conveyance with Pipeline/Tunnel and** 6 **Intakes 1–5 (15,000 cfs; Operational Scenario D)**

7 Alternative 6A would affect terrestrial biological resources in the same manner as Alternative 1A.  
8 Alternative 6A, which is fully described in Section 3.5.11 of Chapter 3, *Description of Alternatives*,  
9 and depicted in Figure 3-2, would employ the same construction footprint and include the same  
10 suite of conservation components as Alternative 1A. For this reason, Alternative 6A is considered  
11 here in a summary fashion; the reader is referred to Alternative 1A for a detailed description of  
12 impacts that would be associated with implementing Alternative 6A. The impacts associated with  
13 Alternatives 1A and 6A were derived by comparing the alternatives to the No Action Alternative for  
14 NEPA purposes, and to Existing Conditions for CEQA purposes.

15 The only difference between the two alternatives is the operational scenario that is proposed.  
16 Alternative 6A would use Operational Scenario D rather than Operational Scenario A. Scenario D  
17 calls for the pipeline and tunnel to act as an isolated conveyance facility. All water destined for the  
18 CVP and SWP canals in the south Delta would be diverted in the north Delta and transported south  
19 through the pipeline and tunnel. The pumping of water directly from south Delta channels would no  
20 longer occur. Operational Scenario D also provides for an increased Delta outflow during September  
21 and October of some water years. These water operations would have no significant effect on  
22 terrestrial biological resources in the study area.

23 The reader is referred to the Alternative 1A impact analysis above for the broader discussion of  
24 overall terrestrial biological resources effects that would result from implementation of Alternative  
25 6A. The Alternative 6A water conveyance facilities construction effects on natural communities are  
26 included in Table 12-6A-1. The principal effects of concern associated with both Alternative 1A and  
27 6A are related to the conversion of large acreages of cultivated lands and managed wetland to water  
28 conveyance facilities (CM1; Table 12-6A-1), and to tidal marsh and other habitat types (CM2, CM4,  
29 and CM5—Table 12-6A-2; CM7, CM8, CM10, and CM18—Table 12-6A-3). Refer to Table 12-1A-69  
30 for a summary of Alternative 1A permanent and temporary jurisdictional waters and wetlands  
31 impacts.

32 Note that the acres of habitat affected by CM1, as listed in Table 12-6A-1, would be acres affected in  
33 the near-term timeframe, or the first 10 years of Plan implementation. The acres represented in  
34 Table 12-6A-2 and Table 12-6A-3 for the late long-term timeframe are acres that would be affected  
35 cumulatively over the entire 50-year period of the Plan. Table 3-4 in Chapter 3, *Description of*  
36 *Alternatives*, describes the schedule for implementation of natural community restoration and  
37 protection conservation measures.

38 These effects accrue to special-status species and common wildlife species that rely on cultivated  
39 lands and managed wetlands during some life stage. Foraging raptors and passerines and some  
40 waterbirds are regular inhabitants of the Delta's cultivated lands. The Delta's managed wetlands  
41 provide freshwater nesting, feeding and resting habitat for a large number of Pacific flyway  
42 waterfowl and shorebirds, as well as nesting passerines, such as tricolored blackbird. Special-status  
43 plant species that occupy the tidal fringe in Suisun Marsh and parts of the Delta would be subject to

1 losses associated with physical construction activities (levee breaching and reconstruction) and  
2 changes in water depth and salinity in their current habitat as a result of tidal marsh restoration.

3 **Table 12-6A-1. Alternative 6A Near-Term Effects of Water Conveyance Facilities (CM1) on Natural**  
4 **Communities (acres)**

Natural Community	Total Existing Habitat in Study Area	Conveyance Option		Conveyance Option	
		Alternative 6A Removed Habitat (Permanent) <sup>b</sup>	Difference from Alternative 1A	Alternative 6A Removed Habitat (Temporary) <sup>c</sup>	Difference from Alternative 1A
Tidal perennial aquatic <sup>a</sup>	86,263	48	0	133	0
Tidal brackish emergent wetland	8,501	0	0	0	0
Tidal freshwater emergent wetland	8,856	6	0	6	0
Valley/foothill riparian	17,966	58	0	28	0
Nontidal perennial aquatic	5,567	12	0	9	0
Nontidal freshwater perennial emergent wetland	1,509	1	0	1	0
Alkali seasonal wetland complex	3,723	0	0	0	0
Vernal pool complex	12,133	3	0	0	0
Managed wetland	70,798	3	0	83	0
Other natural seasonal wetland	842	0	0	0	0
Grassland	78,047	315	0	262	0
Inland dune scrub	19	0	0	0	0
Cultivated lands	487,106	3,836	0	2,191	0

<sup>a</sup> Tidal mudflat has been included in the tidal perennial aquatic natural community.

<sup>b</sup> Features in this category include the following conveyance-related facilities: Forebay, Afterbay, Intake Facilities, Pump Stations, Permanent Access Roads, Shaft Locations, and Reusable Tunnel Material Storage Areas

<sup>c</sup> Features in this category include the following conveyance features: Barge Unloading Facility, Control Structure Work Area, Intake Road Work Area, Intake Work Area, Pipeline, Pipeline Work Area, Road Work Area, Safe Haven Work Area, Temporary Access Road Work Area, Tunnel Work Area and Borrow/Spoil Areas.

5

1 **Table 12-6A-2. Alternative 6A Late Long-Term Effects of Restoration Activities (CM2, CM4, CM5) that**  
2 **Affect Most Natural Communities (acres)**

Natural Community	Conservation Measure					
	CM2 <sup>b</sup>		CM4 <sup>c</sup>		CM5 <sup>d</sup>	
	Permanent <sup>e</sup>	Temporary <sup>f</sup>	Permanent <sup>e</sup>	Temporary <sup>f</sup>	Permanent <sup>e</sup>	Temporary <sup>f</sup>
Tidal perennial aquatic <sup>a</sup>	8	11	18	0	2	5
Tidal brackish emergent wetland	0	0	1	0	0	0
Tidal freshwater emergent wetland	6	0	1	0	1	1
Valley/foothill riparian	89	88	552	0	43	35
Nontidal perennial aquatic	24	12	189	0	28	16
Nontidal freshwater perennial emergent wetland	25	1	99	0	0	0
Alkali seasonal wetland complex	45	0	27	0	0	0
Vernal pool complex	0	0	372	0	0	0
Managed wetland	24	44	13,746	0	0	0
Other natural seasonal wetland	0	0	0	0	0	0
Grassland	388	239	1,122	0	51	34
Inland dune scrub	0	0	0	0	0	0
Cultivated lands	629	363	39,565	0	2,087	1,194

<sup>a</sup> Tidal mudflat has been included in the tidal perennial aquatic natural community.

<sup>b</sup> Yolo Bypass Fisheries Enhancement.

<sup>c</sup> Tidal Natural Communities Restoration.

<sup>d</sup> Seasonally Inundated Floodplain Restoration.

<sup>e</sup> Features in this category include the following: construction of fish passage structures and infrastructure in the Yolo Bypass, construction of permanent structures and infrastructure associated with restoration, and loss of habitat associated with removal and replacement by other habitats.

<sup>f</sup> Features in this category include the following: temporary work areas associated with construction of permanent restoration features, and temporary grading/vegetation removal associated with restoration activities.

3

1 **Table 12-6A-3. Alternative 6A Late Long-Term Effects of Restoration Activities (CM7, CM8, CM10,**  
2 **CM18) that Affect Only Grassland and Cultivated Lands (acres)**

Natural Community	Conservation Measure							
	CM7 <sup>a</sup>		CM8 <sup>b</sup>		CM10 <sup>c</sup>		CM18 <sup>d</sup>	
	Perm <sup>e</sup>	Temp <sup>f</sup>	Perm <sup>e</sup>	Temp <sup>f</sup>	Perm <sup>e</sup>	Temp <sup>f</sup>	Perm <sup>e</sup>	Temp <sup>f</sup>
Grassland	410	0	0	0	0	0	35	0
Cultivated lands	4,553	0	2,000	0	1,950	0	0	0

<sup>a</sup> Riparian Natural Community Restoration.

<sup>b</sup> Grassland Natural Community Restoration.

<sup>c</sup> Nontidal Marsh Restoration.

<sup>d</sup> Conservation Hatcheries.

<sup>e</sup> Features in this category include the following: construction of permanent structures and infrastructure associated with restoration, recreation facilities and hatcheries; and loss of habitat associated with removal and replacement by other habitats.

<sup>f</sup> Features in this category include the following: temporary work areas associated with construction of permanent restoration features, recreation facilities and hatcheries; and temporary grading/vegetation removal associated with restoration activities.

Perm = Permanent.

Temp = Temporary.

3

4 Some of the permanent habitat loss associated with these alternatives would occur during the early,  
5 construction-related stage of the BDCP. Other losses would occur over time as some habitats  
6 (cultivated lands, managed wetland, valley/foothill riparian and grassland) are converted to tidal  
7 marsh (tidal perennial aquatic, tidal brackish emergent wetland, tidal freshwater emergent wetland)  
8 and other natural communities. The BDCP conservation components are designed to eventually  
9 replace and expand habitats that would have a positive influence on plant and animal species  
10 covered in the Plan. These conservation components would also have a positive effect on  
11 noncovered and common species that occupy the study area.

12 **NEPA Effects:** Alternative 6A would not have adverse effects on the terrestrial natural communities,  
13 special-status species and common species that occupy the study area. The alternative also would  
14 not disrupt wildlife movement corridors, significantly increase the risk of introducing invasive  
15 species, result in a net loss of wetlands and other waters of the United States, reduce the value of  
16 habitat for waterfowl and shorebirds, or conflict with plans and policies that affect the study area. As  
17 with Alternative 1A, there would be large acreages of existing habitat converted by the Plan's  
18 conservation actions, including the construction of water conveyance tunnels from the north Delta  
19 to Clifton Court Forebay in the south Delta. The temporarily affected habitat would be restored to its  
20 pre-project condition and the restoration conservation measures (CM2–CM10) would permanently  
21 replace primarily cultivated land and managed wetland with tidal and nontidal marsh, riparian  
22 vegetation, and grassland. The increases in acreage and value of the sensitive natural communities  
23 in the study area would have beneficial effects on covered and noncovered species. Where  
24 conservation actions would not fully offset effects, the Plan has developed AMMs and this document  
25 has included additional mitigation measures to avoid adverse effects. Alternative 6A would not  
26 require mitigation measures beyond what is proposed for Alternative 1A to offset effects because  
27 the affects to terrestrial resources are exactly the same.

1 **CEQA Conclusion:** Alternative 6A would not have significant and unavoidable impacts on the  
2 terrestrial natural communities, special-status species and common species that occupy the study  
3 area. The alternative also would not disrupt wildlife movement corridors, significantly increase the  
4 risk of introducing invasive species, result in a net loss of wetlands and other waters of the United  
5 States, reduce the value of habitat for waterfowl and shorebirds, or conflict with plans and policies  
6 that affect the study area. As with Alternative 1A, there would be large acreages of existing habitat  
7 converted by the Plan's conservation actions, including the construction of water conveyance  
8 tunnels from the north Delta to Clifton Court Forebay in the south Delta. The temporarily affected  
9 habitat would be restored to its pre-project condition and the restoration conservation measures  
10 (CM2–CM10) would permanently replace primarily cultivated land and managed wetland with tidal  
11 and nontidal marsh, riparian vegetation, and grassland. The increases in acreage and value of the  
12 sensitive natural communities in the study area would have beneficial effects on covered,  
13 noncovered, and common species. Where conservation actions would not fully offset impacts, the  
14 Plan has developed AMMs and this document has included additional mitigation measures to avoid  
15 significant impacts. Alternative 6A would not require mitigation measures beyond what is proposed  
16 for Alternative 1A to offset effects because the affects to terrestrial resources are exactly the same.

17 As with Alternative 1A, Alternative 6A would require several mitigation measures to be adopted to  
18 reduce all effects on terrestrial biological resources to less-than-significant levels. These mitigation  
19 measures would be needed beyond the impact offsets provided by Alternative 6A AMMs and CM2–  
20 CM22 conservation actions. The relevant mitigation measures, which are included in detail in the  
21 analysis of Alternative 1A, are as follows:

- 22 • Mitigation Measure BIO-42: Avoid Impacts on Delta Green Ground Beetle and its Habitat
- 23 • Mitigation Measure BIO-43: Avoid and Minimize Loss of Callippe Silverspot Butterfly Habitat
- 24 • Mitigation Measure BIO-55: Conduct Preconstruction Surveys for Noncovered Special-Status  
25 Reptiles and Implement Applicable CM22 Measures
- 26 • Mitigation Measure BIO-66: California Least Tern Nesting Colonies Shall Be Avoided and Indirect  
27 Effects on Colonies Will Be Minimized
- 28 • Mitigation Measure BIO-69a: Compensate for the Loss of Medium to Very High-Value Greater  
29 Sandhill Crane Foraging Habitat
- 30 • Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid  
31 Disturbance of Nesting Birds
- 32 • Mitigation Measure BIO-91: Compensate for Near-Term Loss of High-Value Western Burrowing  
33 Owl Habitat
- 34 • Mitigation Measure BIO-113: Compensate for the Near-Term Loss of Golden Eagle and  
35 Ferruginous Hawk Foraging Habitat
- 36 • Mitigation Measure BIO-117: Avoid Impacts on Rookeries
- 37 • Mitigation Measure BIO-125: Compensate for the Near-Term Loss of Mountain Plover Wintering  
38 Habitat
- 39 • Mitigation Measure BIO-129a: Compensate for Loss of Black Tern Nesting Habitat
- 40 • Mitigation Measure BIO-130: Compensate for the Near-Term Loss of California Horned Lark and  
41 Grasshopper Sparrow Habitat

- 1 • Mitigation Measure BIO-138: Compensate for the Near-Term Loss of High-Value Loggerhead  
2 Shrike Habitat
- 3 • Mitigation Measure BIO-146: Active Bank Swallow Colonies Shall Be Avoided and Indirect  
4 Effects on Bank Swallow Will Be Minimized
- 5 • Mitigation Measure BIO-147: Monitor Bank Swallow Colonies and Evaluate Winter and Spring  
6 Flows Upstream of the Study Area
- 7 • Mitigation Measure BIO-162: Conduct Preconstruction Survey for American Badger
- 8 • Mitigation Measure BIO-166: Conduct Preconstruction Surveys for Roosting Bats and Implement  
9 Protective Measures
- 10 • Mitigation Measure BIO-170: Avoid, Minimize, or Compensate for Impacts on Noncovered  
11 Special-Status Plant Species
- 12 • Mitigation Measure BIO-179a: Conduct Food Studies and Monitoring for Wintering Waterfowl in  
13 Suisun Marsh
- 14 • Mitigation Measure BIO-179b: Conduct Food Studies and Monitoring to Demonstrate Food  
15 Quality of Palustrine Tidal Wetlands in the Yolo and Delta Basins
- 16 • Mitigation Measure BIO-180: Conduct Food and Monitoring Studies of Breeding Waterfowl in  
17 Suisun Marsh

### 18 **12.3.3.12 Alternative 6B—Isolated Conveyance with East Alignment and** 19 **Intakes 1–5 (15,000 cfs; Operational Scenario D)**

20 Alternative 6B would affect terrestrial biological resources in the same manner as Alternative 1B.  
21 Alternative 6B, which is described fully in Section 3.5.12 of Chapter 3, *Description of Alternatives*,  
22 and depicted in Figure 3-4, would employ the same construction footprint and contain the same  
23 suite of conservation components as Alternative 1B. For this reason, Alternative 6B is considered  
24 here in a summary fashion; the reader is referred to Alternative 1B for a detailed description of  
25 impacts that would be associated with implementing Alternative 6B. The impacts associated with  
26 Alternatives 1B and 6B were derived by comparing the alternatives to the No Action Alternative for  
27 NEPA purposes, and to Existing Conditions for CEQA purposes.

28 The only difference between the two alternatives is the operational scenario that is proposed.  
29 Alternative 6B would use Operational Scenario D rather than Operational Scenario A. Scenario D  
30 calls for the eastern canal to act as an isolated conveyance facility. All water destined for the CVP and  
31 SWP canals in the south Delta would be diverted in the north Delta and transported south through  
32 the eastern canal. The pumping of water directly from south Delta channels would no longer occur.  
33 Operational Scenario D also provides for an increased Delta outflow during September and October  
34 of some water years. These water operations would have no significant effect on terrestrial  
35 biological resources in the study area.

36 The Alternative 6B water conveyance facilities construction effects on natural communities are  
37 included in Table 12-6B-1. The principal effects of concern associated with both Alternative 1B and  
38 6B are related to the conversion of large acreages of cultivated lands and managed wetland to water  
39 conveyance facilities (Table 12-6B-1), tidal marsh and other habitat types (Table 12-6B-2 and Table  
40 12-6B-3). Refer to Table 12-1B-68 for a summary of Alternative 1B permanent and temporary  
41 jurisdictional waters and wetlands impacts.

1 Note that the acres of habitat affected by CM1, as listed in Table 12-6B-1, would be acres affected in  
2 the near-term timeframe, or the first 10 years of Plan implementation. The acres represented in  
3 Table 12-6B-2 and Table 12-6B-3 for the late long-term timeframe are acres affected cumulatively  
4 over the entire 50-year period of the Plan. Table 3-4 in Chapter 3, *Description of Alternatives*,  
5 describes the schedule for implementation of natural community restoration and protection  
6 conservation measures.

7 The major habitat conversions associated with Alternatives 1B and 6B accrue to special-status  
8 species and common wildlife species that rely on cultivated lands and managed wetlands during  
9 some life stage. Foraging raptors and passerines and some waterbirds are regular inhabitants of the  
10 Delta's cultivated lands. The Delta's managed wetlands provide freshwater nesting, feeding and  
11 resting habitat for a large number of Pacific flyway waterfowl and shorebirds, as well as nesting  
12 passerines, such as tricolored blackbird. Special-status plant species that occupy the tidal fringe in  
13 Suisun Marsh and parts of the Delta would be subject to losses associated with physical construction  
14 activities (levee breaching and reconstruction) and changes in water depth and salinity in their  
15 current habitat as a result of tidal marsh restoration.

16 **Table 12-6B-1. Alternative 6B Near-Term Effects of Water Conveyance Facilities (CM1) on Natural**  
17 **Communities (acres)**

	Total Existing Habitat in Study Area	Conveyance Option		Conveyance Option	
		Alternative 6B Removed Habitat (Permanent) <sup>b</sup>	Difference from Alternative 1B	Alternative 6B Removed Habitat (Temporary) <sup>c</sup>	Difference from Alternative 1B
Natural Community					
Tidal perennial aquatic <sup>a</sup>	86,263	33	0	145	0
Tidal brackish emergent wetland	8,501	0	0	0	0
Tidal freshwater emergent wetland	8,856	8	0	11	0
Valley/foothill riparian	17,966	51	0	39	0
Nontidal perennial aquatic	5,567	19	0	5	0
Nontidal freshwater perennial emergent wetland	1,509	5	0	6	0
Alkali seasonal wetland complex	3,723	0	0	0	0
Vernal pool complex	12,133	0	0	0	0
Managed wetland	70,798	4	0	18	0
Other natural seasonal wetland	842	0	0	0	0
Grassland	78,047	400	0	358	0
Inland dune scrub	19	0	0	0	0
Cultivated land	487,106	7,886	0	12,551	0

<sup>a</sup> Tidal mudflat has been included in the tidal perennial aquatic natural community.

<sup>b</sup> Features in this category include the following conveyance-related facilities: Canal, Forebay, Afterbay, Intake Facilities, Pump Stations, Permanent Access Roads, Shaft Locations, and Reusable Tunnel Material Storage Areas.

<sup>c</sup> Features in this category include the following conveyance features: Canal Work Area, Barge Unloading Facility, Control Structure Work Area, Intake Road Work Area, Intake Work Area, Pipeline, Pipeline Work Area, Road Work Area, Safe Haven Work Area, Temporary Access Road Work Area, Tunnel Work Area, and Borrow/Spoil Areas.

1 Some of the permanent habitat loss associated with these alternatives would occur during the early,  
 2 construction-related stage of the BDCP. Other losses would occur over time as some habitats  
 3 (cultivated lands, managed wetland, valley/foothill riparian and grassland) are converted to tidal  
 4 marsh (tidal perennial aquatic, tidal brackish emergent wetland, tidal freshwater emergent wetland;  
 5 CM4) and other natural communities (CM2 and CM5, Table 12-6B-2; CM7, CM8, CM10, and CM18,  
 6 Table 12-6B-3). The BDCP conservation components are designed to eventually replace and expand  
 7 habitats that would have a positive influence on plant and animal species covered in the Plan. These  
 8 conservation components would also have a positive effect on noncovered and common species that  
 9 occupy the study area.

10 **Table 12-6B-2. Alternative 6B Late Long-Term Effects of Restoration Activities (CM2, CM4, CM5) that**  
 11 **Affect Most Natural Communities (acres)**

Natural Community	Conservation Measure					
	CM2 <sup>b</sup>		CM4 <sup>c</sup>		CM5 <sup>d</sup>	
	Permanent <sup>e</sup>	Temporary <sup>f</sup>	Permanent <sup>e</sup>	Temporary <sup>f</sup>	Permanent <sup>e</sup>	Temporary <sup>f</sup>
Tidal perennial aquatic <sup>a</sup>	8	11	18	0	2	5
Tidal brackish emergent wetland	0	0	1.	0	0	0
Tidal freshwater emergent wetland	6	0	1	0	1	1
Valley/foothill riparian	89	88	552	0	43	35
Nontidal perennial aquatic	24	12	189	0	28	16
Nontidal freshwater perennial emergent wetland	25	1	99	0	0	0
Alkali seasonal wetland complex	45	0	27	0	0	0
Vernal pool complex	0	0	372	0	0	0
Managed wetland	24	44	13,746	0	0	0
Other natural seasonal wetland	0	0	0	0	0	0
Grassland	388	239	1,122	0	51	34
Inland dune scrub	0	0	0	0	0	0
Cultivated lands	629	363	39,565	0	2,087	1,194

<sup>a</sup> Tidal mudflat has been included in the tidal perennial aquatic natural community.

<sup>b</sup> Yolo Bypass Fisheries Enhancement.

<sup>c</sup> Tidal Natural Communities Restoration

<sup>d</sup> Seasonally Inundated Floodplain Restoration

<sup>e</sup> Features in this category include the following: construction of fish passage structures and infrastructure in the Yolo Bypass, construction of permanent structures and infrastructure associated with restoration, and loss of habitat associated with removal and replacement by other habitats.

<sup>f</sup> Features in this category include the following: temporary work areas associated with construction of permanent restoration features, and temporary grading/vegetation removal associated with restoration activities.

12

1 **Table 12-6B-3. Alternative 6B Late Long-Term Effects of Restoration Activities (CM7, CM8, CM10,**  
2 **CM18) that Affect Only Grassland and Cultivated Lands (acres)**

Natural Community	Conservation Measure							
	CM7 <sup>a</sup>		CM8 <sup>b</sup>		CM10 <sup>c</sup>		CM18 <sup>d</sup>	
	Perm <sup>e</sup>	Temp <sup>f</sup>	Perm <sup>e</sup>	Temp <sup>f</sup>	Perm <sup>e</sup>	Temp <sup>f</sup>	Perm <sup>e</sup>	Temp <sup>f</sup>
Grassland	410	0	0	0	0	0	35	0
Cultivated land	4,553	0	2,000	0	1,950	0	0	0

<sup>a</sup> Riparian Natural Community Restoration.

<sup>b</sup> Grassland Natural Community Restoration.

<sup>c</sup> Nontidal Marsh Restoration.

<sup>d</sup> Conservation Hatcheries.

<sup>e</sup> Features in this category include the following: construction of permanent structures and infrastructure associated with restoration, recreation facilities and hatcheries; and loss of habitat associated with removal and replacement by other habitats.

<sup>f</sup> Features in this category include the following: temporary work areas associated with construction of permanent restoration features, recreation facilities and hatcheries; and temporary grading/vegetation removal associated with restoration activities.

Perm = Permanent.

Temp = Temporary.

3

4 **NEPA Effects:** Alternative 6B would not have adverse effects on the terrestrial natural communities,  
5 special-status species and common species that occupy the study area except for an adverse effect  
6 on giant garter snake population connectivity and on wildlife movement corridors in general. The  
7 construction of the canal would substantially inhibit the movement of giant garter snakes and other  
8 wildlife from moving within and outside of the Delta. This alternative would not significantly  
9 increase the risk of introducing invasive species, result in a net loss of wetlands and other waters of  
10 the United States, reduce the value of habitat for waterfowl and shorebirds, or conflict with plans  
11 and policies that affect the study area. As with Alternative 1B, there would be large acreages of  
12 existing habitat converted by the Plan's conservation actions, including the construction of the water  
13 conveyance canal from the north Delta to Clifton Court Forebay in the south Delta. The temporarily  
14 affected habitat would be restored to its pre-project condition and the restoration conservation  
15 measures (CM2–CM10) would permanently replace primarily cultivated land and managed wetland  
16 with tidal and nontidal marsh, riparian vegetation, and grassland. The increases in acreage and  
17 value of the sensitive natural communities in the study area would have beneficial effects on  
18 covered and noncovered species. Where conservation actions would not fully offset effects, the Plan  
19 has developed AMMs and this document has included additional mitigation measures to avoid and  
20 minimize adverse effects to the maximum extent practicable. Alternative 6B would not require  
21 mitigation measures beyond what is proposed for Alternative 1B to offset effects.

22 **CEQA Conclusion:** Alternative 6B would not have significant and unavoidable impacts on the  
23 terrestrial natural communities, special-status species and common species that occupy the study  
24 area except for giant garter snake habitat connectivity, or to wildlife movement corridors in general.  
25 The construction of the canal would substantially inhibit the movement of giant garter snakes and  
26 other wildlife from moving within and outside of the Delta. The alternative would not increase the  
27 risk of introducing invasive species, result in a net loss of wetlands and other waters of the United  
28 States, reduce the value of habitat for waterfowl and shorebirds, or conflict with plans and policies  
29 that affect the study area. As with Alternative 1B, there would be large acreages of existing habitat

1 converted by the Plan's conservation actions, including the construction of water conveyance  
2 tunnels from the north Delta to Clifton Court Forebay in the south Delta. The temporarily affected  
3 habitat would be restored to its pre-project condition and the restoration conservation measures  
4 (CM2–CM10) would permanently replace primarily cultivated land and managed wetland with tidal  
5 and nontidal marsh, riparian vegetation, and grassland. The increases in acreage and value of the  
6 sensitive natural communities in the study area would have beneficial effects on covered,  
7 noncovered, and common species. Where conservation actions would not fully offset impacts, the  
8 Plan has developed AMMs and this document has included additional mitigation measures to avoid  
9 and minimize significant impacts. Alternative 6B would not require mitigation measures beyond  
10 what is proposed for Alternative 1B to offset effects. Despite these measures, there would remain  
11 significant and unavoidable impacts on giant garter snake population connectivity and wildlife  
12 movement corridors from Alternative 6B.

13 As with Alternative 1B, Alternative 6B would require several mitigation measures to be adopted to  
14 reduce effects on terrestrial biological resources to less-than-significant levels when possible. These  
15 mitigation measures would be needed beyond the impact offsets provided by Alternative 6B AMMs  
16 and CM2–CM22 conservation actions. The relevant mitigation measures, which are included in detail  
17 in the analysis of Alternative 1B, are as follows:

- 18 ● Mitigation Measure BIO-42: Avoid Impacts on Delta Green Ground Beetle and its Habitat
- 19 ● Mitigation Measure BIO-43: Avoid and Minimize Loss of Callippe Silverspot Butterfly Habitat
- 20 ● Mitigation Measure BIO-50a: Provide Connectivity between Coldani Marsh/White Slough  
21 Population and the Giant Garter Snake's Historical Range
- 22 ● Mitigation Measure BIO-55: Conduct Preconstruction Surveys for Noncovered Special-Status  
23 Reptiles and Implement Applicable CM22 Measures
- 24 ● Mitigation Measure BIO-66: California Least Tern Nesting Colonies Shall Be Avoided and Indirect  
25 Effects on Colonies Will Be Minimized
- 26 ● Mitigation Measure BIO-69a: Compensate for the Loss of Medium to Very High-Value Greater  
27 Sandhill Crane Foraging Habitat
- 28 ● Mitigation Measure BIO-69b: BDCP-Related Construction Will Not Result in A Net Decrease in  
29 Crane Use Days on Bract Tract
- 30 ● Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid  
31 Disturbance of Nesting Birds
- 32 ● Mitigation Measure BIO-91: Compensate for Near-Term Loss of High-Value Western Burrowing  
33 Owl Habitat
- 34 ● Mitigation Measure BIO-113: Compensate for the Near-Term Loss of Golden Eagle and  
35 Ferruginous Hawk Foraging Habitat
- 36 ● Mitigation Measure BIO-117: Avoid Impacts on Rookeries
- 37 ● Mitigation Measure BIO-121: Compensate for Loss of Short-Eared Owl and Northern Harrier  
38 Nesting Habitat
- 39 ● Mitigation Measure BIO-125: Compensate for the Near-Term Loss of Mountain Plover Wintering  
40 Habitat
- 41 ● Mitigation Measure BIO-129a: Compensate for Loss of Black Tern Nesting Habitat

- 1 • Mitigation Measure BIO-130: Compensate for the Near-Term Loss of California Horned Lark and  
2 Grasshopper Sparrow Habitat
- 3 • Mitigation Measure BIO-138: Compensate for the Near-Term Loss of High-Value Loggerhead  
4 Shrike Habitat
- 5 • Mitigation Measure BIO-146: Active Bank Swallow Colonies Shall Be Avoided and Indirect  
6 Effects on Bank Swallow Will Be Minimized
- 7 • Mitigation Measure BIO-147: Monitor Bank Swallow Colonies and Evaluate Winter and Spring  
8 Flows Upstream of the Study Area
- 9 • Mitigation Measure BIO-162: Conduct Preconstruction Survey for American Badger
- 10 • Mitigation Measure BIO-166: Conduct Preconstruction Surveys for Roosting Bats and Implement  
11 Protective Measures
- 12 • Mitigation Measure BIO-170: Avoid, Minimize, or Compensate for Impacts on Noncovered  
13 Special-Status Plant Species
- 14 • Mitigation Measure BIO-179a: Conduct Food Studies and Monitoring for Wintering Waterfowl in  
15 Suisun Marsh
- 16 • Mitigation Measure BIO-179b: Conduct Food Studies and Monitoring to Demonstrate Food  
17 Quality of Palustrine Tidal Wetlands in the Yolo and Delta Basins
- 18 • Mitigation Measure BIO-180: Conduct Food and Monitoring Studies of Breeding Waterfowl in  
19 Suisun Marsh

### 20 **12.3.3.13 Alternative 6C—Isolated Conveyance with West Alignment and** 21 **Intakes W1–W5 (15,000 cfs; Operational Scenario D)**

22 Alternative 6C would affect terrestrial biological resources in the same manner as Alternative 1C.  
23 Alternative 6C, which is described fully in Section 3.5.13 of Chapter 3, *Description of Alternatives*, and  
24 depicted in Figure 3-6, would employ the same construction footprint and include the same suite of  
25 conservation components as Alternative 1C. For this reason, Alternative 6C is considered here in a  
26 summary fashion; the reader is referred to Alternative 1C for a detailed description of impacts that  
27 would be associated with implementing Alternative 6C. The impacts associated with Alternatives 1C  
28 and 6C were derived by comparing the alternatives to the No Action Alternative for NEPA purposes,  
29 and to Existing Conditions for CEQA purposes.

30 The only difference between the two alternatives is the operational scenario that is proposed.  
31 Alternative 6C would use Operational Scenario D rather than Operational Scenario A. Scenario D  
32 calls for the western canal and tunnel to act as an isolated conveyance facility. All water destined for  
33 the CVP and SWP canals in the south Delta would be diverted in the north Delta and transported  
34 south through the western canal and tunnel. The direct pumping of water from south Delta  
35 waterways would no longer occur. Operational Scenario D also provides for an increased Delta  
36 outflow during September and October of some water years. These water operations would have no  
37 significant effect on terrestrial biological resources in the study area.

### 38 **CM1 Construction Effects for Alternative 6C**

39 The Alternative 6C water conveyance facilities construction effects on natural communities are  
40 included in Table 12-6C-1. The principal effects of concern associated with both Alternative 1C and

1 6C are related to the conversion of large acreages of cultivated lands, managed wetland, grassland,  
2 vernal pool complex and alkali seasonal wetland complex to water conveyance facilities (Table 12-  
3 6C-1). Refer to Table 12-1C-68 for a summary of Alternative 1C permanent and temporary  
4 jurisdictional waters and wetlands impacts.

5 Note that the acres of habitat affected by CM1, as listed in Table 12-6C-1, would be acres affected in  
6 the near-term timeframe, or the first 10 years of Plan implementation. The acres represented in  
7 Table 12-6C-2 and Table 12-6C-3 for the late long-term timeframe are acres that would be affected  
8 cumulatively over the entire 50-year period of the Plan. Table 3-4 in Chapter 3, *Description of*  
9 *Alternatives*, describes the schedule for implementation of natural community restoration and  
10 protection conservation measures.

11 Construction of the Alternative 6C canal and tunnel in the western Delta and west and northwest of  
12 Clifton Court Forebay would have significant impacts on cultivated lands, and grassland, vernal pool  
13 and alkali seasonal wetland natural communities. The large acreages of vernal pool and alkali  
14 seasonal wetland impacted near Clifton Court Forebay would exceed the offsetting restoration and  
15 protection included in the BDCP, so additional mitigation would be required. These effects accrue to  
16 special-status species and common wildlife species that rely on cultivated land, grassland, vernal  
17 pool complex and alkali seasonal wetland complex during some life stage. Foraging raptors and  
18 passerines and some waterbirds are regular inhabitants of the Delta's cultivated lands. Grassland  
19 habitats also provide foraging for raptors and passerines, and upland habitat for some mammals and  
20 amphibians. Vernal pools provide habitat to special-status crustaceans, California tiger salamander,  
21 numerous common waterbirds, and a suite of special-status plants. Alkali seasonal wetland complex  
22 provides habitat to California tiger salamander, numerous common waterbirds, foraging raptors and  
23 its own suite of special-status, salt tolerant plants.

24 The near-term conservation activities described in Appendix 12D, *Feasibility Assessment of*  
25 *Conservation Measures Offsetting Water Conveyance Facilities Construction Impacts on Terrestrial*  
26 *Biological Resources*, and the mitigation measures proposed in the Alternative 1C analysis would  
27 provide for conservation, enhancement and replacement of habitats affected by the early water  
28 conveyance facility construction activities of Alternative 6C. This conservation activity, which is part  
29 of the early implementation of the BDCP, would offset most water conveyance facilities construction  
30 effects on both covered and noncovered special-status species in the study area. As indicated above,  
31 additional mitigation would be required for species reliant on vernal pool complex and alkali  
32 seasonal wetland complex natural communities.

1 **Table 12-6C-1. Alternative 6C Near-Term Effects of Water Conveyance Facilities (CM1) on Natural**  
2 **Communities (acres)**

Natural Community	Total Existing Habitat in Study Area	Conveyance Option		Conveyance Option	
		Alternative 6C Removed Habitat (Permanent) <sup>b</sup>	Difference from Alternative 1C	Alternative 6C Removed Habitat (Temporary) <sup>c</sup>	Difference from Alternative 1C
Tidal perennial aquatic <sup>a</sup>	86,263	25	0	117	0
Tidal brackish emergent wetland	8,501	0	0	0	0
Tidal freshwater emergent wetland	8,856	0	0	1	0
Valley/foothill riparian	17,966	40	0	86	0
Nontidal perennial aquatic	5,567	22	0	21	0
Nontidal freshwater perennial emergent wetland	1,509	0	0	5	0
Alkali seasonal wetland complex	3,723	13	0	9	0
Vernal pool complex	12,133	29	0	37	0
Managed wetland	70,798	1	0	145	0
Other natural seasonal wetland	842	2	0	2	0
Grassland	78,047	358	0	320	0
Inland dune scrub	19	0	0	0	0
Cultivated lands	487,106	6,073	0	9,481	0

<sup>a</sup> Tidal mudflat has been included in the tidal perennial aquatic natural community.

<sup>b</sup> Features in this category include the following conveyance-related facilities: Canal, Forebay, Afterbay, Intake Facilities, Pump Stations, Permanent Access Roads, Shaft Locations, and Reusable Tunnel Material Storage Areas.

<sup>c</sup> Features in this category include the following conveyance features: Canal Work Area, Barge Unloading Facility, Control Structure Work Area, Intake Road Work Area, Intake Work Area, Pipeline, Pipeline Work Area, Road Work Area, Safe Haven Work Area, Temporary Access Road Work Area, Tunnel Work Area, and Borrow/Spoil Areas.

3

1 **Table 12-6C-2. Alternative 6C Late Long-Term Effects of Restoration Activities (CM2, CM4, CM5) that**  
2 **Affect Most Natural Communities (acres)**

Natural Community	Conservation Measure					
	CM2 <sup>b</sup>		CM4 <sup>c</sup>		CM5 <sup>d</sup>	
	Perm <sup>e</sup>	Temp <sup>f</sup>	Perm <sup>e</sup>	Temp <sup>f</sup>	Perm <sup>e</sup>	Temp <sup>f</sup>
Tidal perennial aquatic <sup>a</sup>	8	11	58	0	2	5
Tidal brackish emergent wetland	0	0	0	0	0	0
Tidal freshwater emergent wetland	6	0	1	0	1	1
Valley/foothill riparian	89	88	552	0	43	35
Nontidal perennial aquatic	24	12	189	0	28	16
Nontidal freshwater perennial emergent wetland	25	1	99	0	0	0
Alkali seasonal wetland complex	45	0	27	0	0	0
Vernal pool complex	0	0	372	0	0	0
Managed wetland	24	44	13,746	0	0	0
Other natural seasonal wetland	0	0	0	0	0	0
Grassland	388	239	1,122	0	51	34
Inland dune scrub	0	0	0	0	0	0
Cultivated lands	629	363	39,565	0	2,087	1,194

<sup>a</sup> Tidal mudflat has been included in the tidal perennial aquatic natural community.

<sup>b</sup> Yolo Bypass Fisheries Enhancement.

<sup>c</sup> Tidal Natural Communities Restoration.

<sup>d</sup> Seasonally Inundated Floodplain Restoration.

<sup>e</sup> Features in this category include the following: construction of fish passage structures and infrastructure in the Yolo Bypass, construction of permanent structures and infrastructure associated with restoration, and loss of habitat associated with removal and replacement by other habitats.

<sup>f</sup> Features in this category include the following: temporary work areas associated with construction of permanent restoration features, and temporary grading/vegetation removal associated with restoration activities.

3

1 **Table 12-6C-3. Alternative 6C Late Long-Term Restoration Activities (CM7, CM8, CM10, CM18) that**  
 2 **Affect Only Grassland and Cultivated Lands (acres)**

Natural Community	Conservation Measure							
	CM7 <sup>a</sup>		CM8 <sup>b</sup>		CM10 <sup>c</sup>		CM18 <sup>d</sup>	
	Perm <sup>e</sup>	Temp <sup>f</sup>	Perm <sup>e</sup>	Temp <sup>f</sup>	Perm <sup>e</sup>	Temp <sup>f</sup>	Perm <sup>e</sup>	Temp <sup>f</sup>
Grassland	410	0	0	0	0	0	35	0
Cultivated lands	4,553	0	2,000	0	1,950	0	0	0

<sup>a</sup> Riparian Natural Community Restoration.

<sup>b</sup> Grassland Natural Community Restoration.

<sup>c</sup> Nontidal Marsh Restoration.

<sup>d</sup> Conservation Hatcheries.

<sup>e</sup> Features in this category include the following: construction of permanent structures and infrastructure associated with restoration, recreation facilities and hatcheries; and loss of habitat associated with removal and replacement by other habitats.

<sup>f</sup> Features in this category include the following: temporary work areas associated with construction of permanent restoration features, recreation facilities and hatcheries; and temporary grading/vegetation removal associated with restoration activities.

Perm = Permanent.

Temp = Temporary.

3

4 **Effects of Restoration-Related Actions of Alternative 6C**

5 Some of the permanent habitat loss associated with Alternative 6C would occur during the early,  
 6 construction-related stage of the BDCP. Other losses would occur over time as some natural  
 7 communities (cultivated lands, managed wetland, alkali seasonal wetland complex, grassland and  
 8 valley/foothill riparian) are converted to tidal marsh (tidal perennial aquatic, tidal brackish  
 9 emergent wetland, tidal freshwater emergent wetland) and other natural communities as part of  
 10 restoration actions (CM2, CM4, and CM5; Table 12-6C-2; CM7, CM8, CM10, and CM18; Table 12-6C-  
 11 3). The large acreages of cultivated land and managed wetland converted during marsh, grassland  
 12 and riparian habitat restoration would affect species similar to those described above for losses  
 13 associated with CM1, only on a larger scale. The BDCP restoration-related conservation components  
 14 are designed to eventually replace and expand habitats that would have a positive influence on plant  
 15 and animal species covered in the Plan. These conservation components would also have a positive  
 16 effect on noncovered and common species that occupy the study area.

17 **NEPA Effects:** Alternative 6C would not have adverse effects on the terrestrial natural communities,  
 18 special-status species and common species that occupy the study. The construction of the canal and  
 19 associated infrastructure would substantially inhibit the movement of wildlife from moving within  
 20 and outside of the Delta resulting in an adverse effect. This alternative would not significantly  
 21 increase the risk of introducing invasive species, result in a net loss of wetlands and other waters of  
 22 the United States, reduce the value of habitat for waterfowl and shorebirds, or conflict with plans  
 23 and policies that affect the study area. As with Alternative 1C, there would be large acreages of  
 24 existing habitat converted by the Plan’s conservation actions, including the construction of the water  
 25 conveyance canal from the north Delta to Clifton Court Forebay in the south Delta. The temporarily  
 26 affected habitat would be restored to its pre-project condition and the restoration conservation  
 27 measures (CM2–CM10) would permanently replace primarily cultivated land and managed wetland  
 28 with tidal and nontidal marsh, riparian vegetation, and grassland. The increases in acreage and

1 value of the sensitive natural communities in the study area would have beneficial effects on  
2 covered and noncovered species. Where conservation actions would not fully offset effects, the Plan  
3 has developed AMMs and this document has included additional mitigation measures to avoid and  
4 minimize adverse effects to the maximum extent practicable. Alternative 6C would not require  
5 mitigation measures beyond what is proposed for Alternative 1C to offset effects.

6 **CEQA Conclusion:** Alternative 6C would not have significant and unavoidable impacts on the  
7 terrestrial natural communities, special-status species and common species that occupy the study.  
8 The construction of the canal and associated infrastructure would substantially inhibit the  
9 movement of wildlife from moving within and outside of the Delta resulting in an adverse effect. The  
10 alternative would not increase the risk of introducing invasive species, result in a net loss of  
11 wetlands and other waters of the United States, reduce the value of habitat for waterfowl and  
12 shorebirds, or conflict with plans and policies that affect the study area. As with Alternative 1C,  
13 there would be large acreages of existing habitat converted by the Plan's conservation actions,  
14 including the construction of water conveyance tunnels from the north Delta to Clifton Court  
15 Forebay in the south Delta. The temporarily affected habitat would be restored to its pre-project  
16 condition and the restoration conservation measures (CM2–CM10) would permanently replace  
17 primarily cultivated land and managed wetland with tidal and nontidal marsh, riparian vegetation,  
18 and grassland. The increases in acreage and value of the sensitive natural communities in the study  
19 area would have beneficial effects on covered, noncovered, and common species. Where  
20 conservation actions would not fully offset impacts, the Plan has developed AMMs and this  
21 document has included additional mitigation measures to avoid and minimize significant impacts.  
22 Alternative 6C would not require mitigation measures beyond what is proposed for Alternative 1C  
23 to offset effects. Despite these measures, there would remain a significant and unavoidable impact  
24 on wildlife movement corridors from Alternative 6C.

25 As with Alternative 1C, Alternative 6C would require several mitigation measures to be adopted to  
26 reduce effects on terrestrial biological resources to less-than-significant levels when possible. These  
27 mitigation measures would be needed beyond the impact offsets provided by Alternative 6C AMMs  
28 and CM2–CM22 conservation actions. The relevant mitigation measures, which are included in detail  
29 in the analysis of Alternative 1C, are as follows:

- 30 ● Mitigation Measure BIO-18: Compensate for Loss of Alkali Seasonal Wetland Complex
- 31 ● Mitigation Measure BIO-27: Compensate for Loss of Other Natural Seasonal Wetland
- 32 ● Mitigation Measure BIO-32: Restore and Protect Vernal Pool Crustacean Habitat
- 33 ● Mitigation Measure BIO-42: Avoid Impacts on Delta Green Ground Beetle and its Habitat
- 34 ● Mitigation Measure BIO-43: Avoid and Minimize Loss of Callippe Silverspot Butterfly Habitat
- 35 ● Mitigation Measure BIO-55: Conduct Preconstruction Surveys for Noncovered Special-Status  
36 Reptiles and Implement Applicable CM22 Measures
- 37 ● Mitigation Measure BIO-66: California Least Tern Nesting Colonies Shall Be Avoided and Indirect  
38 Effects on Colonies Will Be Minimized
- 39 ● Mitigation Measure BIO-69a: Compensate for the Loss of Medium to Very High-Value Greater  
40 Sandhill Crane Foraging Habitat
- 41 ● Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid  
42 Disturbance of Nesting Birds

- 1 • Mitigation Measure BIO-91: Compensate for Near-Term Loss of High-Value Western Burrowing  
2 Owl Habitat
- 3 • Mitigation Measure BIO-91a, Compensate for Permanent Loss of Low-Value Western Burrowing  
4 Owl Habitat
- 5 • Mitigation Measure BIO-113: Compensate for the Near-Term Loss of Golden Eagle and  
6 Ferruginous Hawk Foraging Habitat
- 7 • Mitigation Measure BIO-117: Avoid Impacts on Rookeries
- 8 • Mitigation Measure BIO-121: Compensate for Loss of Short-Eared Owl and Northern Harrier  
9 Nesting Habitat
- 10 • Mitigation Measure BIO-125: Compensate for the Near-Term Loss of Mountain Plover Wintering  
11 Habitat
- 12 • Mitigation Measure BIO-129a: Compensate for Loss of Black Tern Nesting Habitat
- 13 • Mitigation Measure BIO-130: Compensate for the Near-Term Loss of California Horned Lark and  
14 Grasshopper Sparrow Habitat
- 15 • Mitigation Measure BIO-138: Compensate for the Near-Term Loss of High-Value Loggerhead  
16 Shrike Habitat
- 17 • Mitigation Measure BIO-146: Active Bank Swallow Colonies Shall Be Avoided and Indirect  
18 Effects on Bank Swallow Will Be Minimized
- 19 • Mitigation Measure BIO-147: Monitor Bank Swallow Colonies and Evaluate Winter and Spring  
20 Flows Upstream of the Study Area
- 21 • Mitigation Measure BIO-162: Conduct Preconstruction Survey for American Badger
- 22 • Mitigation Measure BIO-166: Conduct Preconstruction Surveys for Roosting Bats and Implement  
23 Protective Measures
- 24 • Mitigation Measure BIO-170: Avoid, Minimize, or Compensate for Impacts on Noncovered  
25 Special-Status Plant Species
- 26 • Mitigation Measure BIO-179a: Conduct Food Studies and Monitoring for Wintering Waterfowl in  
27 Suisun Marsh
- 28 • Mitigation Measure BIO-179b: Conduct Food Studies and Monitoring to Demonstrate Food  
29 Quality of Palustrine Tidal Wetlands in the Yolo and Delta Basins
- 30 • Mitigation Measure BIO-180: Conduct Food and Monitoring Studies of Breeding Waterfowl in  
31 Suisun Marsh

32 **12.3.3.14 Alternative 7—Dual Conveyance with Pipeline/Tunnel, Intakes 2,**  
33 **3, and 5, and Enhanced Aquatic Conservation (9,000 cfs;**  
34 **Operational Scenario E)**

35 The water conveyance facilities construction elements (CM1) of Alternative 7 would affect  
36 terrestrial biological resources in a nearly identical fashion to Alternative 1A. The principal  
37 differences between Alternative 7, which is described fully in Section 3.5.14 of Chapter 3, *Description*  
38 *of Alternatives*, and depicted in Figure 3-2, and Alternative 1A are related to the differing

1 construction footprints. For this reason, Alternative 7 is considered here in a summary fashion; the  
2 reader is referred to Alternative 1A for a detailed description of impacts that would be associated  
3 with implementing Alternative 7. The impacts associated with Alternatives 1A and 7 were derived  
4 by comparing the alternatives to the No Action Alternative for NEPA purposes, and to Existing  
5 Conditions for CEQA purposes.

6 The Alternative 7 water conveyance facilities would entail construction at north Delta Intakes 2, 3,  
7 and 5 rather than 1–5. The locations of these intakes are depicted in Figure 3-2. Eliminating Intakes  
8 1 and 4 would reduce the construction footprint along the eastern bank of the Sacramento River just  
9 north of Clarksburg and immediately south of Hood. The operational scenario for Alternative 7  
10 (Scenario E) is also different from Alternative 1A (Operational Scenario A), but this change would  
11 not significantly alter terrestrial biological resources effects. Alternative 7 operations would extract  
12 water from the river at the three intakes and would require additional pumping at the south Delta  
13 pumps. Also, Operational Scenario E would involve greater Delta freshwater outflows during  
14 September, October and November of some water years when compared with Operational  
15 Scenario A.

16 Alternative 7 would include the same conservation activities as Alternative 1A beyond CM1 with  
17 two exceptions. *CM6 Channel Margin Enhancement* would include restoration and enhancement  
18 activities along 40 miles of river channel in the Delta rather than the 20 miles proposed for all other  
19 alternatives. Also, *CM5 Seasonally Inundated Floodplain Restoration* would expand from 10,000 acres  
20 to 20,000 acres under Alternative 7. These expansions would have major positive impacts on  
21 valley/foothill riparian natural community along major Delta waterways; at the same time, other  
22 natural communities and cultivated land would experience reductions as riparian habitats are  
23 enhanced and expanded.

#### 24 **Comparative Differences in CM1 Construction Effects for Alternatives 7 and 1A**

25 Because of the elimination of Intakes 1 and 4 and their associated pumps and pipelines, Alternative  
26 7 would create relatively small differences in the permanent and temporary loss of natural  
27 communities and cultivated lands during water conveyance facilities construction when compared  
28 with Alternative 1A (Table 12-7-1). All of these differences would occur during the near-term  
29 timeframe associated with water conveyance facilities construction. Alternative 7 would  
30 permanently remove 7 fewer acres of tidal perennial aquatic habitat in the Sacramento River, 10  
31 fewer acres of valley/foothill riparian habitat along the eastern bank of the Sacramento River, and 5  
32 fewer acres of grassland along the river levees. These reductions would occur as a result of not  
33 constructing Intakes 1 and 4 on the east bank of the Sacramento River. There would also be a  
34 reduction in loss of cultivated lands (95 fewer acres) east of the river near these intake sites.  
35 Alternative 7 would also permanently affect a smaller acreage of potential jurisdictional waters  
36 (including wetlands) as regulated by Section 404 of the CWA, when compared to Alternative 1A (7  
37 acres fewer). Refer to Table 12-1A-69 for a summary of Alternative 1A permanent and temporary  
38 jurisdictional waters and wetlands impacts.

1 **Table 12-7-1. Alternative 7 Near-Term Effects of Water Conveyance Facilities (CM1) on Natural**  
2 **Communities (acres)**

Natural Community	Total Existing Habitat in Study Area	Conveyance Option		Conveyance Option	
		Alternative 7 Removed Habitat (Permanent) <sup>b</sup>	Difference from Alternative 1A	Alternative 7 Removed Habitat (Temporary) <sup>c</sup>	Difference from Alternative 1A
Tidal perennial aquatic <sup>a</sup>	86,263	41	-7	108	-25
Tidal brackish emergent wetland	8,501	0	0	0	0
Tidal freshwater emergent wetland	8,856	6	0	5	-1
Valley/foothill riparian	17,966	48	-10	25	-3
Nontidal perennial aquatic	5,567	12	0	9	0
Nontidal freshwater perennial emergent wetland	1,509	1	0	1	0
Alkali seasonal wetland complex	3,723	0	0	0	0
Vernal pool complex	12,133	3	0	0	0
Managed wetland	70,798	3	0	83	0
Other natural seasonal wetland	842	0	0	0	0
Grassland	78,047	305	-5	255	-7
Inland dune scrub	19	0	0	0	0
Cultivated lands	487,106	3,741	-95	1,977	-214

<sup>a</sup> Tidal mudflat has been included in the tidal perennial aquatic natural community.

<sup>b</sup> Features in this category include the following conveyance-related facilities: Forebay, Afterbay, Intake Facilities, Pump Stations, Permanent Access Roads, Shaft Locations, and Reusable Tunnel Material Storage Areas.

<sup>c</sup> Features in this category include the following conveyance features: Barge Unloading Facility, Control Structure Work Area, Intake Road Work Area, Intake Work Area, Pipeline, Pipeline Work Area, Road Work Area, Safe Haven Work Area, Temporary Access Road Work Area, Tunnel Work Area, and Borrow/Spoil Areas.

3  
4 During the water conveyance facilities construction process, Alternative 7 would also involve less  
5 temporary loss of habitat when compared with Alternative 1A. The difference would be reflected in  
6 reduced losses of tidal perennial aquatic (25 acres less), valley/foothill riparian (3 acres less),  
7 grassland (7 acres less), and cultivated land (214 acres less) when compared with Alternative 1A  
8 (Table 12-7-1). Alternative 7 would also temporarily affect a smaller acreage of potential  
9 jurisdictional waters (including wetlands) as regulated by Section 404 of the CWA, when compared  
10 to Alternative 1A (29 acres fewer). Refer to Table 12-1A-69 for a summary of Alternative 1A  
11 permanent and temporary jurisdictional waters and wetlands impacts.

12 These differences in permanent loss of habitat from constructing the water conveyance facility  
13 would create differences in effects on covered and noncovered wildlife. The reduced level of

1 valley/foothill riparian habitat loss would be a positive influence on valley elderberry longhorn  
2 beetle, breeding habitat for raptors, herons and egrets (great egret, snowy egret, great blue heron,  
3 Swainson's hawk, Cooper's hawk, white-tailed kite, and black-crowned night heron), and migratory  
4 habitat for species that use the river corridor, such as western yellow-billed cuckoo. Species that  
5 would benefit from smaller permanent losses of grassland and cultivated land would include  
6 foraging raptors (Swainson's hawk, short-eared owl, northern harrier, merlin and white-tailed kite),  
7 greater sandhill crane, mountain plover, California horned lark, tricolored blackbird and several  
8 species of bats. Alternative 7 would permanently remove 85 fewer acres of greater sandhill crane  
9 foraging habitat when compared to Alternative 1A. The smaller temporary habitat conversions  
10 associated with Alternative 7 would have comparable benefits to these species.

11 The differences in effect that Alternatives 1A and 7 could have on special-status plant species are  
12 extremely minor. Habitat modeling indicates that Alternative 7 would create 5 fewer acres of habitat  
13 loss for Mason's lilaepsis and delta mudwort when compared with Alternative 1A.

14 The near-term conservation activities described in Appendix 12D, *Feasibility Assessment of*  
15 *Conservation Measures Offsetting Water Conveyance Facilities Construction Impacts on Terrestrial*  
16 *Biological Resources*, and the mitigation measures proposed in the Alternative 1A analysis would  
17 provide for protection, enhancement and restoration of habitats affected by the early water  
18 conveyance facility construction activities associated with Alternative 7. This conservation activity,  
19 which is part of the early implementation of the BDCP, would offset water conveyance facilities  
20 construction effects on both covered and noncovered special-status species in the study area.

## 21 **Effects of Restoration-Related Actions of Alternative 7**

22 The natural communities and managed land conversions associated with the restoration-related  
23 conservation measures of Alternative 7 present the greatest potential to affect both covered and  
24 noncovered plants and wildlife in the study area (CM2, CM4, and CM5—Table 12-7-2; CM7, CM8,  
25 CM10, and CM18—Table 12-7-3). Most of Alternative 7's other conservation measures (CM2, CM4,  
26 CM7, CM8, CM10, and CM18) are identical to the other alternatives described above. However, the  
27 seasonally inundated floodplain restoration (CM5) and channel margin enhancement (CM6) for  
28 Alternative 7 would be expanded compared with the other alternatives. The seasonally inundated  
29 floodplain restoration would be expanded by 10,000 acres and the channel margin habitat  
30 enhancement would be extended for another 20 linear miles. Both of these activities would extend  
31 valley/foothill riparian habitat adjacent to some of the Delta's major waterways, including the  
32 Sacramento, San Joaquin and Mokelumne Rivers, and Sutter and Steamboat Sloughs. The floodplain  
33 expansion would also allow for the introduction of wildlife-compatible cultivated land in the newly  
34 created floodplains.

35 The expansion of floodplain habitat would be accomplished through the course of the BDCP  
36 restoration program. During that period, setback of levees and other activities associated with the  
37 conservation components would permanently remove acreages from some natural communities.  
38 The permanent and temporary conversions for Alternative 7 are shown in Table 12-7-2 and Table  
39 12-7-3. Table 3-4 in Chapter 3, *Description of Alternatives*, describes the schedule for  
40 implementation of natural community restoration and protection conservation measures. The  
41 principal permanent losses would be in nontidal perennial aquatic, managed wetland, grassland and  
42 cultivated lands natural communities. These losses would affect plant and wildlife species associated  
43 with the habitats. Grassland and cultivated lands losses along the Delta waterways mentioned above  
44 would reduce foraging habitat for some special-status raptors (short-eared owl, Swainson's hawk,

1 white-tailed kite, northern harrier, merlin, western burrowing owl), greater sandhill crane and  
 2 tricolored blackbird; upland habitat for giant garter snake and riparian brush rabbit; and dispersal  
 3 and upland nesting habitat for western pond turtle. The permanent loss of nontidal perennial  
 4 aquatic habitat would affect aquatic habitat for giant garter snake and western pond turtle. The  
 5 temporary removal of existing riparian habitat to move levees and prepare stream channels for  
 6 replanting of riparian species would have a short-term effect on multiple species, including riparian  
 7 woodrat, riparian brush rabbit, nesting raptors, valley elderberry longhorn beetle, yellow-breasted  
 8 chat, western yellow-billed cuckoo, and western pond turtle.

9 **Table 12-7-2. Alternative 7 Late Long-Term Effects of Restoration Activities (CM2, CM4, CM5) that**  
 10 **Affect Most Natural Communities (acres)**

Natural Community	Conservation Measure					
	CM2 <sup>b</sup>		CM4 <sup>c</sup>		CM5 <sup>d</sup>	
	Permanent <sup>e</sup>	Temporary <sup>f</sup>	Permanent <sup>e</sup>	Temporary <sup>f</sup>	Permanent <sup>e</sup>	Temporary <sup>f</sup>
Tidal perennial aquatic <sup>a</sup>	8	11	18	0	4	10
Tidal brackish emergent wetland	0	0	1	0	0	0
Tidal freshwater emergent wetland	6	0	1	0	2	2
Valley/foothill riparian	89	88	552	0	86	70
Nontidal perennial aquatic	24	12	189	0	56	32
Nontidal freshwater perennial emergent wetland	25	1	99	0	0	0
Alkali seasonal wetland complex	45	0	27	0	0	0
Vernal pool complex	0	0	372	0	0	0
Managed wetland	24	44	13,746	0	0	0
Other natural seasonal wetland	0	0	0	0	0	0
Grassland	388	239	1,122	0	102	68
Inland dune scrub	0	0	0	0	0	0
Cultivated lands	629	363	39,565	0	4,174	2,388

<sup>a</sup> Tidal mudflat has been included in the tidal perennial aquatic natural community.

<sup>b</sup> Yolo Bypass Fisheries Enhancement.

<sup>c</sup> Tidal Natural Communities Restoration.

<sup>d</sup> Seasonally Inundated Floodplain Restoration; the acreages included for CM5 in this table were estimated by doubling the acreages calculated for CM5 for other alternatives. The CM5 acres for other alternatives were estimated based on a hypothetical footprint for the restoration action, but no similar footprint was developed for Alternative 7.

<sup>e</sup> Features in this category include the following: construction of fish passage structures and infrastructure in the Yolo Bypass, construction of permanent structures and infrastructure associated with restoration, and loss of habitat associated with removal and replacement by other habitats.

<sup>f</sup> Features in this category include the following: temporary work areas associated with construction of permanent restoration features, and temporary grading/vegetation removal associated with restoration activities.

1 **Table 12-7-3. Alternative 7 Late Long-Term Effects of Restoration Activities (CM7, CM8, CM10, CM18)**  
2 **that Affect Only Grassland and Cultivated Lands (acres)**

Natural Community	Conservation Measure							
	CM7 <sup>a</sup>		CM8 <sup>b</sup>		CM10 <sup>c</sup>		CM18 <sup>d</sup>	
	Perm <sup>e</sup>	Temp <sup>f</sup>	Perm <sup>e</sup>	Temp <sup>f</sup>	Perm <sup>e</sup>	Temp <sup>f</sup>	Perm <sup>e</sup>	Temp <sup>f</sup>
Grassland	410	0	0	0	0	0	35	0
Cultivated lands	4,553	0	2,000	0	1,950	0	0	0

<sup>a</sup> Riparian Natural Community Restoration.

<sup>b</sup> Grassland Natural Community Restoration.

<sup>c</sup> Nontidal Marsh Restoration.

<sup>d</sup> Conservation Hatcheries.

<sup>e</sup> Features in this category include the following: construction of permanent structures and infrastructure associated with restoration, recreation facilities and hatcheries; and loss of habitat associated with removal and replacement by other habitats.

<sup>f</sup> Features in this category include the following: temporary work areas associated with construction of permanent restoration features, recreation facilities and hatcheries; and temporary grading/vegetation removal associated with restoration activities.

Perm = Permanent.

Temp = Temporary.

3

4 A number of special-status plant species would have modeled habitat affected by the extension of  
5 seasonally inundated floodplain for Alternative 7. There would be permanent and temporary effects  
6 on this habitat. The habitat lost permanently includes 10 acres for slough thistle, 13 acres for delta  
7 button celery, 2 acres each for San Joaquin spearscale and side-flowering skullcap and 1 acre each  
8 for Mason's lilaepsis and delta mudwort. Slightly larger acreages of habitat for these same species  
9 would be affected temporarily.

10 For a broader view of the overall effects of Alternative 7 beyond its unique effects associated with  
11 CM5 and CM6, the reader is referred to the Alternative 1A impact analysis earlier in this chapter.  
12 The principal effects of concern associated with both Alternative 1A and 7 are related to the  
13 conversion of large acreages of cultivated lands and managed wetland to tidal marsh and other  
14 habitat types. These effects accrue to special-status species and common wildlife species that rely on  
15 cultivated lands and managed wetlands during some life stage. Foraging raptors and some  
16 waterbirds are regular inhabitants of the Delta's cultivated lands. The Delta's managed wetlands  
17 provide freshwater nesting, feeding and resting habitat for a large number of Pacific flyway  
18 waterfowl and shorebirds, as well as nesting passerines, such as tricolored blackbird. Special-status  
19 plant species that occupy the tidal fringe in Suisun Marsh and parts of the Delta would be subject to  
20 losses associated with physical construction activities (levee breaching and reconstruction) and  
21 changes in water depth and salinity in their current habitat as a result of tidal marsh restoration.

22 Some of the permanent habitat loss associated with these alternatives would take place during the  
23 early, construction-related stage of the BDCP. Other losses would occur over time as some habitats  
24 (cultivated lands, managed wetland, valley/foothill riparian and grassland) are converted to tidal  
25 marsh (tidal perennial aquatic, tidal brackish emergent wetland, tidal freshwater emergent wetland)  
26 and other natural communities. The BDCP conservation components are designed to eventually  
27 replace and expand habitats that would have a positive influence on plant and animal species

1 covered in the Plan. These conservation components would also have a positive effect on  
2 noncovered and common species that occupy the study area.

3 **NEPA Effects:** Alternative 7 would not have adverse effects on the terrestrial natural communities,  
4 special-status species and common species that occupy the study area. The alternative also would  
5 not disrupt wildlife movement corridors, significantly increase the risk of introducing invasive  
6 species, result in a net loss of wetlands and other waters of the United States, reduce the value of  
7 habitat for waterfowl and shorebirds, or conflict with plans and policies that affect the study area. As  
8 with Alternative 1A, there would be large acreages of existing habitat converted by the Plan's  
9 conservation actions, including the construction of water conveyance tunnels from the north Delta  
10 to Clifton Court Forebay in the south Delta. The temporarily affected habitat would be restored to its  
11 pre-project condition and the restoration conservation measures (CM2–CM10) would permanently  
12 replace primarily cultivated land and managed wetland with tidal and nontidal marsh, riparian  
13 vegetation, and grassland. The increases in acreage and value of the sensitive natural communities  
14 in the study area would have beneficial effects on covered and noncovered species. Where  
15 conservation actions would not fully offset effects, the Plan has developed AMMs and this document  
16 has included additional mitigation measures to avoid adverse effects. Alternative 7 would not  
17 require mitigation measures beyond what is proposed for Alternative 1A to offset effects.

18 **CEQA Conclusion:** Alternative 7 would not have significant and unavoidable impacts on the  
19 terrestrial natural communities, special-status species and common species that occupy the study  
20 area. The alternative also would not disrupt wildlife movement corridors, significantly increase the  
21 risk of introducing invasive species, result in a net loss of wetlands and other waters of the United  
22 States, reduce the value of habitat for waterfowl and shorebirds, or conflict with plans and policies  
23 that affect the study area. As with Alternative 1A, there would be large acreages of existing habitat  
24 converted by the Plan's conservation actions, including the construction of water conveyance  
25 tunnels from the north Delta to Clifton Court Forebay in the south Delta. The temporarily affected  
26 habitat would be restored to its pre-project condition and the restoration conservation measures  
27 (CM2–CM10) would permanently replace primarily cultivated land and managed wetland with tidal  
28 and nontidal marsh, riparian vegetation, and grassland. The increases in acreage and value of the  
29 sensitive natural communities in the study area would have beneficial effects on covered,  
30 noncovered, and common species. Where conservation actions would not fully offset impacts, the  
31 Plan has developed AMMs and this document has included additional mitigation measures to avoid  
32 significant impacts. Alternative 7 would not require mitigation measures beyond what is proposed  
33 for Alternative 1A to offset effects.

34 As with Alternative 1A, Alternative 7 would require several mitigation measures to be adopted to  
35 reduce all effects on terrestrial biological resources to less-than-significant levels. These mitigation  
36 measures would be needed beyond the impact offsets provided by Alternative 7 AMMs and CM2–  
37 CM22 conservation actions. The relevant mitigation measures, which are included in detail in the  
38 analysis of Alternative 1A, are as follows:

- 39 ● Mitigation Measure BIO-42: Avoid Impacts on Delta Green Ground Beetle and its Habitat
- 40 ● Mitigation Measure BIO-43: Avoid and Minimize Loss of Callippe Silverspot Butterfly Habitat
- 41 ● Mitigation Measure BIO-55: Conduct Preconstruction Surveys for Noncovered Special-Status  
42 Reptiles and Implement Applicable CM22 Measures
- 43 ● Mitigation Measure BIO-66: California Least Tern Nesting Colonies Shall Be Avoided and Indirect  
44 Effects on Colonies Will Be Minimized

- 1 • Mitigation Measure BIO-69a: Compensate for the Loss of Medium to Very High-Value Greater  
2 Sandhill Crane Foraging Habitat
- 3 • Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid  
4 Disturbance of Nesting Birds
- 5 • Mitigation Measure BIO-91: Compensate for Near-Term Loss of High-Value Western Burrowing  
6 Owl Habitat
- 7 • Mitigation Measure BIO-113: Compensate for the Near-Term Loss of Golden Eagle and  
8 Ferruginous Hawk Foraging Habitat
- 9 • Mitigation Measure BIO-117: Avoid Impacts on Rookeries
- 10 • Mitigation Measure BIO-125: Compensate for the Near-Term Loss of Mountain Plover Wintering  
11 Habitat
- 12 • Mitigation Measure BIO-129a: Compensate for Loss of Black Tern Nesting Habitat
- 13 • Mitigation Measure BIO-130: Compensate for the Near-Term Loss of California Horned Lark and  
14 Grasshopper Sparrow Habitat
- 15 • Mitigation Measure BIO-138: Compensate for the Near-Term Loss of High-Value Loggerhead  
16 Shrike Habitat
- 17 • Mitigation Measure BIO-146: Active Bank Swallow Colonies Shall Be Avoided and Indirect  
18 Effects on Bank Swallow Will Be Minimized
- 19 • Mitigation Measure BIO-147: Monitor Bank Swallow Colonies and Evaluate Winter and Spring  
20 Flows Upstream of the Study Area
- 21 • Mitigation Measure BIO-162: Conduct Preconstruction Survey for American Badger
- 22 • Mitigation Measure BIO-166: Conduct Preconstruction Surveys for Roosting Bats and Implement  
23 Protective Measures
- 24 • Mitigation Measure BIO-170: Avoid, Minimize, or Compensate for Impacts on Noncovered  
25 Special-Status Plant Species
- 26 • Mitigation Measure BIO-179a: Conduct Food Studies and Monitoring for Wintering Waterfowl in  
27 Suisun Marsh
- 28 • Mitigation Measure BIO-179b: Conduct Food Studies and Monitoring to Demonstrate Food  
29 Quality of Palustrine Tidal Wetlands in the Yolo and Delta Basins
- 30 • Mitigation Measure BIO-180: Conduct Food and Monitoring Studies of Breeding Waterfowl in  
31 Suisun Marsh

32 **12.3.3.15 Alternative 8—Dual Conveyance with Pipeline/Tunnel, Intakes 2,**  
33 **3, and 5 and Increased Delta Outflow (9,000 cfs; Operational**  
34 **Scenario F)**

35 Alternative 8, which is described fully in Section 3.5.15 of Chapter 3, *Description of Alternatives*, and  
36 depicted in Figure 3-2, would affect terrestrial biological resources in a nearly identical fashion to  
37 Alternative 1A. For this reason, Alternative 8 is considered here in a summary fashion; the reader is  
38 referred to Alternative 1A for a detailed description of impacts that would be associated with

1 implementing Alternative 8. The impacts associated with Alternatives 1A and 8 were derived by  
2 comparing the alternatives to the No Action Alternative for NEPA purposes, and to Existing  
3 Conditions for CEQA purposes.

4 The principal differences between these two alternatives would be related to the differing  
5 construction footprints of the water conveyance facilities (CM1). The Alternative 8 water  
6 conveyance facilities would entail construction at north Delta Intakes 2, 3, and 5 rather than Intakes  
7 1–5. The locations of these intakes are depicted in Figure 3-2. Eliminating Intakes 1 and 4 would  
8 reduce the construction footprint along the eastern bank of the Sacramento River just north of  
9 Clarksburg and immediately south of Hood. The operational scenario for Alternative 8 (Scenario F)  
10 is also different from Alternative 1A (Scenario A), but this change would not significantly alter  
11 terrestrial biological resources effects. Alternative 8 operations would extract water from the river  
12 at the three intakes and would require additional pumping at the south Delta pumps. Also,  
13 Operational Scenario F would involve greater Delta freshwater outflows during September and  
14 October of some water years when compared with Operational Scenario A. All of the conservation  
15 measures other than CM1 would be the same as Alternative 1A.

### 16 **Comparative Differences in CM1 Construction Effects for Alternatives 8 and 1A**

17 Because of the elimination of Intakes 1 and 4 and their associated pumps and pipelines, Alternative  
18 8 would create relatively small differences in the permanent and temporary loss of natural  
19 communities and cultivated land during water conveyance facilities construction when compared  
20 with Alternative 1A (Table 12-8-1). All of these differences would take place during the near-term  
21 timeframe associated with water conveyance facilities construction. Alternative 8 would  
22 permanently remove 7 fewer acres of tidal perennial aquatic habitat, 10 fewer acres of  
23 valley/foothill riparian habitat, and 5 fewer acres of grassland along the east bank of the Sacramento  
24 River. Alternative 8 would also remove 95 fewer acres of cultivated land east of the Sacramento  
25 River. Alternative 8 would also permanently affect a smaller acreage of potential jurisdictional  
26 waters (including wetlands) as regulated by Section 404 of the CWA, when compared to Alternative  
27 1A (7 acres fewer). Refer to Table 12-1A-69 for a summary of Alternative 1A permanent and  
28 temporary jurisdictional waters and wetlands impacts.

29 During the water conveyance facilities construction process, Alternative 8 would involve less  
30 temporary loss of habitat when compared with Alternative 1A. There would be reduced losses of  
31 tidal perennial aquatic (25 acres less), tidal freshwater emergent wetland (1 acre less),  
32 valley/foothill riparian (3 acres less), grassland (7 acres less) and cultivated land (214 acres less)  
33 when compared with Alternative 1A (Table 12-8-1). Alternative 8 would also temporarily affect a  
34 smaller acreage of potential jurisdictional waters (including wetlands) as regulated by Section 404  
35 of the CWA, when compared to Alternative 1A (29 acres fewer). Refer to Table 12-1A-69 for a  
36 summary of Alternative 1A permanent and temporary jurisdictional waters and wetlands impacts.

1 **Table 12-8-1. Alternative 8 Near-Term Effects of Water Conveyance Facilities (CM1) on Natural**  
2 **Communities (acres)**

Natural Community	Total Existing Habitat in Study Area	Conveyance Option		Conveyance Option	
		Alternative 8 Removed Habitat (Permanent) <sup>b</sup>	Difference from Alternative 1A	Alternative 8 Removed Habitat (Temporary) <sup>c</sup>	Difference from Alternative 1A
Tidal perennial aquatic <sup>a</sup>	86,263	41	-7	108	-25
Tidal brackish emergent wetland	8,501	0	0	0	0
Tidal freshwater emergent wetland	8,856	6	0	5	-1
Valley/foothill riparian	17,966	48	-10	25	-3
Nontidal perennial aquatic	5,567	12	0	9	0
Nontidal freshwater perennial emergent wetland	1,509	1	0	1	0
Alkali seasonal wetland complex	3,723	0	0	0	0
Vernal pool complex	12,133	3	0	0	0
Managed wetland	70,798	3	0	83	0
Other natural seasonal wetland	842	0	0	0	0
Grassland	78,047	305	-5	255	-7
Inland dune scrub	19	0	0	0	0
Cultivated land	487,106	3,741	-95	1,977	-214

<sup>a</sup> Tidal mudflat has been included in the tidal perennial aquatic natural community.

<sup>b</sup> Features in this category include the following conveyance-related facilities: Forebay, Afterbay, Intake Facilities, Pump Stations, Permanent Access Roads, Shaft Locations, and Reusable Tunnel Material Storage Areas.

<sup>c</sup> Features in this category include the following conveyance features: Barge Unloading Facility, Control Structure Work Area, Intake Road Work Area, Intake Work Area, Pipeline, Pipeline Work Area, Road Work Area, Safe Haven Work Area, Temporary Access Road Work Area, Tunnel Work Area, and Borrow/Spoil Areas.

3  
4 These differences in loss of habitat from constructing the water conveyance facilities would create  
5 differences in effects on covered and noncovered wildlife. The reduced level of valley/foothill  
6 riparian habitat loss would be a positive influence on valley elderberry longhorn beetle, breeding  
7 habitat for raptors, herons and egrets (great egret, snowy egret, great blue heron, Swainson's hawk,  
8 Cooper's hawk, white-tailed kite and black-crowned night heron), and migratory habitat for species  
9 that use the river corridor, such as western yellow-billed cuckoo. Species that would benefit from  
10 smaller permanent losses of grassland and cultivated land would include foraging raptors  
11 (Swainson's hawk, short-eared owl, northern harrier, merlin and white-tailed kite), greater sandhill  
12 crane, mountain plover, California horned lark, tricolored blackbird and several species of bats.  
13 Alternative 8 would permanently remove 85 fewer acres of greater sandhill crane foraging habitat

1 when compared to Alternative 1A The smaller temporary habitat conversions associated with  
2 Alternative 8 would have comparable benefits to these species.

3 The differences in effect that Alternatives 1A and 8 could have on special-status plant species are  
4 extremely minor. Habitat modeling indicates that Alternative 8 would cause 3 fewer acres of  
5 permanent and 2 fewer acres of temporary habitat loss for Mason's lilaepsis and delta mudwort  
6 when compared with Alternative 1A.

7 The near-term conservation activities described in Appendix 12D, *Feasibility Assessment of*  
8 *Conservation Measures Offsetting Water Conveyance Facilities Construction Impacts on Terrestrial*  
9 *Biological Resources*, would provide for conservation, enhancement and replacement of habitats  
10 affected by the early water conveyance facility construction activities. This conservation activity,  
11 which is part of the early implementation of the BDCP, and the mitigation measures included in the  
12 Alternative 1A analysis would offset water conveyance facilities construction effects of Alternative 8  
13 on both covered and noncovered special-status species in the study area.

#### 14 **Effects of Restoration-Related Actions of Alternative 8**

15 Natural community changes associated with the other major restoration activities in Alternative 8  
16 (CM2, CM4, and CM5— Table 12-8-2; CM7, CM8, CM10, and CM18—Table 12-8-3) would be  
17 identical to those described for Alternative 1A. Table 3-4 in Chapter 3, *Description of Alternatives*,  
18 describes the schedule for implementation of natural community restoration and protection  
19 conservation measures.

1 **Table 12-8-2. Alternative 8 Late Long-Term Effects of Restoration Activities (CM2, CM4, CM5) that**  
2 **Affect Most Natural Communities (acres)**

Natural Community	Conservation Measure					
	CM2 <sup>b</sup>		CM4 <sup>c</sup>		CM5 <sup>d</sup>	
	Permanent <sup>e</sup>	Temporary <sup>f</sup>	Permanent <sup>e</sup>	Temporary <sup>f</sup>	Permanent <sup>e</sup>	Temporary <sup>f</sup>
Tidal perennial aquatic <sup>a</sup>	8	11	18	0	2	5
Tidal brackish emergent wetland	0	0	1	0	0	0
Tidal freshwater emergent wetland	6	0	1	0	1	1
Valley/foothill riparian	89	88	552	0	43	35
Nontidal perennial aquatic	24	12	189	0	28	16
Nontidal freshwater perennial emergent wetland	25	1	99	0	0	0
Alkali seasonal wetland complex	45	0	27	0	0	0
Vernal pool complex	0	0	372	0	0	0
Managed wetland	24	44	13,746	0	0	0
Other natural seasonal wetland	0	0	0	0	0	0
Grassland	388	239	1,122	0	51	34
Inland dune scrub	0	0	0	0	0	0
Cultivated lands	540	1	34,653	0	2,087	1,194

<sup>a</sup> Tidal mudflat has been included in the tidal perennial aquatic natural community.

<sup>b</sup> Yolo Bypass Fisheries Enhancement.

<sup>c</sup> Tidal Natural Communities Restoration.

<sup>d</sup> Seasonally Inundated Floodplain Restoration.

<sup>e</sup> Features in this category include the following: construction of fish passage structures and infrastructure in the Yolo Bypass, construction of permanent structures and infrastructure associated with restoration, and loss of habitat associated with removal and replacement by other habitats.

<sup>f</sup> Features in this category include the following: temporary work areas associated with construction of permanent restoration features, and temporary grading/vegetation removal associated with restoration activities.

3

1 **Table 12-8-3. Alternative 8 Late Long-Term Effects of Restoration Activities (CM7, CM8, CM10, CM18)**  
2 **that Affect Only Grassland and Cultivated Lands (acres)**

Natural Community	Conservation Measure							
	CM7 <sup>a</sup>		CM8 <sup>b</sup>		CM10 <sup>c</sup>		CM18 <sup>d</sup>	
	Perm <sup>e</sup>	Temp <sup>f</sup>	Perm <sup>e</sup>	Temp <sup>f</sup>	Perm <sup>e</sup>	Temp <sup>f</sup>	Perm <sup>e</sup>	Temp <sup>f</sup>
Grassland	410	0	0	0	0	0	35	0
Cultivated lands	4,553	0	2,000	0	1,950	0	0	0

<sup>a</sup> Riparian Natural Community Restoration.

<sup>b</sup> Grassland Natural Community Restoration.

<sup>c</sup> Nontidal Marsh Restoration.

<sup>d</sup> Conservation Hatcheries.

<sup>e</sup> Features in this category include the following: construction of permanent structures and infrastructure associated with restoration, recreation facilities and hatcheries; and loss of habitat associated with removal and replacement by other habitats.

<sup>f</sup> Features in this category include the following: temporary work areas associated with construction of permanent restoration features, recreation facilities and hatcheries; and temporary grading/vegetation removal associated with restoration activities.

Perm = Permanent.

Temp = Temporary.

3

4 The reader is referred to the Alternative 1A impact analysis earlier in this chapter for the broader  
5 discussion of overall terrestrial biological resources effects that would result from implementation  
6 of Alternative 8 restoration-related conservation actions. The principal effects of concern associated  
7 with both Alternative 1A and 8 are related to the conversion of large acreages of cultivated lands,  
8 managed wetland, grassland and valley/foothill riparian habitat to tidal marsh and other habitat  
9 types during restoration activities. These effects accrue to special-status species and common  
10 wildlife species, especially to those that rely on cultivated lands and managed wetland during some  
11 life stage. Foraging raptors and some waterbirds are regular inhabitants of the Delta's cultivated  
12 lands. The Delta's managed wetlands provide freshwater nesting, feeding and resting habitat for a  
13 large number of Pacific flyway waterfowl and shorebirds, as well as nesting passerines, such as  
14 tricolored blackbird. Special-status plant species that occupy the tidal fringe in Suisun Marsh and  
15 parts of the Delta would be subject to losses associated with physical construction activity (levee  
16 breaching and reconstruction) and changes in water depth and salinity in their current habitat as a  
17 result of tidal marsh restoration.

18 Some of the permanent habitat loss associated with the restoration components of Alternative 8  
19 would occur during the early, construction-related stage of the BDCP. Other losses would occur over  
20 time as some habitats (cultivated lands, managed wetland, valley/foothill riparian and grassland)  
21 are converted to tidal marsh (tidal perennial aquatic, tidal brackish emergent wetland, tidal  
22 freshwater emergent wetland) and other natural communities. The BDCP conservation components,  
23 including the restoration components (CM2–CM10), are designed to eventually replace and expand  
24 habitats that would have a positive influence on plant and animal species covered in the Plan,  
25 including those that rely on managed wetland and cultivated land. These conservation components  
26 would also have a positive effect on noncovered and common species that occupy the study area.

27 **NEPA Effects:** Alternative 8 would not have adverse effects on the terrestrial natural communities,  
28 special-status species and common species that occupy the study area. The alternative also would

1 not disrupt wildlife movement corridors, significantly increase the risk of introducing invasive  
2 species, result in a net loss of wetlands and other waters of the United States, reduce the value of  
3 habitat for waterfowl and shorebirds, or conflict with plans and policies that affect the study area. As  
4 with Alternative 1A, there would be large acreages of existing habitat converted by the Plan's  
5 conservation actions, including the construction of water conveyance tunnels from the north Delta  
6 to Clifton Court Forebay in the south Delta. The temporarily affected habitat would be restored to its  
7 pre-project condition and the restoration conservation measures (CM2–CM10) would permanently  
8 replace primarily cultivated land and managed wetland with tidal and nontidal marsh, riparian  
9 vegetation, and grassland. The increases in acreage and value of the sensitive natural communities  
10 in the study area would have beneficial effects on covered and noncovered species. Where  
11 conservation actions would not fully offset effects, the Plan has developed AMMs and this document  
12 has included additional mitigation measures to avoid adverse effects. Alternative 8 would not  
13 require mitigation measures beyond what is proposed for Alternative 1A to offset effects.

14 **CEQA Conclusion:** Alternative 8 would not have significant and unavoidable impacts on the  
15 terrestrial natural communities, special-status species and common species that occupy the study  
16 area. The alternative also would not disrupt wildlife movement corridors, significantly increase the  
17 risk of introducing invasive species, result in a net loss of wetlands and other waters of the US,  
18 reduce the value of habitat for waterfowl and shorebirds, or conflict with plans and policies that  
19 affect the study area. As with Alternative 1A, there would be large acreages of existing habitat  
20 converted by the Plan's conservation actions, including the construction of water conveyance  
21 tunnels from the north Delta to Clifton Court Forebay in the south Delta. The temporarily affected  
22 habitat would be restored to its pre-project condition and the restoration conservation measures  
23 (CM2–CM10) would permanently replace primarily cultivated land and managed wetland with tidal  
24 and nontidal marsh, riparian vegetation, and grassland. The increases in acreage and value of the  
25 sensitive natural communities in the study area would have beneficial effects on covered,  
26 noncovered, and common species. Where conservation actions would not fully offset impacts, the  
27 Plan has developed AMMs and this document has included additional mitigation measures to avoid  
28 significant impacts. Alternative 8 would not require mitigation measures beyond what is proposed  
29 for Alternative 1A to offset effects.

30 As with Alternative 1A, Alternative 8 would require several mitigation measures to be adopted to  
31 reduce all effects on terrestrial biological resources to less-than-significant levels. These mitigation  
32 measures would be needed beyond the impact offsets provided by Alternative 8 AMMs and CM2–  
33 CM22 conservation actions. The relevant mitigation measures, which are included in detail in the  
34 analysis of Alternative 1A, are as follows:

- 35 ● Mitigation Measure BIO-42: Avoid Impacts on Delta Green Ground Beetle and its Habitat
- 36 ● Mitigation Measure BIO-43: Avoid and Minimize Loss of Callippe Silverspot Butterfly Habitat
- 37 ● Mitigation Measure BIO-55: Conduct Preconstruction Surveys for Noncovered Special-Status  
38 Reptiles and Implement Applicable CM22 Measures
- 39 ● Mitigation Measure BIO-66: California Least Tern Nesting Colonies Shall Be Avoided and Indirect  
40 Effects on Colonies Will Be Minimized
- 41 ● Mitigation Measure BIO-69a: Compensate for the Loss of Medium to Very High-Value Greater  
42 Sandhill Crane Foraging Habitat
- 43 ● Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid  
44 Disturbance of Nesting Birds

- 1 • Mitigation Measure BIO-91: Compensate for Near-Term Loss of High-Value Western Burrowing  
2 Owl Habitat
- 3 • Mitigation Measure BIO-113: Compensate for the Near-Term Loss of Golden Eagle and  
4 Ferruginous Hawk Foraging Habitat
- 5 • Mitigation Measure BIO-117: Avoid Impacts on Rookeries
- 6 • Mitigation Measure BIO-125: Compensate for the Near-Term Loss of Mountain Plover Wintering  
7 Habitat
- 8 • Mitigation Measure BIO-129a: Compensate for Loss of Black Tern Nesting Habitat
- 9 • Mitigation Measure BIO-130: Compensate for the Near-Term Loss of California Horned Lark and  
10 Grasshopper Sparrow Habitat
- 11 • Mitigation Measure BIO-138: Compensate for the Near-Term Loss of High-Value Loggerhead  
12 Shrike Habitat
- 13 • Mitigation Measure BIO-146: Active Bank Swallow Colonies Shall Be Avoided and Indirect  
14 Effects on Bank Swallow Will Be Minimized
- 15 • Mitigation Measure BIO-147: Monitor Bank Swallow Colonies and Evaluate Winter and Spring  
16 Flows Upstream of the Study Area
- 17 • Mitigation Measure BIO-162: Conduct Preconstruction Survey for American Badger
- 18 • Mitigation Measure BIO-166: Conduct Preconstruction Surveys for Roosting Bats and Implement  
19 Protective Measures
- 20 • Mitigation Measure BIO-170: Avoid, Minimize, or Compensate for Impacts on Noncovered  
21 Special-Status Plant Species
- 22 • Mitigation Measure BIO-179a: Conduct Food Studies and Monitoring for Wintering Waterfowl in  
23 Suisun Marsh
- 24 • Mitigation Measure BIO-179b: Conduct Food Studies and Monitoring to Demonstrate Food  
25 Quality of Palustrine Tidal Wetlands in the Yolo and Delta Basins
- 26 • Mitigation Measure BIO-180: Conduct Food and Monitoring Studies of Breeding Waterfowl in  
27 Suisun Marsh

1 **12.3.3.16 Alternative 9—Through Delta/Separate Corridors (15,000 cfs;**  
2 **Operational Scenario G)**

3 Section 3.5.16 of Chapter 3, *Description of Alternatives*, describes Alternative 9 in detail, and Figure  
4 3-16 depicts the alternative.

5 **Natural Communities**

6 **Tidal Perennial Aquatic**

7 Construction, operation, maintenance and management associated with the conservation  
8 components of Alternative 9 would have no long-term adverse effects on the habitats associated  
9 with the tidal perennial aquatic natural community. Initial development and construction of CM1,  
10 CM2, CM4, CM5, and CM6 would result in both permanent and temporary removal or modification of  
11 this community (see Table 12-9-1). Full implementation of Alternative 9 would also include the  
12 following conservation actions over the term of the BDCP to benefit the tidal perennial aquatic  
13 natural community (BDCP Chapter 3, Section 3.3, *Biological Goals and Objectives*).

- 14 • Restore and protect 65,000 acres of tidal natural communities and transitional uplands to  
15 accommodate sea level rise (Objective L1.3, associated with CM4).
- 16 • Within the restored and protected tidal natural communities and transitional uplands, restore  
17 or create tidal perennial aquatic natural community as necessary when creating tidal emergent  
18 wetland (Objective TPANC1.1, associated with CM4).
- 19 • Control invasive aquatic vegetation that adversely affects native fish habitat (Objective  
20 TPANC2.1, associated with CM13).

21 There is a variety of other, less specific conservation goals and objectives in the that would improve  
22 the value of tidal perennial aquatic natural community for terrestrial species. As explained below,  
23 with the restoration and enhancement of these amounts of habitat, in addition to AMMs, impacts on  
24 tidal aquatic natural community would not be adverse for NEPA purposes and would be less than  
25 significant for CEQA purposes.

26 Note that two time periods are represented in Table 12-9-1 and the other tables contained in the  
27 analysis of Alternative 9. The near-term (NT) acreage effects listed in the table would occur over the  
28 first 10 years of Plan implementation. The late long-term (LLT) effects contained in these tables  
29 represent the cumulative effects of all activities over the entire 50-year term of the Plan. This table  
30 and all impact tables in the chapter include reference to only those CMs that would eliminate natural  
31 community acreage either through construction or restoration activities, or would result in periodic  
32 inundation of the community. Table 3-4 in Chapter 3, *Description of Alternatives*, describes the  
33 schedule for implementation of natural community protection and restoration conservation  
34 measures.

1 **Table 12-9-1. Changes in Tidal Perennial Aquatic Natural Community Associated with Alternative 9**  
2 **(acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Permanent		Temporary		Periodic <sup>d</sup>	
	NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	675	675	345	345	0	0
CM2	8	8	11	11	9–36	0
CM4	11	18	0	0	0	0
CM5		2	0	5	0	39
CM6	Unk.	Unk.	Unk.	Unk.	0	0
<b>TOTAL IMPACTS</b>	<b>694</b>	<b>703</b>	<b>356</b>	<b>361</b>	<b>9–36</b>	<b>39</b>

<sup>a</sup> See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

Unk. = unknown

3

4 **Impact BIO-1: Changes in Tidal Perennial Aquatic Natural Community as a Result of**  
5 **Implementing BDCP Conservation Measures**

6 Construction, channel dredging and land grading activities that would accompany the  
7 implementation of CM1, CM2, CM4, CM5, and CM6 would permanently affect an estimated 703 acres  
8 and temporarily remove 361 acres of tidal perennial aquatic natural community in the study area.  
9 These modifications would affect approximately 1% of the 86,263 acres of the community that is  
10 mapped in the study area. The majority of the permanent and temporary effects would occur during  
11 the first 10 years of Alternative 9 implementation, as water conveyance facilities are constructed  
12 and habitat restoration is initiated. Natural communities restoration would add 8,300 acres of tidal  
13 wetlands, including an estimated 3,400 acres of tidal perennial aquatic natural community during  
14 the same period, which would expand the area of that habitat and offset the losses. The 3,400-acre  
15 increase is estimated, based on modeling reported in BDCP Appendix 3.B Table 5, by comparing  
16 existing Plan Area subtidal habitat to near-term subtidal habitat with the Plan. The BDCP beneficial  
17 effects analysis for Alternative 4 (BDCP Chapter 5, Section 5.4.1.2) indicates that, while there would  
18 be no minimum restoration requirement for the tidal perennial aquatic natural community, an  
19 estimated approximately 27,000 acres of tidal perennial aquatic natural community would be  
20 restored based on tidal restoration modeling. This estimate is based on Table 5 in BDCP Appendix  
21 3.B, subtracting late long-term without project acreage from late long-term with project acreage.  
22 The same conservation actions would be implemented for Alternative 9.

1 The individual effects of each relevant conservation measure are addressed below. A summary  
2 statement of the combined impacts and NEPA and CEQA conclusions follows the individual  
3 conservation measure discussions.

- 4 • *CM1 Water Facilities and Operation*: Construction of in-water features and dredging of existing  
5 Delta waterways as part of Alternative 9's water conveyance facilities would permanently  
6 remove 675 acres and temporarily remove 345 acres of tidal perennial aquatic community. The  
7 permanent effects would occur at channel dredging sites, operable barrier construction sites  
8 and channel widening sites throughout the study area. These construction and dredging  
9 activities would not permanently remove the waterways, but would permanently modify the  
10 channel bottoms and eliminate any associated aquatic vegetation. The affected areas and type of  
11 activity are listed below (refer to the Terrestrial Biology Mapbook for details of these locations).
  - 12 ○ Dredging for channel enlargement in Victoria Canal from Middle River to Old River.
  - 13 ○ Dredging for channel enlargement in Middle River from Victoria Canal to Mildred Island.
  - 14 ○ Canal construction in Old River south of Grant Line Canal.
  - 15 ○ Canal construction across Old River and West Canal at Coney Island.
  - 16 ○ Operable barrier construction in San Joaquin River just north of junction with Old River,  
17 near Lathrop.
  - 18 ○ Operable barrier construction in Middle River just south of Victoria Canal.
  - 19 ○ Operable barrier construction in Victoria Canal at its junction with Old River.
  - 20 ○ Operable barrier construction in North Victoria Canal/Woodward Canal just west of Middle  
21 River.
  - 22 ○ Operable barrier construction in Railroad Cut at the south end of Bacon Island.
  - 23 ○ Operable barrier construction in Connection Slough just west of Middle River.
  - 24 ○ Operable barrier construction at the west end of Three Mile Slough at its junction with the  
25 Sacramento River.
  - 26 ○ Operable barrier construction at the north end of Fishermans Cut at its junction with the San  
27 Joaquin River.
  - 28 ○ Operable barrier construction in Old River at its junction with the San Joaquin River north of  
29 Franks Tract.
  - 30 ○ Operable barrier construction at the north end of Georgianna Slough at the Sacramento  
31 River.
  - 32 ○ Operable barrier construction at the west end of Delta Cross Channel at the Sacramento  
33 River.
  - 34 ○ Operable barrier construction in Snodgrass Slough just north of its junction with Delta Cross  
35 Channel.
  - 36 ○ Channel enlargement and operable barrier construction in Mokelumne River at Lost Slough.
  - 37 ○ Channel enlargement and connection in the Meadows Slough at its junction with the  
38 Sacramento River.

- 1       ○ Channel enlargement and connection within the Meadows Slough east of the Sacramento  
2       River.
- 3       ○ Fish screen construction in the Sacramento River at Georgianna Slough and Delta Cross  
4       Channel.

5       The temporary effects to tidal perennial aquatic natural community would occur primarily along  
6       the channels of the Middle River and Victoria Canal, where temporary work areas would be  
7       needed to support channel dredging operations described above. Several smaller temporary  
8       impact areas would occur where barge operations areas would be developed at these sites.

- 9       ○ North Victoria Canal at Middle River.
- 10      ○ Railroad Cut at Middle River at south end of Bacon Island.
- 11      ○ Middle River at southeastern edge of Bacon Island.
- 12      ○ Middle River at Upper Jones Tract,
- 13      ○ Fishermans Cut at its junction with the San Joaquin River.
- 14      ○ Old River at the San Joaquin River north of Franks Tract.

15      All of these temporary and permanent effects on tidal perennial aquatic natural community from  
16      CM1 would occur during the near-term construction period.

- 17      ● *CM2 Yolo Bypass Fisheries Enhancement:* Implementation of CM2 would involve a number of  
18      construction activities within the Yolo and Sacramento Bypasses, including Fremont Weir and  
19      stilling basin improvements, Putah Creek realignment activities, Lisbon Weir modification and  
20      Sacramento Weir improvements. Some of these activities could involve excavation and grading  
21      in tidal perennial aquatic areas to improve passage of fish through the bypasses. Based on  
22      hypothetical construction footprints, a total of 8 acres could be permanently lost and another 11  
23      acres could be temporarily removed. This activity would occur primarily in the near-term  
24      timeframe.

25      *CM4 Tidal Natural Communities Restoration:* Based on the use of hypothetical restoration  
26      footprints, implementation of CM4 would affect 18 acres of tidal perennial aquatic community.  
27      CM4 involves conversion of existing natural communities to a variety of tidal wetlands,  
28      including tidal perennial aquatic, tidal brackish emergent, and tidal freshwater emergent  
29      wetlands. Specific locations for these conversions are not known. The 18 acres could remain  
30      tidal perennial aquatic with a modified tidal prism, or they could eventually be converted to one  
31      of the other tidal wetland types. For purposes of this analysis, a conservative approach has been  
32      taken and the effect has been discussed simultaneously with the habitat losses associated with  
33      other conservation measures. An estimated 65,000 acres of tidal wetlands and transitional  
34      uplands would be restored during tidal habitat restoration, consistent with BDCP Objective L1.3.  
35      Of these acres, an estimated 27,000 acres of tidal perennial aquatic habitat would be restored,  
36      based on modeling conducted by ESA PWA (refer to Table 5 in BDCP Appendix 3.B, *BDCP Tidal*  
37      *Habitat Evolution Assessment*). This restoration would be consistent with BDCP Objective  
38      TPANC1.1. Approximately 3,400 acres of the restoration would occur during the first 10 years of  
39      Alternative 9 implementation, which would coincide with the timeframe of water conveyance  
40      facilities construction. The remaining restoration would be spread over the following 30 years.  
41      Tidal natural communities restoration is expected to be focused in the ROAs identified in Figure

12-1. Some of the restoration would occur in the lower Yolo Bypass, but restoration would also be spread among the Suisun Marsh, South Delta, Cosumnes/Mokelumne and West Delta ROAs.

- *CM5 Seasonally Inundated Floodplain Restoration*: Floodplain restoration levee construction would permanently remove 2 acres and temporarily remove 5 acres of tidal perennial aquatic habitat. The construction-related losses would be considered a permanent removal of the tidal perennial aquatic habitats directly affected. This activity is scheduled to start following construction of water conveyance facilities, which is expected to take 10 years. Specific locations for the floodplain restoration have not been identified, but it is expected that much of the activity would occur in the south Delta along the major rivers. Floodplain restoration along the San Joaquin River would improve connectivity for a variety of species that rely on tidal perennial aquatic habitat. The regional and Plan Area landscape linkages along the San Joaquin River are included in Figure 12-2.
- *CM6 Channel Margin Enhancement*: Channel margin habitat enhancement could result in filling of small amounts of tidal perennial aquatic habitat along 20 miles of river and sloughs. The extent of this loss cannot be quantified at this time, but the majority of the enhancement activity would occur on tidal perennial aquatic habitat margins, including levees and channel banks. The improvements would occur within the study area on sections of the Sacramento, San Joaquin and Mokelumne Rivers, and along Steamboat and Sutter Sloughs.

The following paragraphs summarize the combined effects discussed above and describe other BDCP conservation actions that offset or avoid these effects. NEPA and CEQA impact conclusions are also included.

### ***Near-Term Timeframe***

During the near-term timeframe (the first 10 years of BDCP implementation), Alternative 9 would affect the tidal perennial aquatic community through CM1 construction losses (675 acres permanent and 345 acres temporary) and the CM2 construction losses (8 acres permanent and 11 acres temporary). These losses would occur at channel dredging sites along Middle River and Victoria Canal, at channel widening and operable barrier construction sites at multiple locations in the study area, and in the northern Yolo Bypass. Approximately 11 acres of the inundation and construction-related effects resulting from CM4 would occur during the near-term throughout the ROAs mapped in Figure 12-1.

The construction losses of this special-status natural community would represent an adverse effect if they were not offset by avoidance and minimization measures and restoration actions associated with BDCP conservation components. Loss of tidal perennial aquatic natural community would be considered both a loss in acreage of a sensitive natural community and a loss of waters of the United States as defined by Section 404 of the CWA. The creation of approximately 3,400 acres of high-value tidal perennial aquatic natural community as part of CM4 during the first 10 years of Alternative 9 implementation would offset this near-term loss, avoiding any adverse effect. Typical project-level mitigation ratios (1:1 for restoration) would indicate 1,050 acres of restoration would be needed to offset (i.e., mitigate) the 1,050 acres of effect (a combination of the permanent and temporary near-term effects listed in Table 12-9-1) associated with near-term activities, including water conveyance facilities construction.

The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2 Construction Best Management Practices and Monitoring*, *AMM6 Disposal and Reuse of Spoils*,

1 *Reusable Tunnel Material, and Dredged Material, AMM7 Barge Operations Plan, and AMM10*  
2 *Restoration of Temporarily Affected Natural Communities.* All of these AMMs include elements that  
3 avoid or minimize the risk of affecting habitats at work areas and storage sites. The AMMs are  
4 described in detail in BDCP Appendix 3.C.

5 ***Late Long-Term Timeframe***

6 Implementation of Alternative 9 as a whole would result in relatively minor (approximately 1%)  
7 conversions or losses of tidal perennial aquatic community in the study area. These losses or  
8 conversions (703 acres of permanent and 361 acres of temporary loss) would be largely associated  
9 with construction of the water conveyance facilities (CM1), construction of Yolo Bypass fish  
10 improvements (CM2), and inundation during tidal marsh restoration (CM4). Inundation conversions  
11 would occur during the course of BDCP restoration activities at various tidal restoration sites  
12 throughout the study area. By the end of the Plan timeframe, approximately 27,000 acres of high-  
13 value tidal perennial aquatic natural community would be restored (estimated from Table 5 in BDCP  
14 Appendix 3.B, *BDCP Tidal Habitat Evolution Assessment*).

15 ***NEPA Effects:*** The creation of approximately 3,400 acres of high-value tidal perennial aquatic  
16 natural community as part of CM4 during the first 10 years of Alternative 9 implementation would  
17 offset near-term losses associated with construction activities for CM1, CM2, CM4, and CM6,  
18 avoiding any adverse effect. Alternative 9, which includes restoration of an estimated 27,000 acres  
19 of this natural community over the course of the Plan, would not result in a net long-term reduction  
20 in the acreage of a sensitive natural community; the effect would be beneficial.

21 ***CEQA Conclusion:***

22 ***Near-Term Timeframe***

23 Alternative 9 would result in the near-term loss or conversion of approximately 1,050 acres of tidal  
24 perennial aquatic natural community due to construction of the water conveyance facilities (CM1)  
25 and fish passage improvements (CM2), and inundation during tidal marsh restoration (CM4). The  
26 losses would occur primarily along the Middle River and Victoria Canal as these channels are  
27 dredged to improve capacity, but would also occur at numerous channel widening, barge unloading  
28 and operable barrier construction sites throughout the Delta. Losses would also occur within the  
29 northern section of the Yolo Bypass. Inundation conversions would occur at various tidal restoration  
30 sites throughout the study area. The losses and conversions would be spread across a 10-year near-  
31 term timeframe. These losses and conversions would be offset by planned restoration of 3,400 acres  
32 of high-value tidal perennial aquatic natural community scheduled for the first 10 years of  
33 Alternative 9 implementation (CM4). AMM1, AMM2, AMM6, AMM7, and AMM10 would also be  
34 implemented to minimize impacts. Because of these offsetting near-term restoration activities and  
35 AMMs, impacts would be less than significant. Typical project-level mitigation ratios (1:1 for  
36 restoration) would indicate that 1,050 acres of restoration would be needed to offset (i.e., mitigate)  
37 the 1,050 acres of loss or conversion. The restoration would be initiated at the beginning of  
38 Alternative 9 implementation to minimize any time lag in the availability of this habitat to special-  
39 status species, and would result in a net gain in acreage of this sensitive natural community.

40 ***Late Long-Term Timeframe***

41 At the end of the Plan period, 1,064 acres of the tidal perennial aquatic natural community would be  
42 lost or converted and an estimated 27,000 acres of this community would be restored. There would

1 be no net permanent reduction in the acreage of this sensitive natural community within the study  
2 area. Therefore, Alternative 9 would not have a substantial adverse effect on this natural  
3 community; the impact would be beneficial.

#### 4 **Impact BIO-2: Increased Frequency, Magnitude and Duration of Periodic Inundation of Tidal** 5 **Perennial Aquatic Natural Community**

6 Two Alternative 9 conservation measures would modify the water depths and inundation/flooding  
7 regimes of both natural and man-made waterways in the study area. CM2, which is designed to  
8 improve fish passage and shallow flooded habitat for Delta fishes in the Yolo Bypass, would increase  
9 periodic inundation of tidal perennial aquatic natural community on small acreages, while CM5  
10 would expose this community to additional flooding as channel margins are modified and levees are  
11 set back to improve fish habitat along some of the major rivers and waterways throughout the study  
12 area.

- 13 • *CM2 Yolo Bypass Fisheries Enhancement*: Operation of the Yolo Bypass under Alternative 9 would  
14 result in an increase in the frequency, magnitude and duration of inundation and changes in  
15 water depth and velocity of 9–36 acres of tidal perennial aquatic natural community. The  
16 methods used to estimate these inundation acreages are described in BDCP Appendix 5.J, *Effects*  
17 *on Natural Communities, Wildlife, and Plants*. The area more frequently affected by inundation  
18 would vary with the flow volume that would pass through the newly constructed notch in the  
19 Fremont Weir. The 9-acre increase in inundation would be associated with a notch flow of 1,000  
20 cfs, and the 36-acre increase would result from a notch flow of 4,000 cfs. Plan-related increases  
21 in flow through Fremont Weir would be expected in 30% of the years. Most of the tidal  
22 perennial aquatic community occurs in the southern section of the bypass on Liberty Island, and,  
23 to a lesser extent, along the eastern edge of the bypass, including the Tule Canal/Toe Drain. The  
24 anticipated change in management of flows in the Yolo Bypass includes more frequent releases  
25 in flows into the bypass from the Fremont and Sacramento Weirs, and in some years, later  
26 releases into the bypass in spring months (April and May). The modification of periodic  
27 inundation events would be expected to be beneficial to the ecological function of tidal perennial  
28 aquatic habitat in the bypass as it relates to BDCP covered aquatic species. The Yolo Bypass  
29 waterway is the key element in the Yolo Bypass landscape linkage mapped in Figure 12-2 and  
30 described in detail in BDCP Chapter 3, Table 3.2-3. The change in periodic inundation in the  
31 bypass would not substantially modify its value for special-status or common terrestrial species.  
32 Water depths and water flow rates would increase over Existing Conditions and the No Action  
33 condition in approximately 30% of the years, but it would not fragment the habitat or make it  
34 less accessible to special-status or common terrestrial species. The modifications would not  
35 result in a loss of this community. The plant species associated with this community are adapted  
36 to inundation. The extended inundation would be designed to expand foraging and spawning  
37 habitat for Delta fishes. The effects of these changes in the inundation regime on terrestrial  
38 species that rely on tidal perennial aquatic habitats are discussed in detail later in this chapter,  
39 under the individual species assessments.
- 40 • *CM5 Seasonally Inundated Floodplain Restoration*: Floodplain restoration would result in a  
41 seasonal increase in the frequency and duration of flooding of 39 acres of tidal perennial aquatic  
42 habitat. Specific locations for this restoration activity have not been identified, but they would  
43 likely be focused in the south Delta area, along the major rivers and Delta channels. The more  
44 frequent exposure of these wetlands to stream flooding events would be beneficial to the  
45 ecological function of tidal perennial aquatic habitats, especially as they relate to BDCP target

1 aquatic species. The plant species associated with these tidal perennial aquatic areas are  
2 adapted to inundation and would not be substantially modified.

3 In summary, 48–75 acres of tidal perennial aquatic community in the study area would be subjected  
4 to more frequent increases in water depth and velocity from inundation as a result of implementing  
5 two Alternative 9 conservation measures (CM2 and CM5). Tidal perennial aquatic community is  
6 already, by definition, permanently inundated aquatic habitat of value to terrestrial and aquatic  
7 species in the study area; therefore, periodic changes in water depth and velocity would not result in  
8 a net permanent reduction in the acreage of this community in the study area.

9 **NEPA Effects:** Increasing periodic inundation of tidal perennial aquatic natural community would  
10 not have an adverse effect on the community.

11 **CEQA Conclusion:** An estimated 48–75 acres of tidal perennial aquatic community in the study area  
12 would be subjected to more frequent increases in water depth and velocity from inundation as a  
13 result of implementing CM2 and CM5 under Alternative 9. Tidal perennial aquatic community is  
14 already, by definition, permanently inundated aquatic habitat of value to terrestrial and aquatic  
15 species in the study area. The periodic inundation would not result in a net permanent reduction in  
16 the acreage of this community in the study area. Therefore, there would no substantial adverse  
17 effect on the community. The impact would be less than significant.

### 18 **Impact BIO-3: Modification of Tidal Perennial Aquatic Natural Community from Ongoing** 19 **Operation, Maintenance and Management Activities**

20 Once the physical facilities associated with Alternative 9 are constructed and the stream flow regime  
21 associated with changed water management is in effect, there would be new ongoing and periodic  
22 actions associated with operation, maintenance and management of the BDCP facilities and  
23 conservation lands that could affect tidal perennial aquatic natural community in the study area. The  
24 ongoing actions include the diversion of Sacramento River flows at two newly screened sites at  
25 Georgianna Slough and Delta Cross Channel in the north Delta, the operation of multiple operable  
26 barriers in Delta waterways, and modified diversions from south Delta channels. These actions are  
27 associated with CM1 (see the impact discussion above for effects associated with CM2). The periodic  
28 actions would involve access road and conveyance facility repair, vegetation management at the  
29 various water conveyance facilities and habitat restoration sites (CM13), levee repair and  
30 replacement of levee armoring, channel dredging, and habitat enhancement in accordance with  
31 natural community management plans. The potential effects of these actions are described below.

- 32 • *Modified river flows upstream of and within the study area and modified diversions from south*  
33 *Delta channels.* Changes in releases from reservoirs upstream of the study area, modified  
34 diversion of Sacramento River flows at Georgianna Slough and Delta Cross Channel, and  
35 modified diversions from south Delta channels (Operational Scenario G) would not result in the  
36 permanent reduction in acreage of a sensitive natural community in the study area. Flow levels  
37 in the upstream rivers would not change such that the acreage of tidal perennial aquatic  
38 community would be reduced on a permanent basis. Some minor increases and some decreases  
39 would be expected to occur during some seasons and in some water-year types, but there would  
40 be no permanent loss. Similarly, modified diversions of Sacramento River flows at Georgianna  
41 Slough and Delta Cross Channel would not result in a permanent reduction in tidal perennial  
42 aquatic community downstream of these diversions. Flow volumes in these two diversions and  
43 in the downstream channels that had been dredged (Middle River and Victoria Canal) would

1 increase under certain Sacramento River flow conditions and water year types. However, tidal  
2 influence in the Sacramento River and Delta waterways would continue to be dominant such  
3 that there would be no significant change in water levels that might affect in-stream and  
4 adjacent vegetation. Modified diversions from south Delta channels would not create a  
5 reduction in this natural community.

- 6 • *Access road, water conveyance facility and levee repair.* Periodic repair of access roads, water  
7 conveyance facilities and levees associated with the BDCP actions have the potential to require  
8 removal of adjacent vegetation and could entail earth and rock work in tidal perennial aquatic  
9 habitats. This activity could lead to increased soil erosion, turbidity and runoff entering tidal  
10 perennial aquatic habitats. These activities would be subject to normal erosion, turbidity and  
11 runoff control management practices, including those developed as part of *AMM2 Construction*  
12 *Best Management Practices and Monitoring* and *AMM4 Erosion and Sediment Control Plan*. Any  
13 vegetation removal or earth work adjacent to or within aquatic habitats would require use of  
14 sediment and turbidity barriers, soil stabilization and revegetation of disturbed surfaces. Proper  
15 implementation of these measures would avoid permanent adverse effects on this community.
- 16 • *Vegetation management.* Vegetation management, in the form of physical removal and chemical  
17 treatment, would be a periodic activity associated with the long-term maintenance of water  
18 conveyance facilities and restoration sites. Vegetation management is also the principal activity  
19 associated with *CM13 Invasive Aquatic Vegetation Control*, and is consistent with BDCP Objective  
20 TRANPC2.1. Use of herbicides to control nuisance vegetation could pose a long-term hazard to  
21 tidal perennial aquatic natural community at or adjacent to treated areas. The hazard could be  
22 created by uncontrolled drift of herbicides, uncontrolled runoff of contaminated stormwater  
23 onto the natural community, or direct discharge of herbicides to tidal perennial aquatic areas  
24 being treated for invasive species removal. Environmental commitments and *AMM5 Spill*  
25 *Prevention, Containment, and Countermeasure Plan* have been made part of the BDCP to reduce  
26 hazards to humans and the environment from use of various chemicals during maintenance  
27 activities, including the use of herbicides. These commitments are described in Appendix 3B,  
28 including the commitment to prepare and implement spill prevention, containment, and  
29 countermeasure plans and stormwater pollution prevention plans. Best management practices,  
30 including control of drift and runoff from treated areas, and use of herbicides approved for use  
31 in aquatic environments would also reduce the risk of affecting natural communities adjacent to  
32 water conveyance features and levees associated with restoration activities.

33 Herbicides to remove aquatic invasive species as part of CM13 would be used to restore the  
34 normal ecological function of tidal aquatic habitats in planned restoration areas. The treatment  
35 activities would be conducted in concert with the California Department of Boating and  
36 Waterways' invasive species removal program. Eliminating large stands of water hyacinth and  
37 Brazilian waterweed would improve habitat conditions for some aquatic species by removing  
38 cover for nonnative predators, improving water flow and removing barriers to movement (see  
39 Chapter 11, *Fish and Aquatic Resources*). These habitat changes should also benefit terrestrial  
40 species that use tidal perennial aquatic natural community for movement corridors and for  
41 foraging. Vegetation management effects on individual species are discussed in the species  
42 sections on following pages.

- 43 • *Channel dredging.* Long-term operation of the Alternative 9 diversions on the Sacramento River  
44 (Georgianna Slough and Delta Cross Channel) would include periodic dredging of sediments that  
45 might accumulate in front of intake and fish screens. Maintenance dredging would also be

1 required in Middle River and Victoria Canal to maintain channel capacity. The dredging would  
2 occur in tidal perennial aquatic natural community and would result in short-term increases in  
3 turbidity and disturbance of the substrate. These conditions would not eliminate the  
4 community, but would diminish its value for special-status and common species that rely on it  
5 for movement corridor or foraging area. The individual species effects are discussed later in this  
6 chapter. *AMM2 Construction Best Management Practices and Monitoring, AMM3 Stormwater*  
7 *Pollution Prevention Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention,*  
8 *Containment, and Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel*  
9 *Material, and Dredged Material, and AMM10 Restoration of Temporarily Affected Natural*  
10 *Communities* are part of the Plan and would require actions to avoid or minimize dredging  
11 effects on tidal perennial aquatic habitats.

- 12 • *Habitat enhancement.* The BDCP includes a long-term management element for the natural  
13 communities within the Plan Area (CM11). For tidal perennial aquatic natural community, a  
14 management plan would be prepared that specifies actions to improve the value of the habitats  
15 for covered species. Actions would include control of invasive nonnative plant and animal  
16 species, restrictions on vector control and application of herbicides, and maintenance of  
17 infrastructure that would allow for movement through the community. The enhancement efforts  
18 would improve the long-term value of this community for both special-status and common  
19 species.

20 The various operations and maintenance activities described above could alter acreage of tidal  
21 perennial aquatic natural community in the study area through changes in flow patterns and  
22 changes in periodic flooding of this community. Activities could also introduce sediment and  
23 herbicides that would reduce the value of this community to common and sensitive plant and  
24 wildlife species. Other periodic activities associated with the Plan, including management,  
25 protection and enhancement actions associated with *CM3 Natural Communities Protection and*  
26 *Restoration* and *CM11 Natural Communities Enhancement and Management*, would be undertaken to  
27 enhance the value of the community. While some of these activities could result in small reductions  
28 in acreage, these reductions would be greatly offset by restoration activities planned as part of *CM4*  
29 *Tidal Natural Communities Restoration*. The management actions associated with levee repair,  
30 periodic dredging and control of invasive plant species would also result in a long-term benefit to  
31 the species associated with tidal perennial aquatic habitats by improving water movement.

32 **NEPA Effects:** Ongoing operation, maintenance and management activities associated with  
33 Alternative 9 would not result in a net permanent reduction in the tidal perennial aquatic natural  
34 community within the study area. Therefore, there would be no adverse effect to the community.

35 **CEQA Conclusion:** The operation and maintenance activities associated with Alternative 9 would  
36 have the potential to create minor losses in total acreage of tidal perennial aquatic natural  
37 community in the study area, and could create temporary increases in turbidity and sedimentation.  
38 The activities could also introduce herbicides periodically to control nonnative, invasive plants.  
39 Implementation of environmental commitments and AMM2, AMM3, AMM4, AMM5, AMM6, and  
40 AMM10 would minimize these impacts, and other operations and maintenance activities, including  
41 management, protection and enhancement actions associated with *CM3 Natural Communities*  
42 *Protection and Restoration* and *CM11 Natural Communities Enhancement and Management*, would  
43 create positive effects, including improved water movement in these habitats. Long-term restoration  
44 activities associated with *CM4 Tidal Natural Communities Restoration* would greatly expand this  
45 natural community in the study area. Ongoing operation, maintenance and management activities

1 would not result in a net permanent reduction in the acreage and value of this sensitive natural  
2 community within the study area. Therefore, there would be a less-than-significant impact.

### 3 **Tidal Brackish Emergent Wetland**

4 Construction, operation, maintenance and management associated with the conservation  
5 components of Alternative 9 would have no adverse effect on the habitats associated with the tidal  
6 brackish emergent wetland natural community. Habitat restoration and construction associated  
7 with CM1, CM2, CM5, and CM6 would not remove tidal brackish emergent wetland; levee breaching  
8 and minor construction associated with CM4 may temporarily remove small amounts of this natural  
9 community (see Table 12-9-2). Full implementation of Alternative 9 would include the following  
10 conservation actions over the term of the BDCP to benefit the tidal brackish emergent wetland  
11 natural community.

- 12 ● Restore and protect 65,000 acres of tidal natural communities and transitional uplands to  
13 accommodate sea level rise (Objective L1.3 associated with CM4).
- 14 ● Within the restored and protected tidal natural communities and transitional uplands, include  
15 sufficient transitional uplands along the fringes of restored brackish and freshwater tidal  
16 emergent wetlands to accommodate up to 3 feet of sea level rise where possible and allow for  
17 the future upslope establishment of tidal emergent wetland communities (Objective L1.7,  
18 associated with CM4).
- 19 ● Within the restored and protected tidal natural communities and transitional uplands, restore  
20 or create at least 6,000 acres of tidal brackish emergent wetland in Conservation Zone 11  
21 (Objective TBEWNC1.1 associated with CM4).
- 22 ● Restore connectivity to isolated patches of tidal brackish emergent marsh where isolation has  
23 reduced effective use of these marshes by the species that depend on them (Objective  
24 TBEWNC1.3 associated with CM4).
- 25 ● Create topographic heterogeneity in restored tidal brackish emergent wetland to provide  
26 variation in inundation characteristics and vegetative composition (Objective TBEWNC1.4  
27 associated with CM4).
- 28 ● Limit perennial pepperweed to no more than 10% cover in tidal brackish emergent wetland  
29 natural community within the reserve system (Objective TBEWNC2.1 associated with CM11).

30 There is a variety of other, less specific conservation goals and objectives in BDCP Chapter 3, Section  
31 3.3 that would improve the value of tidal brackish emergent wetland natural community for  
32 terrestrial species. As explained below, with the restoration and enhancement of these amounts of  
33 habitat, in addition to implementation of AMMs, impacts on this natural community would not be  
34 adverse for NEPA purposes and would be less than significant for CEQA purposes.

1 **Table 12-9-2. Changes in Tidal Brackish Emergent Wetland Natural Community Associated with**  
 2 **Alternative 9 (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Permanent		Temporary		Periodic <sup>d</sup>	
	NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	0	0	0	0	0	0
CM2	0	0	0	0	0	0
CM4	Unk.	Unk.	Unk.	Unk.	0	0
CM5	0	0	0	0	0	0
CM6	0	0	0	0	0	0
<b>TOTAL IMPACTS</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

<sup>a</sup> See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only.

NT = near-term

LLT = late long-term

Unk. = unknown

3

4 **Impact BIO-4: Changes in Tidal Brackish Emergent Wetland Natural Community as a Result of**  
 5 **Implementing BDCP Conservation Measures**

6 Construction of the Alternative 9 water conveyance facilities (CM1) would not affect tidal brackish  
 7 emergent wetland natural community.

8 Restoration of tidal marsh habitats associated with CM4 would require site preparation, earthwork,  
 9 and other site activities that could remove tidal brackish emergent wetland. Levee modifications,  
 10 grading or contouring, filling to compensate for land subsidence, and creation of new channels could  
 11 also result in the removal of tidal brackish emergent wetland. All of this construction and land  
 12 modification activity that could affect tidal brackish emergent wetland would occur in Suisun Marsh  
 13 (CZ 11). The acreage of loss has not been calculated because the specific locations for site  
 14 preparation and earthwork have not been identified, but the loss would likely be very small (less  
 15 than 1 acre). These activities would occur through the course of the CM4 restoration program. The  
 16 restoration elements of CM4 would greatly exceed any of the short-term losses described above. At  
 17 least 6,000 acres of tidal brackish emergent wetland would be restored in the Plan Area (BDCP  
 18 Objective TBEWNC1.1, associated with CM4), with 2,000 acres of restoration occurring in the near-  
 19 term timeframe. In addition, the habitat and ecosystem functions of BDCP restored tidal brackish  
 20 emergent wetland would be maintained and enhanced (CM11). The BDCP beneficial effects  
 21 evaluation of Alternative 4 (BDCP Chapter 5, Section 5.4.3.2) states that at least 6,000 acres of tidal  
 22 brackish emergent wetland community would be restored in CZ 11, and that tidal natural  
 23 communities restoration would decrease habitat fragmentation by providing additional connectivity  
 24 between isolated patches of tidal brackish emergent wetland. These same conservation actions  
 25 would be implemented under Alternative 9.

1 The restoration activities associated with CM4 in Suisun Marsh would result in other effects that  
2 could alter the habitat value of tidal brackish emergent wetland. Disturbances associated with levee  
3 breaching and grading or contouring would increase opportunities for the introduction or spread of  
4 invasive species. Implementation of CM11 would limit this risk through invasive species control and  
5 wetland management and enhancement activities to support native species. Tidal flooding of dry  
6 areas could also increase the bioavailability of methylmercury in Suisun Marsh. Site-specific  
7 conditions would dictate the significance of this hazard to tidal brackish marsh vegetation and  
8 associated wildlife. According to the Suisun Marsh Plan EIR/EIS (Bureau of Reclamation et al. 2010,  
9 pg. 5.2-18), marsh creation may generate less methylmercury than is currently being generated by  
10 managed wetlands. However, this has not been confirmed through comprehensive studies. Because  
11 of the difficulty in assessing this risk at a programmatic level, it will need to be considered at a  
12 project level. Site-specific restoration plans that address the creation and mobilization of mercury,  
13 and monitoring and adaptive management as described in *CM12 Methylmercury Management*, would  
14 be available to address the uncertainty of methylmercury levels in restored tidal marsh. Water  
15 temperature fluctuations in newly created marsh and the potential for increased nitrogen  
16 deposition associated with construction vehicles are also issues of concern that are difficult to  
17 quantify at the current stage of restoration design. None of these effects is expected to limit the  
18 extent or value of tidal brackish emergent wetland in the study area.

19 **NEPA Effects:** The increase of tidal brackish emergent wetland associated with CM4 would be a  
20 beneficial effect on the natural community.

21 **CEQA Conclusion:** Tidal brackish emergent wetland natural community could experience small  
22 losses in acreage in Suisun Marsh (CZ 11) as a result of the large-scale tidal marsh restoration  
23 planned as part of CM4. These losses (expected to not exceed 1 acre) would be associated with levee  
24 modification, site preparation and other earthwork needed to expose diked lands to tidal influence.  
25 Because at least 6,000 acres of tidal brackish emergent wetland would be restored in the Plan Area  
26 as part of CM4, including 2,000 acres restored in the near-term timeframe, there would be a large  
27 increase in tidal brackish emergent wetland both in the near-term and over the life of the Plan.  
28 Indirect effects associated with the expansion of tidal brackish emergent wetland natural  
29 community, including the potential spread of invasive species, the generation of methylmercury,  
30 increases in marsh water temperatures, and increased nitrogen deposition are not expected to have  
31 a significant impact on this natural community in the study area. Therefore, this impact would be  
32 beneficial.

### 33 **Impact BIO-5: Modification of Tidal Brackish Emergent Wetland Natural Community from** 34 **Ongoing Operation, Maintenance and Management Activities**

35 Once the physical facilities associated with Alternative 9 are constructed and the stream flow regime  
36 associated with changed water management is in effect, there would be new ongoing and periodic  
37 actions associated with operation, maintenance and management of the BDCP facilities and  
38 conservation lands that could affect tidal brackish emergent wetland natural community in the  
39 study area. The ongoing actions include the diversion of Sacramento River flows at two newly  
40 screened sites at Georgianna Slough and Delta Cross Channel in the north Delta, the operation of  
41 multiple operable barriers in Delta waterways, and modified diversions from south Delta channels.  
42 These actions are associated with CM1 (see the impact discussion above for effects associated with  
43 CM2). The periodic actions would involve access road and conveyance facility repair, vegetation  
44 management at the various water conveyance facilities and habitat restoration sites (CM11), levee

1 repair and replacement of levee armoring, channel dredging at the two diversions with fish screens  
2 and in the Middle River and Victoria Canal, and habitat enhancement in accordance with natural  
3 community management plans. The potential effects of these actions are described below.

- 4 • *Modified river flows upstream of and within the study area and modified diversions from south*  
5 *Delta channels.* Changes in releases from reservoirs upstream of the study area, modified  
6 diversion of Sacramento River flows at Georgianna Slough and Delta Cross Channel, and  
7 modified diversions from south Delta channels (Operational Scenario G) would not result in the  
8 permanent reduction in acreage of the tidal brackish emergent wetland natural community in  
9 the study area. Flow levels in the upstream rivers would not affect tidal brackish emergent  
10 wetland because this community does not exist along upstream rivers. Modified diversions of  
11 Sacramento River flows at Georgianna Slough and Delta Cross Channel would not result in a  
12 permanent reduction in tidal brackish emergent wetland community downstream of these  
13 diversions. Flow volumes in these two diversions and in the downstream channels that had been  
14 dredged (Middle River and Victoria Canal) would increase under certain Sacramento River flow  
15 conditions and water year types. However, tidal influence in the Sacramento River and Delta  
16 waterways would continue to be dominant such that there would be no substantial change in  
17 water levels that might affect in-stream and adjacent vegetation. Modified diversions from south  
18 Delta channels would not create a reduction in this natural community.
- 19 • *Access road and levee repair.* Periodic repair of access roads and levees associated with the BDCP  
20 actions have the potential to require removal of adjacent vegetation and could entail earth and  
21 rock work in tidal brackish emergent wetland habitats. This activity could lead to increased soil  
22 erosion, turbidity and runoff entering these habitats. The activities would be subject to normal  
23 erosion, turbidity and runoff control management practices, including those developed as part  
24 of *AMM2 Construction Best Management Practices and Monitoring* and *AMM4 Erosion and*  
25 *Sediment Control Plan*. Any vegetation removal or earth work adjacent to or within aquatic  
26 habitats would require use of sediment and turbidity barriers, soil stabilization and revegetation  
27 of disturbed surfaces. Proper implementation of these measures would avoid permanent  
28 adverse effects on this community.
- 29 • *Vegetation management.* Vegetation management, in the form of physical removal and chemical  
30 treatment, would be a periodic activity associated with the long-term maintenance of  
31 restoration sites (*CM11 Natural Communities Enhancement and Management*). Use of herbicides  
32 to control nuisance vegetation could pose a long-term hazard to tidal brackish emergent  
33 wetland natural community at or adjacent to treated areas. The hazard could be created by  
34 uncontrolled drift of herbicides, uncontrolled runoff of contaminated stormwater onto the  
35 natural community, or direct discharge of herbicides to wetland areas being treated for invasive  
36 species removal. Environmental commitments and *AMM5 Spill Prevention, Containment, and*  
37 *Countermeasure Plan* have been made part of the BDCP to reduce hazards to humans and the  
38 environment from use of various chemicals during maintenance activities, including the use of  
39 herbicides. These commitments are described in Appendix 3B, including the commitment to  
40 prepare and implement spill prevention, containment, and countermeasure plans and  
41 stormwater pollution prevention plans. Best management practices, including control of drift  
42 and runoff from treated areas, and use of herbicides approved for use in aquatic environments  
43 would also reduce the risk of affecting natural communities adjacent to levees associated with  
44 tidal wetland restoration activities.

- 1 • *Channel dredging.* Long-term maintenance of tidal channels that support wetland expansion in  
2 Suisun Marsh would include periodic dredging of sediments. The dredging would occur adjacent  
3 to tidal brackish emergent wetland natural community and would result in short-term increases  
4 in turbidity and disturbance of the substrate. These conditions would not eliminate the  
5 community, but would diminish its value in the short term for special-status and common  
6 species that rely on it for cover, movement corridor or foraging area. The individual species  
7 effects are discussed later in this chapter. *AMM2 Construction Best Management Practices and*  
8 *Monitoring, AMM3 Stormwater Pollution Prevention Plan, AMM4 Erosion and Sediment Control*  
9 *Plan, AMM5 Spill Prevention, Containment, and Countermeasure Plan, AMM6 Disposal and Reuse of*  
10 *Spoils, Reusable Tunnel Material, and Dredged Material, and AMM10 Restoration of Temporarily*  
11 *Affected Natural Communities* are part of the Plan and would require actions to avoid or  
12 minimize dredging effects on adjacent sensitive vegetation.
- 13 • *Habitat enhancement.* The BDCP includes a long-term management element for the natural  
14 communities within the Plan Area (CM11). For tidal brackish emergent wetland natural  
15 community, a management plan would be prepared that specifies actions to improve the value  
16 of the habitats for covered species. Actions would include control of invasive nonnative plant  
17 and animal species, fire management, restrictions on vector control and application of  
18 herbicides, and maintenance of infrastructure that would allow for movement through the  
19 community. The enhancement efforts would improve the long-term value of this community for  
20 both special-status and common species.

21 The various operations and maintenance activities described above could alter acreage and value of  
22 tidal brackish emergent wetland natural community in the study area through water operations,  
23 levee and road maintenance, channel dredging and vegetation management in or adjacent to this  
24 community. Activities could also introduce sediment and herbicides that would reduce the value of  
25 this community to common and sensitive plant and wildlife species. Other periodic activities  
26 associated with the Plan, including management, protection and enhancement actions associated  
27 with *CM3 Natural Communities Protection and Restoration* and *CM11 Natural Communities*  
28 *Enhancement and Management*, would be undertaken to enhance the value of the community. While  
29 some of these activities could result in small changes in acreage, these changes would be greatly  
30 offset by restoration activities planned as part of *CM4 Tidal Natural Communities Restoration*. The  
31 management actions associated with levee repair, periodic dredging and control of invasive plant  
32 species would also result in a long-term benefit to the species associated with tidal brackish  
33 emergent wetland habitats by improving water movement.

34 **NEPA Effects:** Ongoing operation, maintenance and management activities associated with  
35 Alternative 9 would not result in a net permanent reduction in the tidal brackish emergent wetland  
36 natural community within the study area. Therefore, there would be no adverse effect on this  
37 community.

38 **CEQA Conclusion:** The operation and maintenance activities associated with Alternative 9 would  
39 have the potential to create minor changes (not exceeding 1 acre) in total acreage of tidal brackish  
40 emergent wetland natural community in Suisun Marsh, and could create temporary increases in  
41 turbidity and sedimentation. The activities could also introduce herbicides periodically to control  
42 nonnative, invasive plants. Implementation of environmental commitments and AMM2, AMM3,  
43 AMM4, AMM5, AMM6, and AMM10 would minimize these impacts, and other operations and  
44 maintenance activities, including management, protection and enhancement actions associated with  
45 *CM3 Natural Communities Protection and Restoration* and *CM11 Natural Communities Enhancement*

1 *and Management*, would create positive effects, including improved water movement in these  
2 habitats. Long-term restoration activities associated with *CM4 Tidal Natural Communities*  
3 *Restoration* would greatly expand this natural community in the study area. Ongoing operation,  
4 maintenance and management activities would not result in a net permanent reduction in this  
5 sensitive natural community within the study area. Therefore, there would be a less-than-significant  
6 impact.

#### 7 **Tidal Freshwater Emergent Wetland**

8 Construction, operation, maintenance and management associated with the conservation  
9 components of Alternative 9 would have no long-term adverse effects on the habitats associated  
10 with the tidal freshwater emergent wetland natural community. Initial development and  
11 construction of CM1, CM2, CM4, CM5, and CM6 would result in both permanent and temporary  
12 removal of this community (Table 12-9-3). Full implementation of Alternative 9 would also include  
13 the following conservation actions over the term of the BDCP to benefit the tidal freshwater  
14 emergent wetland natural community.

- 15 ● Restore and protect 65,000 acres of tidal natural communities and transitional uplands to  
16 accommodate sea level rise (Objective L1.3 associated with CM4).
- 17 ● Within the 65,000 acres of tidal natural communities and transitional uplands, include sufficient  
18 transitional uplands along the fringes of restored brackish and freshwater tidal emergent  
19 wetlands to accommodate up to 3 feet of sea level rise where possible and allow for the future  
20 upslope establishment of tidal emergent wetland communities (Objective L1.7, associated with  
21 CM4).
- 22 ● Within the 65,000 acres of tidal natural communities, restore or create at least 24,000 acres of  
23 tidal freshwater emergent wetland in Conservation Zones 1, 2, 4, 5, 6, and/or 7 (Objective  
24 TFEWNC1.1, associated with CM4).
- 25 ● Restore tidal freshwater emergent wetlands in areas that increase connectivity among  
26 conservation lands (Objective TFEWNC1.2, associated with CM4).
- 27 ● Restore and sustain a diversity of marsh vegetation that reflects historical species compositions  
28 and high structural complexity (Objective TFEWNC2.1, associated with CM4).
- 29 ● Create topographic heterogeneity in restored tidal freshwater emergent wetland to provide  
30 variation in inundation characteristics and vegetative composition (Objective TFEWNC2.2,  
31 associated with CM4).

32 There is a variety of other, less specific conservation goals and objectives in BDCP Chapter 3, Section  
33 3.3 that would improve the value of tidal freshwater emergent wetland natural community for  
34 terrestrial species. As explained below, with the restoration and enhancement of these amounts of  
35 habitat, in addition to implementation of AMMs, impacts on this natural community would not be  
36 adverse for NEPA purposes and would be less than significant for CEQA purposes.

1 **Table 12-9-3. Changes in Tidal Freshwater Emergent Wetland Natural Community Associated with**  
2 **Alternative 9 (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Permanent		Temporary		Periodic <sup>d</sup>	
	NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	62	62	123	123		
CM2	6	6	0	0	24-58	
CM4	1	1	0	0		
CM5	0	1	0	1		3
CM6	Unk.	Unk.	Unk.	Unk.		
<b>TOTAL IMPACTS</b>	<b>69</b>	<b>70</b>	<b>123</b>	<b>124</b>	<b>24-58</b>	<b>3</b>

<sup>a</sup> See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

Unk. = unknown

3

4 **Impact BIO-6: Changes in Tidal Freshwater Emergent Wetland Natural Community as a Result**  
5 **of Implementing BDCP Conservation Measures**

6 Construction and land grading activities that would accompany the implementation of CM1, CM2,  
7 CM4, CM5, and CM6 would permanently eliminate an estimated 70 acres and temporarily remove  
8 124 acres of tidal freshwater emergent wetland natural community in the study area. These  
9 modifications represent approximately 2% of the 8,856 acres of the community that is mapped in  
10 the study area. The majority of the permanent and temporary losses would occur during the first 10  
11 years of Alternative 9 implementation, as water conveyance facilities are constructed and habitat  
12 restoration is initiated. Natural communities restoration would add at least 24,000 acres of tidal  
13 freshwater emergent wetland natural community during the course of Plan restoration activities,  
14 which would greatly expand the area of this natural community and offset the losses. The BDCP  
15 beneficial effects evaluation of Alternative 4 (BDCP Chapter 5, Section 5.4.4.2) states that the  
16 implementation of *CM4 Tidal Natural Communities Restoration* will restore at least 24,000 acres of  
17 tidal freshwater emergent wetland community in Cache Slough (Conservation Zones 1, 2, and 3), the  
18 Cosumnes/Mokelumne (Conservation Zone 4), West Delta (Conservation Zone 5 and 6), and South  
19 Delta (Conservation Zone 7) ROAs. The BDCP evaluation also states that the objectives in the Plan  
20 will promote vegetation diversity and structural complexity (as incorporated into the restoration  
21 design) in restored tidal freshwater marsh. These same conservation actions would be implemented  
22 under Alternative 9.

1 The individual effects of each relevant conservation measure are addressed below. A summary  
2 statement of the combined impacts and NEPA and CEQA conclusions follows the individual  
3 conservation measure discussions.

- 4 • *CM1 Water Facilities and Operation*: Construction of the Alternative 9 water conveyance facilities  
5 would permanently remove 62 acres and temporarily remove 123 acres of tidal freshwater  
6 emergent wetland community. Most of the permanent loss would occur at the channel dredging  
7 sites within the Middle River and Victoria Canal. Middle River dredging would occur from  
8 Victoria Canal north to Mildred Island, while Victoria Canal dredging would extend from Middle  
9 River westward to Old River. This community exists as fringing vegetation along the banks of  
10 these channels and also as fringing vegetation on the islands within the channels. Smaller areas  
11 would be permanently lost at operable barrier sites adjacent to Middle River and San Joaquin  
12 River. Temporary tidal freshwater emergent wetland removal would occur at dredging work  
13 areas along Victoria Canal and Middle River. Detailed mapping of these facilities in relation to  
14 natural communities can be found in the Terrestrial Biology Mapbook. These losses would take  
15 place during the near-term construction period.

16 There is the potential for increased nitrogen deposition associated with construction vehicles  
17 during the construction phase of CM1. BDCP Appendix 5.J, Attachment 5J.A, *Construction-Related*  
18 *Nitrogen Deposition on BDCP Natural Communities*, addresses this issue in detail. It has been  
19 concluded that this potential deposition would pose a low risk of changing tidal freshwater  
20 emergent wetland natural community because the construction would contribute a negligible  
21 amount of nitrogen to regional projected emissions. No adverse effect is expected.

- 22 • *CM2 Yolo Bypass Fisheries Enhancement*: Implementation of CM2 involves a number of  
23 construction or channel modification activities within the Yolo and Sacramento Bypasses,  
24 including improvements in flow through the west side channel of the bypass, Putah Creek  
25 realignment activities, Lisbon Weir modification and Sacramento Weir improvements. All of  
26 these activities could involve excavation and grading in tidal freshwater emergent wetland areas  
27 to improve passage of fish through the bypasses. Based on hypothetical construction footprints,  
28 a total of 6 acres could be permanently lost to these activities. The loss is expected to occur in  
29 the first 10 years of Alternative 9 implementation.
- 30 • *CM4 Tidal Natural Communities Restoration*: Based on hypothetical footprints of this restoration  
31 activity, initial land grading and levee modification could permanently remove 1 acre of tidal  
32 freshwater emergent wetland natural community. This loss would occur in the near-term  
33 timeframe and would occur throughout the ROAs identified for tidal wetland restoration. At the  
34 same time, an estimated 24,000 acres of tidal freshwater emergent wetland community would  
35 be restored during tidal habitat restoration, consistent with BDCP Objective TFEWNC1.1,  
36 associated with CM4. Approximately 8,850 acres of the restoration would occur during the first  
37 10 years of Alternative 9 implementation, which would coincide with the timeframe of water  
38 conveyance facilities construction. The remaining restoration would be spread over the  
39 following 30 years. Tidal wetland communities restoration is expected to be focused in the ROAs  
40 identified in Figure 12-1. Restoration would be located and designed to improve habitat  
41 connectivity (Objective TFEWNC1.2), improve marsh species diversity (Objective TFEWNC2.1),  
42 and provide variation in inundation characteristics (Objective TFEWNC2.2). Some of the  
43 restoration would occur in the lower Yolo Bypass, but restoration would also be spread among  
44 the Suisun Marsh, South Delta, Cosumnes/Mokelumne and West Delta ROAs.

1 The restoration activities associated with CM4 in the Plan Area ROAs would result in other  
2 effects that could alter the habitat value of tidal freshwater emergent wetland. Disturbances  
3 associated with levee breaching and grading or contouring would increase opportunities for the  
4 introduction or spread of invasive species. Implementation of CM11 would limit this risk  
5 through invasive species control and wetland management and enhancement activities to  
6 support native species. Flooding of dry areas for tidal freshwater marsh creation could also  
7 increase the bioavailability of methylmercury, especially in the Cache Slough,  
8 Cosumnes/Mokelumne and Suisun Marsh ROAs. Site-specific conditions would dictate the  
9 significance of this hazard to marsh vegetation and associated wildlife. Because of the difficulty  
10 in assessing this risk at a programmatic level, it will need to be considered at a project level.  
11 Site-specific restoration plans that address the creation and mobilization of mercury, and  
12 monitoring and adaptive management as described in *CM12 Methylmercury Management*, would  
13 be available to address the uncertainty of methylmercury levels in restored tidal marsh.

14 Water temperature fluctuations in newly created marsh is also an issue of concern that is  
15 difficult to quantify at the current stage of restoration design. None of these effects is expected  
16 to limit the extent or value of tidal freshwater emergent wetland in the study area.

- 17 ● *CM5 Seasonally Inundated Floodplain Restoration*: Floodplain restoration levee construction  
18 would permanently remove 1 acre and temporarily remove 1 acre of tidal freshwater emergent  
19 wetland habitat. The construction-related losses would be considered a permanent removal of  
20 the habitats directly affected. The majority of seasonally inundated floodplain restoration is  
21 expected to occur along the lower San Joaquin River in the south and central Delta areas. This  
22 activity is scheduled to start following construction of water conveyance facilities, which is  
23 expected to take 10 years. Floodplain restoration along the San Joaquin River would improve  
24 connectivity for a variety of species that rely on freshwater marsh and riparian habitats. The  
25 regional and Plan Area landscape linkages along the San Joaquin River are included in Figure 12-  
26 2.
- 27 ● *CM6 Channel Margin Enhancement*: Channel margin habitat enhancement could result in filling  
28 of small amounts of tidal freshwater emergent wetland habitat along 20 miles of river and  
29 sloughs. The extent of this loss cannot be quantified at this time, but the majority of the  
30 enhancement activity would occur on narrow strips of habitat, including levees and channel  
31 banks. The improvements would occur within the study area on sections of the Sacramento, San  
32 Joaquin and Mokelumne Rivers, and along Steamboat and Sutter Sloughs.

33 The following paragraphs summarize the combined effects discussed above and describe other  
34 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA impact conclusions are  
35 also included.

### 36 ***Near-Term Timeframe***

37 During the near-term timeframe (the first 10 years of BDCP implementation), Alternative 9 would  
38 affect the tidal freshwater emergent wetland natural community through CM1 construction losses  
39 (62 acres permanent and 123 acres temporary), CM2 construction losses (6 acres permanent), and  
40 CM4 construction losses (1 acre permanent). These losses would occur primarily in the southern  
41 and central Delta along Middle River and Victoria Canal, north and east of Clifton Court Forebay.  
42 Smaller areas would be lost at operable barrier sites along Middle River and San Joaquin River in the  
43 central Delta, and at various locations within the Yolo Bypass and the tidal restoration ROAs.

1 The construction losses of this special-status natural community would represent an adverse effect  
2 if they were not offset by avoidance and minimization measures and restoration actions associated  
3 with BDCP conservation components. Loss of tidal freshwater emergent wetland natural community  
4 would be considered both a loss in acreage of a sensitive natural community and a loss of wetland as  
5 defined by Section 404 of the CWA. However, the creation of 8,850 acres of tidal freshwater  
6 emergent wetland natural community as part of CM4 during the first 10 years of Alternative 9  
7 implementation would more than offset this near-term loss, avoiding any adverse effect. Typical  
8 project-level mitigation ratios (1:1 for restoration) would indicate that 192 acres of restoration  
9 would be needed to offset (i.e., mitigate) the 192 acres of loss (the total permanent and temporary  
10 near-term effects listed in Table 12-9-3).

11 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
12 *Construction Best Management Practices and Monitoring*, *AMM6 Disposal and Reuse of Spoils*,  
13 *Reusable Tunnel Material*, and *Dredged Material*, *AMM7 Barge Operations Plan*, and *AMM10*  
14 *Restoration of Temporarily Affected Natural Communities*. All of these AMMs include elements that  
15 avoid or minimize the risk of affecting habitats at work areas and storage sites. The AMMs are  
16 described in detail in BDCP Appendix 3.C.

### 17 **Late Long-Term Timeframe**

18 Implementation of Alternative 9 as a whole would result in relatively minor (approximately 2%)  
19 losses of tidal freshwater emergent wetland community in the study area. These losses (70 acres of  
20 permanent and 124 acres of temporary loss) would be largely associated with construction of the  
21 water conveyance facilities (CM1), construction of Yolo Bypass fish improvements (CM2), and levee  
22 modification and land grading associated with tidal marsh restoration (CM4) and floodplain  
23 restoration (CM5). The CM4 and CM5 losses would occur during the course of the CM4 and CM5  
24 conservation actions at various tidal and floodplain restoration sites throughout the study area. By  
25 the end of the Plan timeframe, a total of 24,000 acres of this natural community would be restored.  
26 The restoration would occur over a wide region of the study area, including within the Suisun  
27 Marsh, Cosumnes/Mokelumne, Cache Slough, South Delta and Cosumnes/Mokelumne ROAs (see  
28 Figure 12-1).

29 **NEPA Effects:** The creation of 8,850 acres of tidal freshwater emergent wetland natural community  
30 as part of CM4 during the first 10 years of Alternative 9 implementation would more than offset the  
31 construction and inundation-related effects of implementing CM1, CM2, CM4 and CM5, avoiding any  
32 adverse effect in the near-term. Because of the 24,000 acres of tidal freshwater emergent wetland  
33 restoration that would occur over the course of the Plan, Alternative 9 would not result in a net  
34 long-term reduction in the acreage of a sensitive natural community; the effect would be beneficial.

### 35 **CEQA Conclusion:**

#### 36 **Near-Term Timeframe**

37 Alternative 9 would result in the loss of approximately 192 acres of tidal freshwater emergent  
38 wetland natural community due to construction of the water conveyance facilities (CM1) and fish  
39 passage improvements (CM2), and tidal marsh restoration (CM4) in the near-term. The construction  
40 losses would occur primarily in the southern and central Delta along Middle River and Victoria  
41 Canal, north and east of Clifton Court Forebay. Smaller areas would be lost at operable barrier sites  
42 along Middle River and San Joaquin River in the central Delta, and at various locations within the  
43 Yolo Bypass and the tidal restoration ROAs. The losses would be spread across a 10-year near-term

1 timeframe and would be offset by planned restoration of 8,850 acres of tidal freshwater emergent  
2 wetland natural community scheduled for the first 10 years of Alternative 9 implementation (CM4).  
3 AMM1, AMM2, AMM6, AMM7, and AMM10 would also be implemented to minimize impacts.  
4 Because of these offsetting near-term restoration activities and AMMs, impacts would be less than  
5 significant. Typical project-level mitigation ratios (1:1 for restoration) would indicate that 192 acres  
6 of restoration would be needed to offset (i.e., mitigate) the 192 acres of loss. The restoration would  
7 be initiated at the beginning of Alternative 9 implementation to minimize any time lag in the  
8 availability of this habitat to special-status species, and would result in a net gain in acreage of this  
9 sensitive natural community.

#### 10 ***Late Long-Term Timeframe***

11 At the end of the Plan period, 194 acres of this community would be lost to conservation activities  
12 and 24,000 acres of this community would be restored. There would be no net permanent reduction  
13 in the acreage and value of this sensitive natural community within the study area. Therefore,  
14 Alternative 9 would not have a substantial adverse effect on this natural community; the impact  
15 would be beneficial.

#### 16 **Impact BIO-7: Increased Frequency, Magnitude and Duration of Periodic Inundation of Tidal** 17 **Freshwater Emergent Wetland Natural Community**

18 Two Alternative 9 conservation measures would modify the inundation/flooding regimes of both  
19 natural and man-made waterways in the study area. CM2, which is designed to improve fish passage  
20 and shallow flooded habitat for Delta fishes in the Yolo Bypass, would increase periodic inundation  
21 of tidal freshwater emergent wetland natural community on small acreages, while CM5 would  
22 expose this community to additional flooding as channel margins are modified and levees are set  
23 back to improve fish habitat along some of the major rivers and waterways throughout the study  
24 area.

- 25 • *CM2 Yolo Bypass Fisheries Enhancement*: Operation of the Yolo Bypass under Alternative 9 would  
26 result in an increase in the frequency, magnitude and duration of inundation of 24–58 acres of  
27 tidal freshwater emergent wetland natural community. The methods used to estimate these  
28 inundation acreages are described in BDCP Appendix 5.J, *Effects on Natural Communities,*  
29 *Wildlife, and Plants*. The area more frequently inundated would vary with the flow volume that  
30 would pass through the newly constructed notch in the Fremont Weir. The 24-acre increase in  
31 inundation would be associated with a notch flow of 1,000 cubic feet per second (cfs), and the  
32 58-acre increase would result from a notch flow of 4,000 cfs. Plan-related increases in flow  
33 through Fremont Weir would be expected in 30% of the years. Most of this community occurs in  
34 the southern section of the bypass on Liberty Island, on the fringes of tidal perennial aquatic  
35 habitats. Smaller areas are scattered among the cropland within the bypass, south of Interstate  
36 80. The anticipated change in management of flows in the Yolo Bypass includes more frequent  
37 releases in flows into the bypass from the Fremont and Sacramento Weirs, and in some years,  
38 later releases into the bypass in spring months (April and May). The modification of periodic  
39 inundation events would not adversely affect the ecological function of tidal freshwater  
40 emergent wetland habitats and would not substantially modify its value for special-status or  
41 common terrestrial species. The plants in this natural community are adapted to periodic  
42 inundation events within the Yolo Bypass. The effects of this inundation on wildlife and plant  
43 species are described in detail in later sections of this chapter.

- 1 • *CM5 Seasonally Inundated Floodplain Restoration*: Floodplain restoration would result in a  
2 seasonal increase in the frequency and duration of inundation of 3 acres of tidal freshwater  
3 emergent wetland habitats. Specific locations for this restoration activity have not been  
4 identified, but they would likely be focused in the south Delta area, along the major rivers and  
5 Delta channels. The reconnection of these wetlands to stream flooding events would be  
6 beneficial to their ecological function, especially as they relate to BDCP target terrestrial and  
7 aquatic species. Foraging activity and refuge sites would be expanded into areas currently  
8 unavailable or infrequently available to some aquatic species.

9 In summary, 27–61 acres of tidal freshwater emergent wetland natural community in the study area  
10 would be subjected to more frequent inundation as a result of implementing two Alternative 9  
11 conservation measures (CM2 and CM5). Tidal freshwater emergent wetland natural community is a  
12 habitat of great value to both terrestrial and aquatic species in the study area.

13 **NEPA Effects:** Periodic inundation of tidal freshwater emergent wetland natural community  
14 associated with Alternative 9 would not result in a net permanent reduction in the acreage and  
15 value of this community in the study area. There would be no adverse effect.

16 **CEQA Conclusion:** An estimated 27–61 acres of tidal freshwater emergent wetland natural  
17 community in the study area would be subjected to more frequent inundation as a result of  
18 implementing CM2 and CM5 under Alternative 9. This community is of great value to aquatic and  
19 terrestrial species in the study area. The periodic inundation would not result in a net permanent  
20 reduction in the acreage and value of this community in the study area. Therefore, there would be a  
21 less-than-significant impact on the community.

## 22 **Impact BIO-8: Modification of Tidal Freshwater Emergent Wetland Natural Community from** 23 **Ongoing Operation, Maintenance and Management Activities**

24 Once the physical facilities associated with Alternative 9 are constructed and the stream flow regime  
25 associated with changed water management is in effect, there would be new ongoing and periodic  
26 actions associated with operation, maintenance and management of the BDCP facilities and  
27 conservation lands that could affect tidal freshwater emergent wetland natural community in the  
28 study area. The ongoing actions include the diversion of Sacramento River flows at two newly  
29 screened sites at Georgianna Slough and Delta Cross Channel in the north Delta, the operation of  
30 multiple operable barriers in Delta waterways, and modified diversions from south Delta channels.  
31 These actions are associated with CM1 (see the impact discussion above for effects associated with  
32 CM2). The periodic actions would involve access road and conveyance facility repair, vegetation  
33 management at the various water conveyance facilities and habitat restoration sites (CM13), levee  
34 repair and replacement of levee armoring, channel dredging at the two diversions with fish screens  
35 and in the Middle River and Victoria Canal, and habitat enhancement in accordance with natural  
36 community management plans. The potential effects of these actions are described below.

- 37 • *Modified river flows upstream of and within the study area and modified diversions from south*  
38 *Delta channels*. Changes in releases from reservoirs upstream of the study area, modified  
39 diversion of Sacramento River flows at Georgianna Slough and Delta Cross Channel, and  
40 modified diversions from south Delta channels (Operational Scenario G) would not result in the  
41 permanent reduction in acreage of a sensitive natural community in the study area. Flow levels  
42 in the upstream rivers would not change such that the acreage of tidal freshwater emergent  
43 wetland community would be reduced on a permanent basis. Some minor increases and some

1 decreases would be expected to occur during some seasons and in some water-year types, but  
2 there would be no permanent loss. Similarly, modified diversions of Sacramento River flows at  
3 Georgianna Slough and Delta Cross Channel would not result in a permanent reduction in tidal  
4 freshwater emergent wetland community downstream of these diversions. Flow volumes in  
5 these two diversions and in the downstream channels that had been dredged (Middle River and  
6 Victoria Canal) would increase under certain Sacramento River flow conditions and water year  
7 types. However, tidal influence in the Sacramento River and Delta waterways would continue to  
8 be dominant such that there would be no substantial change in water levels that might affect in-  
9 stream and adjacent vegetation. Modified diversions from south Delta channels would not create  
10 a reduction in this natural community.

- 11 • *Access road, water conveyance facility and levee repair.* Periodic repair of access roads, water  
12 conveyance facilities and levees associated with the BDCP actions have the potential to require  
13 removal of adjacent vegetation and could entail earth and rock work in or adjacent to tidal  
14 freshwater emergent wetland habitats. This activity could lead to increased soil erosion,  
15 turbidity and runoff entering tidal aquatic habitats. These activities would be subject to normal  
16 erosion, turbidity and runoff control management practices, including those developed as part  
17 of *AMM2 Construction Best Management Practices and Monitoring* and *AMM4 Erosion and*  
18 *Sediment Control Plan*. Any vegetation removal or earth work adjacent to or within emergent  
19 wetland habitats would require use of sediment and turbidity barriers, soil stabilization and  
20 revegetation of disturbed surfaces. Proper implementation of these measures would avoid  
21 permanent adverse effects on this community.
- 22 • *Vegetation management.* Vegetation management, in the form of physical removal and chemical  
23 treatment, would be a periodic activity associated with the long-term maintenance of water  
24 conveyance facilities and restoration sites (*CM11 Natural Communities Enhancement and*  
25 *Management*). Use of herbicides to control nuisance vegetation could pose a long-term hazard to  
26 tidal freshwater emergent wetland natural community at or adjacent to treated areas. The  
27 hazard could be created by uncontrolled drift of herbicides, uncontrolled runoff of contaminated  
28 stormwater onto the natural community, or direct discharge of herbicides to tidal aquatic areas  
29 being treated for invasive species removal. Environmental commitments and *AMM5 Spill*  
30 *Prevention, Containment, and Countermeasure Plan* have been made part of the BDCP to reduce  
31 hazards to humans and the environment from use of various chemicals during maintenance  
32 activities, including the use of herbicides. These commitments are described in Appendix 3B,  
33 including the commitment to prepare and implement spill prevention, containment, and  
34 countermeasure plans and stormwater pollution prevention plans. Best management practices,  
35 including control of drift and runoff from treated areas, and use of herbicides approved for use  
36 in aquatic environments would also reduce the risk of affecting natural communities adjacent to  
37 water conveyance features and levees associated with restoration activities.
- 38 • *Channel dredging.* Long-term operation of the Alternative 9 diversions on the Sacramento River  
39 (Georgianna Slough and Delta Cross Channel) would include periodic dredging of sediments that  
40 might accumulate in front of intake and fish screens. Maintenance dredging would also be  
41 required in Middle River and Victoria Canal to maintain channel capacity. The dredging would  
42 occur in the vicinity of tidal freshwater emergent natural community and would result in short-  
43 term increases in turbidity and disturbance of the substrate. These conditions would not  
44 eliminate the community, but would diminish its value for special-status and common species  
45 that rely on it for nesting habitat, cover or foraging area. The individual species effects are  
46 discussed later in this chapter. *AMM2 Construction Best Management Practices and Monitoring*,

1            *AMM3 Stormwater Pollution Prevention Plan, AMM4 Erosion and Sediment Control Plan, AMM5*  
2            *Spill Prevention, Containment, and Countermeasure Plan, AMM6 Disposal and Reuse of Spoils,*  
3            *Reusable Tunnel Material, and Dredged Material, and AMM10 Restoration of Temporarily Affected*  
4            *Natural Communities* are part of the Plan and would require actions to avoid or minimize  
5            dredging effects on tidal freshwater emergent wetland habitats.

- 6            • *Habitat enhancement.* The BDCP includes a long-term management element for the natural  
7            communities within the Plan Area (CM11). For tidal freshwater emergent wetland community, a  
8            management plan would be prepared that specifies actions to improve the value of the habitats  
9            for covered species. Actions would include control of invasive nonnative plant and animal  
10           species, fire management, restrictions on vector control and application of herbicides, and  
11           maintenance of infrastructure that would allow for movement through the community. The  
12           enhancement efforts would improve the long-term value of this community for both special-  
13           status and common species.

14           The various operations and maintenance activities described above could alter acreage of tidal  
15           freshwater emergent wetland natural community in the study area through changes in flow  
16           patterns, channel and levee maintenance, and vegetation control. Activities could also introduce  
17           sediment and herbicides that would reduce the value of this community to common and sensitive  
18           plant and wildlife species. Other periodic activities associated with the Plan, including management,  
19           protection and enhancement actions associated with *CM3 Natural Communities Protection and*  
20           *Restoration* and *CM11 Natural Communities Enhancement and Management*, would be undertaken to  
21           enhance the value of the community. While some of these activities could result in small changes in  
22           acreage, these changes would be greatly offset by restoration activities planned as part of *CM4 Tidal*  
23           *Natural Communities Restoration*. The management actions associated with levee repair, periodic  
24           dredging and control of invasive plant species would also result in a long-term benefit to the species  
25           associated with tidal freshwater emergent wetland habitats by improving water movement.

26           **NEPA Effects:** Ongoing operation, maintenance and management activities associated with  
27           Alternative 9 would not result in a net permanent reduction in the tidal freshwater emergent  
28           wetland natural community within the study area. Therefore, there would be no adverse effect on  
29           this natural community.

30           **CEQA Conclusion:** The operation and maintenance activities associated with Alternative 9 would  
31           have the potential to create minor changes in total acreage of tidal freshwater emergent wetland  
32           natural community in the study area, and could create temporary increases in turbidity and  
33           sedimentation. The activities could also introduce herbicides periodically to control nonnative,  
34           invasive plants. Implementation of environmental commitments and AMM2, AMM3, AMM4, AMM5,  
35           AMM6, and AMM10 would minimize these impacts, and other operations and maintenance  
36           activities, including management, protection and enhancement actions associated with *CM3 Natural*  
37           *Communities Protection and Restoration* and *CM11 Natural Communities Enhancement and*  
38           *Management*, would create positive effects, including improved water movement in these habitats.  
39           Long-term restoration activities associated with *CM4 Tidal Natural Communities Restoration* would  
40           expand this natural community in the study area. Ongoing operation, maintenance and management  
41           activities would not result in a net permanent reduction in this sensitive natural community within  
42           the study area. Therefore, there would be a less-than-significant impact on the community.



1 **Table 12-9-4. Changes in Valley/Foothill Riparian Natural Community Associated with**  
2 **Alternative 9 (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Permanent		Temporary		Periodic <sup>d</sup>	
	NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	61	61	248	248	0	0
CM2	89	89	88	88	51-92	0
CM4	298	552	0	0	0	0
CM5	0	43	0	35	0	266
CM6	Unk.	Unk.	Unk.	Unk.	0	0
<b>TOTAL IMPACTS</b>	<b>448</b>	<b>745</b>	<b>336</b>	<b>371</b>	<b>51-92</b>	<b>266</b>

<sup>a</sup> See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

Unk. = unknown

3

4 **Impact BIO-9: Changes in Valley/Foothill Riparian Natural Community as a Result of**  
5 **Implementing BDCP Conservation Measures**

6 Construction, channel dredging, land grading and habitat restoration activities that would  
7 accompany the implementation of CM1, CM2, CM4, CM5, and CM6 would permanently eliminate an  
8 estimated 745 acres and temporarily remove 371 acres of valley/foothill riparian natural  
9 community in the study area. These modifications represent approximately 6% of the 17,966 acres  
10 of the community that is mapped in the study area. The majority of the permanent and temporary  
11 losses would occur during the first 10 years of Alternative 9 implementation, as Delta channels are  
12 dredged, new diversion structures and operable barriers are constructed, and habitat restoration is  
13 initiated. Valley/foothill riparian protection (750 acres) and restoration (800 acres) would be  
14 initiated during the same period, which would partially offset the losses. By the end of the Plan  
15 period, 5,000 acres of this natural community would be restored. The BDCP beneficial effects  
16 analysis (BDCP Chapter 5, Section 5.4.5.2) indicates that implementation of Alternative 4 will  
17 restore or create 5,000 acres of riparian forest and scrub in Conservation Zones 1, 2, 4, 5, 6, and 7,  
18 with at least 3,000 acres occurring on restored seasonally inundated floodplain. Alternative 4 will  
19 also protect 750 acres of existing valley/foothill riparian natural community in Conservation Zone 7.  
20 These same conservation measures would be implemented under Alternative 9.

21 The individual effects of each relevant conservation measure are addressed below. A summary  
22 statement of the combined impacts and NEPA and CEQA conclusions follows the individual  
23 conservation measure discussions.

- 1 ● *CM1 Water Facilities and Operation*: Construction of the Alternative 9 water conveyance facilities  
2 would permanently remove 61 acres and temporarily remove 248 acres of valley/foothill  
3 riparian natural community. Most of the permanent loss would occur as wider and deeper  
4 channels are dredged in Middle River and Victoria Canal, and as operable barriers and new  
5 Sacramento River diversions are constructed in various waterways across the Delta. Much of the  
6 riparian vegetation in this area is composed of dense stands of willows, brambles and  
7 blackberry, and associated low profile woody plants. The principal facilities that would cause  
8 permanent losses and the general types of riparian vegetation that would be lost are listed  
9 below.

- 10 ○ Victoria Canal dredging: small island patches of riparian dominated by California dogwood.  
11 ○ Middle River dredging: large and small patches of riparian on in-channel islands dominated  
12 by California dogwood, willow, mixed brambles, tules and bulrush.  
13 ○ Canal construction across Old River near Clifton Court Forebay—small patches of riparian on  
14 the river margins dominated by blackberry, willow and giant reed;  
15 ○ Diversion structures and operable barriers on Sacramento River at Georgianna Slough and  
16 Delta Cross Channel: corridors of mixed riparian including valley oak, white alder, willow,  
17 mixed brambles and deciduous shrublands.  
18 ○ Channel enlargement at the Sacramento River and Meadows Slough: narrow band of  
19 riparian dominated by valley oak along the Sacramento River and larger stands of valley oak  
20 and willow along Meadows Slough.  
21 ○ Operable barrier construction at Mokelumne River and Lost Slough: narrow bands of willow  
22 and walnut along the Mokelumne River and larger patches of mixed riparian including  
23 walnut, willow, mixed bramble, and white alder along Lost Slough.  
24 ○ Operable barrier construction at the San Joaquin River and Fishermans Cut: small patches of  
25 willow and mixed brambles.  
26 ○ Operable barrier construction on the San Joaquin River at the head of Old River: small  
27 stringers and patches of cottonwood, willow and valley oak along the San Joaquin River.

28 Temporary losses of riparian community would occur primarily along Middle River between  
29 Victoria Canal and Mildred Island, where large dredging work areas and operable barrier work  
30 areas would be placed. Some of this vegetation may be temporarily removed as dredging  
31 progresses, while other areas may remain in place but be temporarily affected by sedimentation  
32 and equipment movement associated with dredging. The riparian vegetation in this area is also  
33 composed primarily of dense stands of willows, brambles and blackberry, and associated low  
34 profile woody plants. Refer to the Terrestrial Biology Mapbook for a more detailed view of these  
35 impact areas. These losses would take place during the near-term construction period.

- 36 ● *CM2 Yolo Bypass Fisheries Enhancement*: Implementation of CM2 would involve a number of  
37 construction activities within the Yolo and Sacramento Bypasses, including Fremont Weir and  
38 stilling basin improvements, Putah Creek realignment activities, Lisbon Weir modification and  
39 Sacramento Weir improvements. All of these activities could involve excavation and grading in  
40 valley/foothill riparian areas to improve passage of fish through the bypasses. Based on  
41 hypothetical construction footprints, a total of 89 acres could be permanently lost and another  
42 88 acres could be temporarily removed. Most of the riparian losses would occur at the north end  
43 of Yolo Bypass where major fish passage improvements are planned. This vegetation is a mix of

1 valley oak, sycamore, cottonwood and willow trees. The riparian areas here are primarily small,  
2 disconnected patches with moderate to low value as wildlife movement corridors. Most of these  
3 patches lack structural complexity. Excavation to improve water movement in the Toe Drain and  
4 in the Sacramento Weir would remove similar vegetation. These losses would occur primarily in  
5 the near-term timeframe.

- 6 • *CM4 Tidal Natural Communities Restoration*: Based on the use of hypothetical restoration  
7 footprints, implementation of CM4 would permanently inundate or remove 552 acres of  
8 valley/foothill riparian community. The losses would be spread among most of the ROAs  
9 established for tidal restoration (see Figure 12-1). No losses would occur from Suisun Marsh  
10 restoration. These ROAs support a mix of riparian vegetation types, including valley oak stands,  
11 extensive willow and cottonwood stringers along waterways, and areas of scrub vegetation  
12 dominated by blackberry. These areas are considered of low to moderate habitat value (BDCP  
13 Chapter 5, Section 5.4.5). The actual loss of riparian habitat to marsh restoration would be  
14 expected to be smaller than predicted by use of the theoretical footprint. As marsh restoration  
15 projects were identified and planned, sites could be selected that avoid riparian areas as much  
16 as possible.
- 17 • *CM5 Seasonally Inundated Floodplain Restoration*: Floodplain restoration levee construction  
18 would permanently remove 43 acres and temporarily remove 35 acres of valley/foothill  
19 riparian natural community. The construction-related losses would be considered a permanent  
20 removal of the habitats directly affected. These losses would be expected to occur along the San  
21 Joaquin River and other major waterways in CZ 7 (see Figure 12-1). This activity is scheduled to  
22 start following construction of water conveyance facilities, which is expected to take 10 years.
- 23 • *CM6 Channel Margin Enhancement*: Channel margin habitat enhancement could result in  
24 removal of small amounts of valley/foothill riparian habitat along 20 miles of river and sloughs.  
25 The extent of this loss cannot be quantified at this time, but the majority of the enhancement  
26 activity would occur along waterway margins where riparian habitat stringers exist, including  
27 levees and channel banks. The improvements would occur within the study area on sections of  
28 the Sacramento, San Joaquin and Mokelumne Rivers, and along Steamboat and Sutter Sloughs.
- 29 • *CM7 Riparian Natural Community Restoration*: The valley/foothill riparian natural community  
30 would be restored primarily in association with the tidal (CM4) and floodplain (CM5)  
31 restoration and channel margin enhancements (CM6). Following community-specific goals and  
32 objectives in the Plan, a total of 5,000 acres of this community would be restored (BDCP  
33 Objective VFRNC1.1) and 750 acres would be protected (BDCP Objective VFRNC1.2) over the life  
34 of the Plan. Approximately 800 acres would be restored and the entire 750 acres would be  
35 protected in the first 10 years of Plan implementation. Riparian restoration and protection  
36 would be focused in CZs 4 and 7 (BDCP Objective VFRNC2.3), with a goal of adding a 500-acre  
37 portion of the restoration in one or the other of these zones. A variety of successional stages  
38 would also be sought to benefit the variety of sensitive plant and animal species that rely on this  
39 natural community in the study area (BDCP Objective VFRNC2.4).

40 The following paragraphs summarize the combined effects discussed above and describe other  
41 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA impact conclusions are  
42 also included.

1       **Near-Term Timeframe**

2       During the near-term timeframe (the first 10 years of BDCP implementation), Alternative 9 would  
3       affect the valley/foothill riparian natural community through CM1 construction losses (61 acres  
4       permanent and 248 acres temporary) and the CM2 construction losses (89 acres permanent and 88  
5       acres temporary). These losses would occur primarily along Middle River as channel dredging  
6       proceeds, at various operable barrier and diversion structure construction sites scattered across the  
7       Delta, and in the northern Yolo Bypass. Approximately 298 acres of the inundation and  
8       construction-related loss from CM4 would occur in the near-term. These losses would occur  
9       throughout the ROAs mapped in Figure 12-1.

10       The construction losses of this special-status natural community would represent an adverse effect  
11       if they were not offset by avoidance and minimization measures and protection/restoration actions  
12       associated with BDCP conservation components. Loss of valley/foothill riparian natural community  
13       would be considered a loss in acreage of a sensitive natural community, and could be considered a  
14       loss of wetlands as defined in Section 404 of the CWA. As indicated above, much of this riparian loss  
15       would be in small patches or narrow strips along waterways, with limited structural complexity. The  
16       restoration of 800 acres (CM3) and protection (including significant enhancement) of 750 acres of  
17       valley/foothill riparian natural community (CM7) during the first 10 years of Alternative 9  
18       implementation would partially offset this near-term loss. At least 400 acres of the protection is  
19       planned for the first 5 years of Alternative 9 implementation. The restoration areas would be large  
20       areas providing connectivity with existing riparian habitats and would include a variety of trees and  
21       shrubs to produce structural complexity. Typical project-level mitigation ratios (1:1 for restoration  
22       and 1:1 for protection) would indicate that 784 acres of protection and 784 acres of restoration  
23       would be needed to offset (i.e., mitigate) the 784 acres of near-term loss (the combination of  
24       permanent and temporary near-term losses listed in Table 12-9-4). The combined 1,550 acres of  
25       protection and restoration in the near-term, combined with Plan goals for protecting and restoring  
26       high-value riparian habitats, are designed to avoid a temporal lag in the value of riparian habitat  
27       available to sensitive species. The restoration and protection acreages contained in the BDCP would  
28       not be sufficient to provide the typical level of mitigation for this community; therefore, the effect of  
29       Alternative 9 would be adverse. Mitigation would be available to offset this effect.

30       The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
31       *Construction Best Management Practices and Monitoring*, *AMM6 Disposal and Reuse of Spoils*,  
32       *Reusable Tunnel Material*, and *Dredged Material*, *AMM7 Barge Operations Plan*, *AMM10 Restoration of*  
33       *Temporarily Affected Natural Communities*, and *AMM18 Swainson's Hawk and White-Tailed Kite*. All  
34       of these AMMs include elements that avoid or minimize the risk of affecting habitats at work areas  
35       and storage sites. The AMMs are described in detail in BDCP Appendix 3.C.

36       **Late Long-Term Timeframe**

37       Implementation of Alternative 9 as a whole would result in an estimated 6% loss of valley/foothill  
38       riparian community in the study area. These losses (745 acres of permanent and 371 acres of  
39       temporary loss) would be largely associated with construction of the water conveyance facilities  
40       (CM1), construction of Yolo Bypass fish improvements (CM2), and inundation during tidal marsh  
41       restoration (CM4). Inundation losses would occur during the course of BDCP restoration activities at  
42       various tidal restoration sites throughout the study area. By the end of the Plan timeframe, a total of  
43       5,000 acres of this natural community would be restored and 750 acres would be protected (CM7

1 and CM3, respectively). The restoration would occur primarily in CZs 4 and 7, in the  
2 Cosumnes/Mokelumne and South Delta ROAs (see Figure 12-1).

3 **NEPA Effects:** The restoration of 800 acres and protection (including significant enhancement) of  
4 750 acres of valley/foothill riparian natural community as part of CM7 and CM3 during the first 10  
5 years of Alternative 9 implementation would minimize the near-term loss of this community, but  
6 would result in an adverse effect. Because of the Plan's commitment to restoration of 5,000 acres  
7 and protection of 750 acres of valley/foothill riparian natural community during the course of the  
8 Plan, Alternative 9 would not result in a net long-term reduction in the acreage and value of a  
9 sensitive natural community; the effect would be beneficial.

10 **CEQA Conclusion:**

11 **Near-Term Timeframe**

12 Alternative 9 would result in the loss of approximately 784 acres of valley/foothill riparian natural  
13 community due to construction of the water conveyance facilities (CM1) and fish passage  
14 improvements (CM2), and inundation during tidal marsh restoration (CM4) in the near-term. These  
15 losses would occur primarily along Middle River as channel dredging proceeds, at various operable  
16 barrier and diversion structure construction sites scattered across the Delta, and in the northern  
17 Yolo Bypass. The construction losses would be spread across a 10-year near-term timeframe. These  
18 losses would be partially offset by planned restoration of 800 acres (CM7) and protection (including  
19 significant enhancement) of 750 acres (CM3) of valley/foothill riparian natural community  
20 scheduled for the first 10 years of Alternative 9 implementation. At least 400 acres of the protection  
21 is planned for the first 5 years of Alternative 9 implementation. Implementation of Plan goals for the  
22 location, patch size and composition of riparian community protection and restoration would aid in  
23 maintaining the value of riparian habitats in this near-term period. AMM1, AMM2, AMM6, AMM7,  
24 AMM10 and AMM18 would also be implemented to minimize impacts. In spite of these near-term  
25 restoration and protection activities and AMMs, impacts would be significant. Typical project-level  
26 mitigation ratios (1:1 for protection and 1:1 for restoration) would indicate that 784 acres of  
27 protection and 784 acres of restoration would be needed to offset (i.e., mitigate) the 784 acres of  
28 loss (the combination of permanent and temporary near-term losses listed in Table 12-9-4).  
29 Alternative 9 would be short 34 acres of protection in the near-term to meet typical mitigation  
30 ratios. The restoration would be initiated at the beginning of Alternative 9 implementation to  
31 minimize any time lag in the availability of this habitat to special-status species. With the  
32 implementation of Mitigation Measure BIO-9a, *Compensate for Loss of Valley/Foothill Riparian*  
33 *Natural Community*, the impact would be less than significant.

34 **Late Long-Term Timeframe**

35 At the end of the Plan period, 1,116 acres of valley/foothill riparian natural community would be  
36 permanently or temporarily removed by conservation actions, 5,000 acres would be restored and  
37 750 acres would be protected. There would be no net permanent reduction in the acreage and value  
38 of this sensitive natural community within the study area. Therefore, Alternative 9 would not have a  
39 substantial adverse effect on this natural community; the impact would be beneficial.

1       **Mitigation Measure BIO-9a: Compensate for Loss of Valley/Foothill Riparian Natural**  
2       **Community**

3       To fully compensate for loss of valley/foothill riparian natural community as a result of  
4       implementing Alternative 9, DWR shall increase its near-term goals for protection of this natural  
5       community to 784 acres.

6       **Impact BIO-10: Increased Frequency, Magnitude and Duration of Periodic Inundation of**  
7       **Valley/Foothill Riparian Natural Community**

8       Two Alternative 9 conservation measures would modify the inundation/flooding regimes of both  
9       natural and man-made waterways in the study area. CM2, which is designed to improve fish passage  
10      and shallow flooded habitat for Delta fishes in the Yolo Bypass, would increase periodic inundation  
11      of valley/foothill riparian natural community at scattered locations, while CM5 would expose this  
12      community to additional flooding as channel margins are modified and levees are set back to  
13      improve fish habitat along some of the major rivers and waterways of the study area.

- 14      ● *CM2 Yolo Bypass Fisheries Enhancement:* Operation of the Yolo Bypass under Alternative 9 would  
15      result in an increase in the frequency, magnitude and duration of inundation of 51–92 acres of  
16      valley/foothill riparian natural community. The area more frequently inundated would vary  
17      with the flows that would be passed through the newly constructed notch in the Fremont Weir.  
18      The 51 acres would be created by a notch flow of 8,000 cfs and the 92 acres would be created by  
19      a notch flow of 4,000 cfs. The methods used to estimate these inundation acreages are described  
20      in BDCP Appendix 5.J, *Effects on Natural Communities, Wildlife, and Plants*. These increased flow  
21      conditions would be expected to occur in no more than 30% of all years (see BDCP Chapter 5,  
22      Section 5.4.1.2). The valley/foothill riparian community occurs throughout the bypass, including  
23      a large acreage just below Fremont Weir in the north end of the bypass. There are other riparian  
24      habitat areas on Liberty Island, and, to a lesser extent, along the eastern and western edges of  
25      the bypass, including along the Tule Canal/Toe Drain, the west side channels and the  
26      Sacramento Bypass. The anticipated change in management of flows in the Yolo Bypass includes  
27      more frequent releases in flows into the bypass from the Fremont and Sacramento Weirs, and in  
28      some years, later releases into the bypass in spring months (April and May). The modification of  
29      periodic inundation events would not adversely affect riparian habitats, as they have persisted  
30      under similar high flows and extended inundation periods in the Yolo Bypass. The effects of this  
31      inundation on wildlife and plant species are described in detail in later sections of this chapter.
- 32      ● *CM5 Seasonally Inundated Floodplain Restoration:* Floodplain restoration would result in an  
33      increase in the frequency and duration of inundation of 266 acres of valley/foothill riparian  
34      habitats. Specific locations for this restoration activity have not been identified, but they would  
35      likely be focused in the south Delta area, along the major rivers and Delta channels in CZ 7 (see  
36      Figure 12-1). The reconnection of riparian vegetation to periodic stream flooding events would  
37      be beneficial to the ecological function of this natural community, especially in the germination  
38      and establishment of native riparian plants as flood scour increases.

39      In summary, 317–368 acres of valley/foothill riparian community in the study area would be  
40      subjected to more frequent inundation as a result of implementing two Alternative 9 conservation  
41      measures (CM2 and CM5). The valley/foothill riparian community is conditioned to and benefits  
42      from periodic inundation; therefore, periodic inundation would not result in a net permanent  
43      reduction in the acreage of this community in the study area. The increased inundation could create

1 a beneficial effect on the community as it relates to germination and establishment of native riparian  
2 plants.

3 **NEPA Effects:** Increasing periodic inundation of valley/foothill riparian natural community in the  
4 Yolo Bypass and along south Delta waterways would have a beneficial effect on the community.

5 **CEQA Conclusion:** An estimated 317–368 acres of valley/foothill riparian community in the study  
6 area would be subjected to more frequent inundation as a result of implementing CM2 and CM5  
7 under Alternative 9. The valley/foothill riparian community is conditioned to and benefits from  
8 periodic inundation; therefore, periodic inundation would not result in a net permanent reduction in  
9 the acreage of this community in the study area. Increasing periodic inundation of valley/foothill  
10 riparian natural community in the Yolo Bypass and along south Delta waterways would have a  
11 beneficial impact on the community.

### 12 **Impact BIO-11: Modification of Valley/Foothill Riparian Natural Community from Ongoing** 13 **Operation, Maintenance and Management Activities**

14 Once the physical facilities associated with Alternative 9 are constructed and the stream flow regime  
15 associated with changed water management is in effect, there would be new ongoing and periodic  
16 actions associated with operation, maintenance and management of the BDCP facilities and  
17 conservation lands that could affect valley/foothill riparian natural community in the study area.  
18 The ongoing actions include modified operation of upstream reservoirs, the diversion of Sacramento  
19 River flows at two new diversion structures at Georgianna Slough and Delta Cross Channel, the  
20 operation of multiple operable barriers in Delta waterways, modified diversions from south Delta  
21 channels, and recreational use of reserve areas. These actions are associated with CM1 and CM11  
22 (see the impact discussion above for effects associated with CM2). The periodic actions would  
23 involve access road and conveyance facility repair, vegetation management at the various water  
24 conveyance facilities and habitat restoration sites (CM11), levee repair and replacement of levee  
25 armoring, channel dredging, and habitat enhancement in accordance with natural community  
26 management plans. The potential effects of these actions are described below.

- 27 ● *Modified releases and water levels in upstream reservoirs.* Modified releases and water levels at  
28 Shasta Lake, Lake Oroville, Whiskeytown Lake, Lewiston Lake, and Folsom Lake would not affect  
29 valley/foothill riparian natural community. The anticipated changes in water levels over time  
30 with Alternative 9, as compared to no action, would be slightly lower in the October to May  
31 timeframe. The small changes in frequency of higher water levels in these lakes would not  
32 substantially reduce the small patches of riparian vegetation that occupy the upper fringes of  
33 the reservoir pools. Changes in releases that would influence downstream river flows are  
34 discussed below.
- 35 ● *Modified river flows upstream of and within the study area and modified diversions from south*  
36 *Delta channels.* Changes in releases from reservoirs upstream of the study area and their  
37 resultant changes in flows in the Sacramento, American and Feather Rivers, modified diversion  
38 of Sacramento River flows at Georgianna Slough and Delta Cross Channel, and modified  
39 diversions from south Delta channels (Operational Scenario G) would not be expected to result  
40 in the permanent reduction in acreage of the valley/foothill riparian natural community along  
41 these waterways. There is no evidence that flow levels in the upstream rivers would change  
42 such that the acreage of valley/foothill riparian natural community would be reduced on a  
43 permanent basis. Riparian habitats along the rivers of the Sacramento Valley have historically

1 been exposed to significant variations in river stage. Based on modeling conducted for the BDCP  
2 (see Appendix 11C, *CALSIM II Model Results Utilized in the Fish Analysis*), flow levels in these  
3 upstream rivers could be reduced nearly 20% in certain months of certain water-year types, and  
4 could be increased similarly in certain months of certain water-year types. Estimates of average  
5 changes range from less than 1% to more than 12% decreases in the July to November time  
6 frame when compared to No Action, while estimated average flow levels in the February to May  
7 time frame could increase between 1% and 7% with implementation of Alternative 9. Similar  
8 ranges in average flow changes below Sacramento are included in Appendix 11C, Section 11C.9.  
9 Tidal influence in the Sacramento River and Delta waterways would continue to be dominant  
10 such that there would be no substantial change in water levels that might affect in-stream and  
11 adjacent vegetation. Modified diversions from south Delta channels would not create a  
12 reduction in this natural community.

13 The periodic changes in flows in the Sacramento River, Feather River, and American River  
14 associated with modified reservoir operations, and the increased diversion of Sacramento River  
15 flows at Georgiana Slough and Delta Cross Channel associated with Alternative 9 could affect  
16 salinity, water temperature, dissolved oxygen levels, turbidity, contaminant levels and dilution  
17 capacity in these rivers and Delta waterways. These changes are discussed in detail in Chapter 8,  
18 *Water Quality*. Increases in electrical conductivity (salinity) could occur in the west Delta and  
19 Suisun Marsh as a result of these changed water operations. These salinity changes may alter the  
20 plant composition of riparian habitats along the lower Sacramento and San Joaquin Rivers and  
21 west Delta islands. The severity and extent of these salinity changes would be complicated by  
22 anticipated sea level rise and the effects of downstream tidal restoration over the life of the Plan.  
23 There is the potential that some valley/foothill riparian natural community may be degraded  
24 immediately adjacent to river channels. The riparian communities in the west Delta are  
25 dominated by willows, cottonwood and mixed brambles. These potential changes are not  
26 expected to result in a significant reduction in the acreage and value of valley/foothill riparian  
27 natural community in the study area.

- 28 • *Access road, water conveyance facilities and levee repair.* Periodic repair of access roads, water  
29 conveyance facilities and levees associated with the BDCP actions have the potential to require  
30 removal of adjacent vegetation and could entail earth and rock work in valley/foothill riparian  
31 habitats. This activity could lead to increased soil erosion, turbidity and runoff entering these  
32 habitats. These activities would be subject to normal erosion, turbidity and runoff control  
33 management practices, including those developed as part of *AMM2 Construction Best*  
34 *Management Practices and Monitoring* and *AMM4 Erosion and Sediment Control Plan*. Any  
35 vegetation removal or earth work adjacent to or within riparian habitats would require use of  
36 sediment barriers, soil stabilization and revegetation of disturbed surfaces (*AMM10 Restoration*  
37 *of Temporarily Affected Natural Communities*). Proper implementation of these measures would  
38 avoid permanent adverse effects on this community.
- 39 • *Vegetation management.* Vegetation management, in the form of physical removal and chemical  
40 treatment, would be a periodic activity associated with the long-term maintenance of water  
41 conveyance facilities and restoration sites (*CM11 Natural Communities Enhancement and*  
42 *Management*). Use of herbicides to control nuisance vegetation could pose a long-term hazard to  
43 valley/foothill riparian natural community at or adjacent to treated areas. The hazard could be  
44 created by uncontrolled drift of herbicides, uncontrolled runoff of contaminated stormwater  
45 onto the natural community, or direct discharge of herbicides to riparian areas being treated for  
46 invasive species removal. Environmental commitments and *AMM5 Spill Prevention, Containment,*

1        *and Countermeasure Plan* have been made part of the BDCP to reduce hazards to humans and  
2        the environment from use of various chemicals during maintenance activities, including the use  
3        of herbicides. These commitments are described in Appendix 3B, including the commitment to  
4        prepare and implement spill prevention, containment, and countermeasure plans and  
5        stormwater pollution prevention plans. Best management practices, including control of drift  
6        and runoff from treated areas, and use of herbicides approved for use in terrestrial  
7        environments would also reduce the risk of affecting natural communities adjacent to water  
8        conveyance features and levees associated with restoration activities.

- 9        ● *Channel dredging.* Long-term operation of the Alternative 9 diversions on the Sacramento River  
10        (Georgianna Slough and Delta Cross Channel) would include periodic dredging of sediments that  
11        might accumulate in front of intake and fish screens. Maintenance dredging would also be  
12        required in Middle River and Victoria Canal to maintain channel capacity. The dredging would  
13        occur adjacent to valley/foothill riparian natural community. This activity should not adversely  
14        affect riparian plants as long as dredging equipment is kept out of riparian areas and dredge  
15        spoil is disposed of outside of riparian corridors. *AMM2 Construction Best Management Practices*  
16        *and Monitoring, AMM3 Stormwater Pollution Prevention Plan, AMM4 Erosion and Sediment*  
17        *Control Plan, AMM5 Spill Prevention, Containment, and Countermeasure Plan, AMM6 Disposal and*  
18        *Reuse of Spoils, Reusable Tunnel Material, and Dredged Material, and AMM10 Restoration of*  
19        *Temporarily Affected Natural Communities* are part of the Plan and would require actions to  
20        avoid or minimize dredging effects on adjacent sensitive vegetation.
- 21        ● *Habitat enhancement.* The BDCP includes a long-term management element for the natural  
22        communities within the Plan Area (CM11). For the valley/foothill riparian natural community, a  
23        management plan would be prepared that specifies actions to improve the value of the habitats  
24        for covered species. Actions would include control of invasive nonnative plant and animal  
25        species, fire management, restrictions on vector control and application of herbicides, and  
26        maintenance of infrastructure that would allow for movement through the community. The  
27        enhancement efforts would improve the long-term value of this community for both special-  
28        status and common species.
- 29        ● *Recreation.* The BDCP would allow for certain types of recreation in and adjacent to  
30        valley/foothill riparian natural community in the reserve system. The activities could include  
31        wildlife and plant viewing and hiking. *CM11 Natural Communities Enhancement and*  
32        *Management* (BDCP Chapter 3, Section 3.4.11) describes this program and identifies applicable  
33        restrictions on recreation that might adversely affect riparian habitat. The BDCP also includes an  
34        avoidance and minimization measure (AMM37) that further dictates limits on recreation  
35        activities that might affect this natural community. Priority would be given to use of existing  
36        trails and roads, with some potential for new trails. Limited tree removal and limb trimming  
37        could also be involved.

38        The various operations and maintenance activities described above could alter acreage of  
39        valley/foothill riparian natural community in the study area through changes in flow patterns and  
40        resultant changes in water quality. Activities could also introduce sediment and herbicides that  
41        would reduce the value of this community to common and sensitive plant and wildlife species.  
42        Recreation activities could encroach on riparian areas and require occasional tree removal. Other  
43        periodic activities associated with the Plan, including management, protection and enhancement  
44        actions associated with *CM3 Natural Communities Protection and Restoration* and *CM11 Natural*  
45        *Communities Enhancement and Management*, would be undertaken to enhance the value of the

1 community. While some of these activities could result in small changes in acreage, these changes  
2 would be greatly offset by restoration and protection activities planned as part of *CM7 Riparian*  
3 *Natural Community Restoration* and *CM3 Natural Communities Protection and Restoration*, or  
4 minimized by implementation of AMM2, AMM3, AMM4, AMM5, AMM6, AMM10, AMM18 and  
5 AMM37. The management actions associated with levee repair, periodic dredging and control of  
6 invasive plant species would also result in a long-term benefit to the species associated with  
7 riparian habitats by improving water movement in adjacent waterways and by eliminating  
8 competitive, invasive species of plants.

9 **NEPA Effects:** Ongoing operation, maintenance and management activities associated with  
10 Alternative 9 would not result in a net permanent reduction in the valley/foothill riparian natural  
11 community within the study area. Therefore, there would be no adverse effect to the community.

12 **CEQA Conclusion:** The operation and maintenance activities associated with Alternative 9 would  
13 have the potential to create minor changes in total acreage of valley/foothill riparian natural  
14 community in the study area, and could create temporary increases in turbidity and sedimentation.  
15 The activities could also introduce herbicides periodically to control nonnative, invasive plants.  
16 Implementation of environmental commitments and AMM2, AMM3, AMM4, AMM5, AMM6, AMM10,  
17 AMM18 and AMM37 would minimize these impacts, and other operations and maintenance  
18 activities, including management, protection and enhancement actions associated with *CM3 Natural*  
19 *Communities Protection and Restoration* and *CM11 Natural Communities Enhancement and*  
20 *Management*, would create positive effects, including reduced competition from invasive, nonnative  
21 plants in these habitats. Long-term restoration and protection activities associated with *CM7*  
22 *Riparian Natural Community Restoration* and *CM3 Natural Communities Protection and Restoration*  
23 would expand this natural community in the study area. Ongoing operation, maintenance and  
24 management activities would not result in a net permanent reduction in this sensitive natural  
25 community within the study area. Therefore, there would be a less-than-significant impact.

### 26 **Nontidal Perennial Aquatic**

27 Construction, operation, maintenance and management associated with the conservation  
28 components of Alternative 9 would have no long-term adverse effects on the habitats associated  
29 with the nontidal perennial aquatic natural community. Initial development and construction of  
30 CM2, CM4, CM5, and CM6 would result in both permanent and temporary removal of this  
31 community (see Table 12-9-5). Full implementation of Alternative 9 would also include the  
32 following conservation actions over the term of the BDCP to benefit the nontidal perennial aquatic  
33 natural community.

- 34 • Create at least 1,200 acres of nontidal marsh consisting of a mosaic of nontidal perennial aquatic  
35 and nontidal freshwater perennial emergent wetland natural communities (Objective  
36 NFEW/NPANC1.1, associated with CM10).

37 There is a variety of other, less specific conservation goals and objectives in BDCP Chapter 3, Section  
38 3.3 that would improve the value of nontidal perennial aquatic natural community for terrestrial  
39 species. As explained below, with the restoration and enhancement of these amounts of habitat, in  
40 addition to implementation of AMMs, impacts on this natural community would not be adverse for  
41 NEPA purposes and would be less than significant for CEQA purposes.

1 **Table 12-9-5. Changes in Nontidal Perennial Aquatic Natural Community Associated with**  
2 **Alternative 9 (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Permanent		Temporary		Periodic <sup>d</sup>	
	NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	0	0	0	0	0	0
CM2	24	24	12	12	50-77	0
CM4	34	189	0	0	0	0
CM5	0	28	0	16	0	25
CM6	Unk.	Unk.	Unk.	Unk.	0	0
<b>TOTAL IMPACTS</b>	<b>58</b>	<b>241</b>	<b>12</b>	<b>28</b>	<b>50-77</b>	<b>25</b>

<sup>a</sup> See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

Unk. = unknown

3

4 **Impact BIO-12: Changes in Nontidal Perennial Aquatic Natural Community as a Result of**  
5 **Implementing BDCP Conservation Measures**

6 Construction and land grading activities that would accompany the implementation of CM2, CM4,  
7 CM5, and CM6 would permanently eliminate an estimated 241 acres and temporarily remove 28  
8 acres of nontidal perennial aquatic natural community in the study area. These modifications  
9 represent approximately 5% of the 5,567 acres of the community that is mapped in the study area.  
10 Approximately 26% (70 acres) of the permanent and temporary losses would occur during the first  
11 10 years of Alternative 9 implementation, as habitat restoration is initiated. Natural communities  
12 restoration would add 1,200 acres of nontidal marsh over the life of the Plan (CM10), which would  
13 expand the area of that habitat and offset the losses. The nontidal marsh restoration would include a  
14 mosaic of nontidal perennial aquatic and nontidal freshwater perennial emergent wetland natural  
15 communities, as specified in Objective NFEW/NPANC1.1. The BDCP beneficial effects analysis (BDCP  
16 Chapter 5, Section 5.4.6.2) indicates that implementation of Alternative 4 will result in the  
17 restoration of 1,200 acres of nontidal marsh, and that the restoration will occur in blocks that will be  
18 contiguous with the Plan's larger reserve system. The nontidal marsh will be restored in the vicinity  
19 of giant garter snake subpopulations identified in the recovery plan for this species (U.S. Fish and  
20 Wildlife Service 1998). The same conservation actions would be implemented under Alternative 9.

21 The individual effects of each relevant conservation measure are addressed below. A summary  
22 statement of the combined impacts and NEPA and CEQA conclusions follows the individual  
23 conservation measure discussions.

- 1       • *CM1 Water Facilities and Operation*: Construction of the Alternative 9 water conveyance facilities  
2       would not affect nontidal perennial aquatic natural community.
- 3       • *CM2 Yolo Bypass Fisheries Enhancement*: Implementation of CM2 involves a number of  
4       construction activities within the Yolo and Sacramento Bypasses, including Fremont Weir and  
5       stilling basin improvements, west side channels modifications, Putah Creek realignment  
6       activities, and Sacramento Weir and Tule Canal improvements. All of these activities could  
7       involve excavation and grading in nontidal perennial aquatic areas to improve passage of fish  
8       through the bypasses. Based on hypothetical construction footprints, a total of 24 acres could be  
9       permanently lost and another 12 acres could be temporarily removed. This activity would occur  
10      primarily in the near-term timeframe.
- 11      • *CM4 Tidal Natural Communities Restoration*: Based on the use of hypothetical restoration  
12      footprints, implementation of CM4 would permanently change to tidally inundated or remove  
13      189 acres of nontidal perennial aquatic community. These losses would be expected to occur  
14      primarily in the Cache Slough and Cosumnes/Mokelumne ROAs (see Figure 12-1). An estimated  
15      1,200 acres of nontidal marsh would be restored during tidal habitat restoration (BDCP  
16      Objective NFEW/NPANC1.1, associated with CM10). Approximately 400 acres of the restoration  
17      would occur during the first 10 years of Alternative 9 implementation, which would coincide  
18      with the timeframe of water conveyance facilities construction. The remaining restoration  
19      would be spread over the following 30 years. Nontidal natural communities restoration is  
20      expected to be focused in CZs 2, 4 and/or 5 identified in Figure 12-1.
- 21      • *CM5 Seasonally Inundated Floodplain Restoration*: Based on theoretical footprints, floodplain  
22      restoration levee construction would permanently remove 28 acres and temporarily remove 16  
23      acres of nontidal perennial aquatic habitat. The construction-related losses would be considered  
24      a permanent removal of the nontidal perennial aquatic habitats. It is expected that floodplain  
25      restoration would be focused on the south part of the study area, in CZ 7. This activity is  
26      scheduled to start following construction of water conveyance facilities, which is expected to  
27      take 10 years. Floodplain restoration along the southern Delta rivers would improve  
28      connectivity for a variety of species that rely on aquatic and riparian habitats. The regional and  
29      Plan Area landscape linkages along the San Joaquin River, Middle River and Old River are  
30      included in Figure 12-2. This activity is scheduled to start following construction of water  
31      conveyance facilities, which is expected to take 10 years.
- 32      • *CM6 Channel Margin Enhancement*: Channel margin habitat enhancement could result in filling  
33      of small amounts of nontidal perennial aquatic habitat along 20 miles of river and sloughs. The  
34      extent of this loss cannot be quantified at this time, but the majority of the enhancement activity  
35      would occur on the edges of tidal perennial aquatic habitat, including levees and channel banks.  
36      Nontidal marsh adjacent to these tidal areas could be affected. The improvements would occur  
37      within the study area on sections of the Sacramento, San Joaquin and Mokelumne Rivers, and  
38      along Steamboat and Sutter Sloughs.
- 39      • *CM10 Nontidal Marsh Restoration*: CM10 would entail restoration of 1,200 acres of nontidal  
40      marsh in CZs 2, 4 and/or 5. The restoration would create a mosaic of nontidal perennial aquatic  
41      and nontidal freshwater perennial emergent natural communities. This marsh restoration  
42      would occur in 25-acre or larger patches in or near giant garter snake occupied habitat and  
43      would be accompanied by adjacent grassland restoration or protection.

1 The following paragraphs summarize the combined effects discussed above and describe other  
2 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA impact conclusions are  
3 also included.

#### 4 ***Near-Term Timeframe***

5 During the near-term timeframe (the first 10 years of BDCP implementation), Alternative 9 would  
6 affect the nontidal perennial aquatic community through CM2 construction losses (24 acres  
7 permanent and 12 acres temporary). These losses would occur primarily at scattered locations  
8 along the west side channels and the channels associated with the Sacramento and Lisbon Weirs in  
9 the Yolo Bypass. Approximately 34 acres of the inundation and construction-related losses from  
10 CM4 would occur in the near-term. These losses would occur throughout several of the ROAs  
11 mapped in Figure 12-1.

12 The construction losses of this special-status natural community would represent an adverse effect  
13 if they were not offset by avoidance and minimization measures and restoration actions associated  
14 with BDCP conservation components. Loss of nontidal perennial aquatic natural community would  
15 be considered both a loss in acreage of a sensitive natural community and a loss of waters of the  
16 United States as defined by Section 404 of the CWA. The creation of 400 acres of nontidal marsh as  
17 part of CM10 during the first 10 years of Alternative 9 implementation would offset this near-term  
18 loss, avoiding any adverse effect. Typical project-level mitigation ratios (1:1 for restoration and 1:1  
19 for protection) would indicate 70 acres of restoration and 70 acres of protection would be needed to  
20 offset (i.e., mitigate) the 70 acres of loss. While the Plan does not include protection of nontidal  
21 perennial aquatic habitat, it includes well in excess of the typical 1:1 restoration acreage (which  
22 includes protection in perpetuity), and therefore compensates for the lack of protection.

23 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
24 *Construction Best Management Practices and Monitoring*, *AMM6 Disposal and Reuse of Spoils*,  
25 *Reusable Tunnel Material*, and *Dredged Material*, *AMM7 Barge Operations Plan*, and *AMM10*  
26 *Restoration of Temporarily Affected Natural Communities*. All of these AMMs include elements that  
27 avoid or minimize the risk of affecting habitats at work areas and storage sites. The AMMs are  
28 described in detail in BDCP Appendix 3.C.

#### 29 ***Late Long-Term Timeframe***

30 Implementation of Alternative 9 as a whole would result in 5% losses of nontidal perennial aquatic  
31 community in the study area. These losses (241 acres of permanent and 28 acres of temporary loss)  
32 would be largely associated with construction of Yolo Bypass fish improvements (CM2), and change  
33 to tidally influenced inundation during tidal marsh restoration (CM4). The changes in tidally  
34 influenced inundation would occur during the course of the CM4 restoration activities at various  
35 tidal restoration sites throughout the study area. By the end of the Plan timeframe, a total of 1,200  
36 acres of nontidal marsh would be restored. The restoration would occur over a wide region of the  
37 study area, including within the Cosumnes/Mokelumne, Cache Slough and South Delta ROAs (see  
38 Figure 12-1).

39 ***NEPA Effects:*** During the first 10 years of implementing Alternative 9, creating 400 acres of nontidal  
40 marsh as part of CM10 would offset the construction-related and inundation losses of 70 acres of  
41 nontidal perennial aquatic natural community. There would be no adverse effect. During the full  
42 duration of Plan implementation, Alternative 9 would not result in a net reduction in the acreage of

1 the nontidal perennial aquatic natural community; there would be an expansion of nontidal marsh  
2 and the effect would be beneficial.

3 ***CEQA Conclusion:***

4 ***Near-Term Timeframe***

5 Alternative 9 would result in the loss of approximately 70 acres of nontidal perennial aquatic  
6 natural community due to construction of fish passage improvements (CM2), and change to tidally  
7 influenced inundation during tidal marsh restoration (CM4). The construction losses would occur  
8 primarily at scattered locations along the west side channels and the channels associated with the  
9 Sacramento and Lisbon Weirs in the Yolo Bypass. The 34 acres of the inundation and construction-  
10 related losses from CM4 would occur throughout several of the ROAs mapped in Figure 12-1. The  
11 losses would be spread across a 10-year near-term timeframe. These losses would be offset by  
12 planned restoration of 400 acres of nontidal marsh scheduled for the first 10 years of Alternative 9  
13 implementation (CM10). Also, AMM1, AMM2, AMM6, AMM7, and AMM10 would be implemented to  
14 minimize impacts. Because of these offsetting near-term restoration activities and AMMs, impacts  
15 would be less than significant. Typical project-level mitigation ratios (1:1 for restoration and 1:1 for  
16 protection) would indicate that 70 acres of restoration and 70 acres of protection would be needed  
17 to offset (i.e., mitigate) the 70 acres of loss. While the Plan does not include protection of nontidal  
18 perennial aquatic habitat, it includes well in excess of the typical 1:1 restoration acreage (which  
19 includes protection in perpetuity), and therefore compensates for the lack of protection. The  
20 restoration and protection would be initiated at the beginning of Alternative 9 implementation to  
21 minimize any time lag in the availability of this habitat to special-status species, and would result in  
22 a net gain in acreage of this sensitive natural community.

23 ***Late Long-Term Timeframe***

24 At the end of the Plan period, 269 acres of the natural community would be removed and 1,200  
25 acres of nontidal marsh would be restored. The nontidal marsh would consist of a mosaic of nontidal  
26 perennial aquatic and nontidal freshwater perennial emergent wetland natural communities. There  
27 would be no net permanent reduction in the acreage of this sensitive natural community within the  
28 study area. Therefore, Alternative 9 would not have a substantial adverse effect on this natural  
29 community; the impact would be beneficial.

30 **Impact BIO-13: Increased Frequency, Magnitude and Duration of Periodic Inundation of**  
31 **Nontidal Perennial Aquatic Natural Community**

32 Two Alternative 9 conservation measures would modify the inundation/flooding regimes of both  
33 natural and man-made waterways in the study area. CM2, which is designed to improve fish passage  
34 and shallow flooded habitat for Delta fishes in the Yolo Bypass, would increase periodic inundation  
35 of nontidal perennial aquatic natural community on small acreages, while CM5 would expose this  
36 community to additional flooding as channel margins are modified and levees are set back to  
37 improve fish habitat along some of the major rivers and waterways throughout the study area.

- 38 • *CM2 Yolo Bypass Fisheries Enhancement:* Operation of the Yolo Bypass under Alternative 9 would  
39 result in an increase in the frequency, magnitude and duration of inundation of 50–77 acres of  
40 nontidal perennial aquatic natural community. The methods used to estimate these inundation  
41 acreages are described in BDCP Appendix 5.J, Effects on Natural Communities, Wildlife, and  
42 Plants. The area more frequently affected by inundation would vary with the flow volume that

1 would pass through the newly constructed notch in the Fremont Weir. The 50-acre increase in  
2 inundation would be associated with a notch flow of 3,000 cubic feet per second (cfs), and the  
3 77-acre increase would result from a notch flow of 6,000 cfs. Plan-related increases in flow  
4 through Fremont Weir would be expected in 30% of the years. This community occurs in small  
5 stringers and patches throughout the bypass, including along the Tule Canal/Toe Drain, the  
6 western channels north of Interstate 80, and below the Fremont and Sacramento Weirs. The  
7 anticipated change in management of flows in the Yolo Bypass includes more frequent releases  
8 in flows into the bypass from the Fremont and Sacramento Weirs, and in some years, later  
9 releases into the bypass in spring months (April and May). The modification of periodic  
10 inundation events would not adversely affect the ecological function of this natural community  
11 and would not substantially modify its value for special-status or common wildlife species.  
12 Nontidal perennial aquatic habitats in the Yolo Bypass have developed under a long-term  
13 regime of periodic inundation events. The extended inundation would be designed to expand  
14 foraging and spawning habitat for Delta fishes. The effects of this inundation on wildlife and  
15 plant species are described in detail in later sections of this chapter.

- 16 • *CM5 Seasonally Inundated Floodplain Restoration*: Floodplain restoration would result in an  
17 increase in the frequency and duration of inundation of an estimated 25 acres of nontidal  
18 perennial aquatic habitat. Specific locations for this restoration activity have not been identified,  
19 but they would likely be focused in the south Delta area, along the major rivers and Delta  
20 channels. The reconnection of these wetlands to stream flooding events would be beneficial to  
21 the ecological function of nontidal perennial aquatic habitats, especially as they relate to BDCP  
22 target aquatic species. The periodic flooding may also encourage germination of nontidal marsh  
23 vegetation.

24 In summary, 75-102 acres of nontidal perennial aquatic community in the study area would be  
25 subjected to more frequent inundation as a result of implementing two Alternative 9 conservation  
26 measures (CM2 and CM5). Nontidal perennial aquatic community in the Yolo Bypass has developed  
27 under a long-term regime of periodic inundation events and inundation along expanded river  
28 floodplains would be infrequent.

29 **NEPA Effects:** The increased inundation of nontidal perennial aquatic natural community in the Yolo  
30 Bypass and along south Delta waterways associated with Alternative 9 would not reduce the  
31 acreage of this natural community and could encourage germination of aquatic vegetation. This  
32 increased inundation would not be adverse.

33 **CEQA Conclusion:** An estimated 75–102 acres of nontidal perennial aquatic community in the study  
34 area would be subjected to more frequent inundation as a result of implementing CM2 and CM5  
35 under Alternative 9. Nontidal perennial aquatic community would not be significantly impacted  
36 because its habitats in the Yolo Bypass have developed under a long-term regime of periodic  
37 inundation events and inundation along expanded river floodplains would be infrequent. The  
38 periodic inundation would not result in a net permanent reduction in the acreage of this community  
39 in the study area. Therefore, there would be no substantial adverse effect on the community. The  
40 impact would be less than significant.

1 **Impact BIO-14: Modification of Nontidal Perennial Aquatic Natural Community from Ongoing**  
2 **Operation, Maintenance and Management Activities**

3 Once the physical facilities associated with Alternative 9 are constructed and the stream flow regime  
4 associated with changed water management is in effect, there would be new ongoing and periodic  
5 actions associated with operation, maintenance and management of the BDCP facilities and  
6 conservation lands that could affect nontidal perennial aquatic natural community in the study area.  
7 The ongoing actions include modified operation of upstream reservoirs, the diversion of Sacramento  
8 River flows at two newly screened sites at Georgianna Slough and Delta Cross Channel in the north  
9 Delta, the operation of multiple operable barriers in Delta waterways, and modified diversions from  
10 south Delta channels. These actions are associated with CM1 (see the impact discussion above for  
11 effects associated with CM2). The periodic actions would involve access road and conveyance facility  
12 repair, vegetation management at the various water conveyance facilities and habitat restoration  
13 sites (CM11), levee repair and replacement of levee armoring, channel dredging, and habitat  
14 enhancement in accordance with natural community management plans. The potential effects of  
15 these actions are described below.

- 16 • *Modified releases and water levels in upstream reservoirs.* Modified releases and water levels at  
17 Shasta Lake, Lake Oroville, Whiskeytown Lake, Lewiston Lake, and Folsom Lake would affect  
18 nontidal perennial aquatic natural community, in the form of the reservoir pools. The  
19 Alternative 9 operations scheme would alter the surface elevations of these reservoir pools as  
20 described in Chapter 6, *Surface Water*. These fluctuations would occur within historic ranges  
21 and would not adversely affect the natural community. Changes in releases that would influence  
22 downstream river flows are discussed below.
- 23 • *Modified river flows upstream of and within the study area and modified diversions from south*  
24 *Delta channels.* Changes in releases from reservoirs upstream of the study area, modified  
25 diversion of Sacramento River flows at Georgianna Slough and Delta Cross Channel, and  
26 modified diversions from south Delta channels (Operational Scenario G) would not result in the  
27 permanent reduction in acreage of the nontidal perennial aquatic natural community in the  
28 study area. Flow levels in the upstream rivers would not change such that the acreage of  
29 nontidal perennial aquatic community would be reduced on a permanent basis. Some minor  
30 increases and some decreases would be expected to occur along the major rivers during some  
31 seasons and in some water-year types, but there would be no permanent loss. Similarly,  
32 increased diversions of Sacramento River flows at Georgianna Slough and Delta Cross Channel  
33 would not result in a permanent reduction in nontidal perennial aquatic community  
34 downstream of these diversions. Nontidal wetlands below the diversions are not directly  
35 connected to the rivers, as this section of Delta waterways is tidally influenced. Modified  
36 diversions from south Delta channels would not create a reduction in this natural community.
- 37 • *Access road, water conveyance facility and levee repair.* Periodic repair of access roads, water  
38 conveyance facilities and levees associated with the BDCP actions have the potential to require  
39 removal of adjacent vegetation and could entail earth and rock work in nontidal perennial  
40 aquatic habitats. This activity could lead to increased soil erosion, turbidity and runoff entering  
41 nontidal perennial aquatic habitats. These activities would be subject to normal erosion,  
42 turbidity and runoff control management practices, including those developed as part of *AMM2*  
43 *Construction Best Management Practices and Monitoring* and *AMM4 Erosion and Sediment*  
44 *Control Plan*. Any vegetation removal or earth work adjacent to or within aquatic habitats would  
45 require use of sediment and turbidity barriers, soil stabilization and revegetation of disturbed

1 surfaces. Proper implementation of these measures would avoid permanent adverse effects on  
2 this community.

- 3 • *Vegetation management.* Vegetation management, in the form of physical removal and chemical  
4 treatment, would be a periodic activity associated with the long-term maintenance of water  
5 conveyance facilities and restoration sites (*CM11 Natural Communities Enhancement and*  
6 *Management*). Vegetation management is also the principal activity associated with *CM13*  
7 *Invasive Aquatic Vegetation Control*. Use of herbicides to control nuisance vegetation could pose  
8 a long-term hazard to nontidal perennial aquatic natural community at or adjacent to treated  
9 areas. The hazard could be created by uncontrolled drift of herbicides, uncontrolled runoff of  
10 contaminated stormwater onto the natural community, or direct discharge of herbicides to  
11 nontidal perennial aquatic areas being treated for invasive species removal. Environmental  
12 commitments and *AMM5 Spill Prevention, Containment, and Countermeasure Plan* have been  
13 made part of the BDCP to reduce hazards to humans and the environment from use of various  
14 chemicals during maintenance activities, including the use of herbicides. These commitments  
15 are described in Appendix 3B, including the commitment to prepare and implement spill  
16 prevention, containment, and countermeasure plans and stormwater pollution prevention  
17 plans. Best management practices, including control of drift and runoff from treated areas, and  
18 use of herbicides approved for use in aquatic environments would also reduce the risk of  
19 affecting natural communities adjacent to water conveyance features and levees associated with  
20 restoration activities.

21 Herbicides to remove aquatic invasive species as part of CM13 would be used to restore the  
22 normal ecological function of tidal and nontidal aquatic habitats in planned restoration areas.  
23 The treatment activities would be conducted in concert with the California Department of  
24 Boating and Waterways' invasive species removal program. Eliminating large stands of water  
25 hyacinth and Brazilian waterweed would improve habitat conditions for some aquatic species  
26 by removing cover for nonnative predators, improving water flow and removing barriers to  
27 movement (see Chapter 11, *Fish and Aquatic Resources*). These habitat changes should also  
28 benefit terrestrial species that use tidal and nontidal perennial aquatic natural community for  
29 movement corridors and for foraging. Vegetation management effects on individual species are  
30 discussed in the species sections on following pages.

- 31 • *Channel dredging.* Channel dredging associated with Alternative 9 would not affect this natural  
32 community. Nontidal wetlands are not connected to the tidal channels that would be dredged.  
33 *AMM2 Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution*  
34 *Prevention Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment,*  
35 *and Countermeasure Plan, AMM6 Reuse and Disposal of Spoils, Reusable Tunnel Material, and*  
36 *Dredged Material, and AMM10 Restoration of Temporarily Affected Natural Communities* are part  
37 of the Plan and would require actions to avoid or minimize dredging effects on adjacent  
38 sensitive vegetation.

- 39 • *Habitat enhancement.* The BDCP includes a long-term management element for the natural  
40 communities within the Plan Area (CM11). For nontidal perennial aquatic natural community, a  
41 management plan would be prepared that specifies actions to improve the value of the habitats  
42 for covered species. Actions would include control of invasive nonnative plant and animal  
43 species, fire management, restrictions on vector control and application of herbicides, and  
44 maintenance of infrastructure that would allow for movement through the community. The

1 enhancement efforts would improve the long-term value of this community for both special-  
2 status and common species.

3 The various operations and maintenance activities described above could alter acreage of nontidal  
4 perennial aquatic natural community in the study area through changes in flow patterns and  
5 changes in periodic inundation of this community. Activities could also introduce sediment and  
6 herbicides that would reduce the value of this community to common and sensitive plant and  
7 wildlife species. Other periodic activities associated with the Plan would be undertaken to enhance  
8 the value of the community. While some of these activities could result in small changes in acreage,  
9 these changes would be greatly offset by restoration activities planned as part of *CM4 Tidal Natural*  
10 *Communities Restoration* and protection actions associated with *CM3 Natural Communities*  
11 *Protection and Restoration*. The management actions associated with levee repair and control of  
12 invasive plant species would also result in a long-term benefit to the species associated with  
13 nontidal perennial aquatic habitats by improving water movement.

14 **NEPA Effects:** Ongoing operation, maintenance and management activities associated with  
15 Alternative 9 would not result in a net permanent reduction in the nontidal perennial aquatic  
16 natural community within the study area. Therefore, there would be no adverse effect on this  
17 natural community.

18 **CEQA Conclusion:** The operation and maintenance activities associated with Alternative 9 would  
19 have the potential to create minor changes in total acreage of nontidal perennial aquatic natural  
20 community in the study area, and could create temporary increases in turbidity and sedimentation.  
21 The activities could also introduce herbicides periodically to control nonnative, invasive plants.  
22 Implementation of environmental commitments and AMM2-AMM6 and AMM10 would minimize  
23 these impacts, and other operations and maintenance activities would create positive effects,  
24 including improved water movement in these habitats. Long-term restoration activities associated  
25 with *CM4 Tidal Natural Communities Restoration* and protection actions associated with *CM3*  
26 *Natural Communities Protection and Restoration* would greatly expand this natural community in the  
27 study area. Ongoing operation, maintenance and management activities would not result in a net  
28 permanent reduction in this sensitive natural community within the study area. Therefore, there  
29 would be a less-than-significant impact.

### 30 **Nontidal Freshwater Perennial Emergent Wetland**

31 Construction, operation, maintenance and management associated with the conservation  
32 components of Alternative 9 would have no long-term adverse effects on the habitats associated  
33 with the nontidal freshwater perennial emergent wetland natural community. Initial development  
34 and construction of CM1, CM2, CM4, and CM6 would result in both permanent and temporary  
35 removal of this community (see Table 12-9-6). Full implementation of Alternative 9 would also  
36 include the following conservation actions over the term of the BDCP to benefit the nontidal  
37 freshwater perennial emergent wetland natural community.

- 38 ● Create at least 1,200 acres of nontidal marsh consisting of a mosaic of nontidal perennial aquatic  
39 and nontidal freshwater perennial emergent wetland natural communities (Objective  
40 NFEW/NPANC1.1, associated with CM10).
- 41 ● Protect and manage 50 acres of occupied or recently occupied tricolored blackbird nesting  
42 habitat located within 5 miles of high-value foraging habitat in Conservation Zones 1, 2, 8 or 11.

1 Nesting habitat will be managed to provide young, lush stands of bulrush/cattail emergent  
2 vegetation (Objective TRBL1.1).

3 There is a variety of other, less specific conservation goals and objectives in BDCP Chapter 3, Section  
4 3.3 that would improve the value of nontidal freshwater perennial emergent wetland natural  
5 community for terrestrial species. As explained below, with the restoration and enhancement of  
6 these amounts of habitat, in addition to implementation of AMMs, impacts on this natural  
7 community would not be adverse for NEPA purposes and would be less than significant for CEQA  
8 purposes.

9 **Table 12-9-6. Changes in Nontidal Freshwater Perennial Emergent Wetland Natural Community**  
10 **Associated with Alternative 9 (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Permanent		Temporary		Periodic <sup>d</sup>	
	NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	1	1	24	24	0	0
CM2	25	25	1	1	6-8	0
CM4	40	99	0	0	0	0
CM5	0	0	0	0	0	8
CM6	Unk.	Unk.	Unk.	Unk.	0	0
<b>TOTAL IMPACTS</b>	<b>66</b>	<b>125</b>	<b>25</b>	<b>25</b>	<b>6-8</b>	<b>8</b>

<sup>a</sup> See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

Unk. = unknown

11

12 **Impact BIO-15: Changes in Nontidal Freshwater Perennial Emergent Wetland Natural**  
13 **Community as a Result of Implementing BDCP Conservation Measures**

14 Construction and land grading activities that would accompany the implementation of CM1, CM2,  
15 CM4, and CM6 would permanently eliminate an estimated 125 acres and temporarily remove 25  
16 acres of nontidal freshwater perennial emergent wetland natural community in the study area.  
17 These modifications represent approximately 9% of the 1,509 acres of the community that is  
18 mapped in the study area. Approximately 60% (91 acres) of the permanent and temporary losses  
19 would occur during the first 10 years of Alternative 9 implementation, as water conveyance facilities  
20 are constructed and habitat restoration is initiated. Natural communities restoration would add  
21 1,200 acres (CM10) and natural communities protection would protect 50 acres (CM3) of nontidal  
22 marsh over the course of Alternative 9 implementation, which would expand the area of that habitat  
23 and offset the losses. The nontidal marsh restoration would include a mosaic of nontidal perennial

1 aquatic and nontidal freshwater perennial emergent wetland natural communities, as specified in  
2 BDCP Objective NFEW/NPANC1.1 (Table 3.3-1 in BDCP Chapter 3, *Conservation Strategy*). The  
3 nontidal marsh protection would be designed to support tricolored blackbird populations in the  
4 study area. The BDCP beneficial effects analysis (BDCP Chapter 5, Section 5.4.6.2) indicates that  
5 implementation of Alternative 4 would result in the restoration of 1,200 acres of nontidal marsh.  
6 The restoration would occur in blocks that are contiguous with the alternative's larger reserve  
7 system. The nontidal marsh would be restored in the vicinity of giant garter snake subpopulations  
8 identified in the recovery plan for this species (U.S. Fish and Wildlife Service 1998). The same  
9 conservation actions would be implemented under Alternative 9.

10 The individual effects of each relevant conservation measure are addressed below. A summary  
11 statement of the combined impacts and NEPA and CEQA conclusions follows the individual  
12 conservation measure discussions.

- 13 • *CM1 Water Facilities and Operation*: Construction of the Alternative 9 water conveyance facilities  
14 would permanently remove 1 acre and temporarily remove 24 acres of tidal freshwater  
15 perennial emergent wetland community. The permanent loss would occur adjacent to Clifton  
16 Court Forebay where the new canal would cross Coney Island (see Terrestrial Biology Mapbook).  
17 The temporary losses would occur in temporary dredging work areas along Middle River  
18 between Victoria Canal and Mildred Island. These wetlands occur in small patches, primarily on  
19 the interiors of islands within the Middle River corridor. These losses would take place during  
20 the near-term construction period.
- 21 • *CM2 Yolo Bypass Fisheries Enhancement*: Implementation of CM2 involves a number of  
22 construction activities within the Yolo and Sacramento Bypasses, including Fremont Weir and  
23 stilling basin improvements, west side channels and Tule Canal modifications, Putah Creek  
24 realignment activities, Lisbon Weir modification and Sacramento Weir improvements. Some of  
25 these activities could involve excavation and grading in nontidal freshwater perennial emergent  
26 wetland areas to improve passage of fish through the bypasses. Based on hypothetical  
27 construction footprints, a total of 25 acres could be permanently lost and 1 acre could be  
28 temporarily removed. These losses would most likely occur in the Tule Canal and west side  
29 channels at the north end of the bypass. The habitat there includes narrow bands within these  
30 side channels of the bypass and is isolated from other marsh or open water habitats. The narrow  
31 bands are bordered by riparian habitats, primarily willows and cottonwoods. This activity  
32 would occur in the near-term timeframe.
- 33 • *CM4 Tidal Natural Communities Restoration*: Based on the use of hypothetical restoration  
34 footprints, implementation of CM4 would permanently inundate or remove 99 acres of nontidal  
35 freshwater perennial emergent wetland community. These losses would be expected to occur  
36 primarily in the Cache Slough ROA (see Figure 12-1). An estimated 1,200 acres of nontidal  
37 marsh would be restored (CM10) and 50 acres would be protected (CM3) during nontidal  
38 habitat conservation actions. Approximately 400 acres of the restoration and 25 acres of the  
39 protection would occur during the first 10 years of Alternative 9 implementation, which would  
40 coincide with the timeframe of water conveyance facilities construction and early tidal marsh  
41 restoration. The remaining restoration would be spread over the following 30 years. Nontidal  
42 marsh natural communities restoration is expected to be focused in the vicinity of giant garter  
43 snake populations in the eastern Delta and near the Yolo Bypass.

- 1 • *CM5 Seasonally Inundated Floodplain Restoration*: Based on theoretical footprints, floodplain  
2 restoration levee construction would not affect nontidal freshwater perennial emergent wetland  
3 natural community.
- 4 • *CM6 Channel Margin Enhancement*: Channel margin habitat enhancement could result in filling  
5 of small amounts of nontidal freshwater perennial emergent wetland habitat along 20 miles of  
6 river and sloughs. The extent of this loss cannot be quantified at this time, but the majority of the  
7 enhancement activity would occur on the edges of tidal perennial aquatic habitat, including  
8 levees and channel banks. Nontidal marsh adjacent to these tidal areas could be affected. The  
9 improvements would occur within the study area on sections of the Sacramento, San Joaquin  
10 and Mokelumne Rivers, and along Steamboat and Sutter Sloughs.
- 11 • *CM10 Nontidal Marsh Restoration*: CM10 would entail restoration of 1,200 acres of nontidal  
12 marsh in CZs 2, 4 and/or 5. The restoration would create a mosaic of nontidal perennial aquatic  
13 and nontidal freshwater perennial emergent natural communities. This marsh restoration  
14 would occur in 25-acre or larger patches in or near giant garter snake occupied habitat and  
15 would be accompanied by adjacent grassland restoration or protection.

16 The following paragraphs summarize the combined effects discussed above and describe other  
17 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA impact conclusions are  
18 also included.

#### 19 ***Near-Term Timeframe***

20 During the near-term timeframe (the first 10 years of BDCP implementation), Alternative 9 would  
21 affect the nontidal freshwater perennial emergent wetland community through CM1 construction  
22 losses (1 acre permanent and 24 acres temporary) and the CM2 construction losses (25 acres  
23 permanent and 1 acre temporary). These losses would occur on Coney Island, within the Middle  
24 River dredging corridor, and in the Yolo Bypass. Approximately 40 acres of the inundation and  
25 construction-related losses from CM4 would occur in the near-term. These losses would occur  
26 throughout several of the ROAs mapped in Figure 12-1.

27 The construction losses of this special-status natural community would represent an adverse effect  
28 if they were not offset by avoidance and minimization measures and restoration actions associated  
29 with BDCP conservation components. Loss of nontidal freshwater perennial emergent wetland  
30 natural community would be considered both a loss in acreage of a sensitive natural community and  
31 a loss of wetland as defined by Section 404 of the CWA. However, the creation of 400 acres and  
32 protection of 25 acres of nontidal marsh as part of CM3 and CM10 during the first 10 years of  
33 Alternative 9 implementation would offset this near-term loss, avoiding any adverse effect. Typical  
34 project-level mitigation ratios (1:1 for restoration and 1:1 for protection) would indicate 91 acres of  
35 restoration and 91 acres of protection would be needed to offset (i.e., mitigate) the 91 acres of loss.  
36 While the Plan includes just 25 acres of protection in the near-term, it includes well in excess of the  
37 typical 1:1 restoration acreage (which includes protection in perpetuity), and therefore  
38 compensates for the shortfall in protection.

39 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
40 *Construction Best Management Practices and Monitoring*, *AMM6 Disposal and Reuse of Spoils*,  
41 *Reusable Tunnel Material*, and *Dredged Material*, *AMM7 Barge Operations Plan*, and *AMM10*  
42 *Restoration of Temporarily Affected Natural Communities*. All of these AMMs include elements that

1 avoid or minimize the risk of affecting habitats at work areas and storage sites. The AMMs are  
2 described in detail in BDCP Appendix 3.C.

3 ***Late Long-Term Timeframe***

4 Implementation of Alternative 9 as a whole would result in a 9% loss of nontidal freshwater  
5 perennial emergent wetland community in the study area. These losses (125 acres of permanent  
6 and 25 acres of temporary loss) would be largely associated with construction of the Yolo Bypass  
7 fish passage improvement facilities (CM2) and inundation during tidal marsh restoration (CM4).  
8 Inundation losses would occur through the course of the CM4 restoration activities at various tidal  
9 restoration sites throughout the study area. By the end of the Plan timeframe, a total of 1,200 acres  
10 of nontidal marsh would be restored and 50 acres would be protected. The restoration would occur  
11 near giant garter snake occupied habitat in the eastern Delta and near Yolo Bypass, in CZs 2, 4 and 5.  
12 The 50 acres of protection would occur in CZ 1, 2, 8 or 11 to provide nesting habitat for tri-colored  
13 blackbird (see Figure 12-1).

14 ***NEPA Effects:*** In the near-term, the combination of creating 400 acres and protecting 25 acres of  
15 nontidal perennial marsh as part of CM3 and CM10 would offset the near-term losses associated  
16 with construction of CM1, CM2 and CM4 facilities, avoiding any adverse effect. With 1,200 acres of  
17 nontidal marsh restoration (BDCP Objective NFEW/NPANC1.1) and 50 acres of protection (BDCP  
18 Objective TRBL1.1) included with full implementation of the Plan, Alternative 9 would not result in a  
19 net long-term reduction in the acreage of a sensitive natural community; the effect would be  
20 beneficial.

21 ***CEQA Conclusion:***

22 ***Near-Term Timeframe***

23 Alternative 9 would result in the loss of approximately 91 acres of nontidal freshwater perennial  
24 emergent wetland natural community due to construction of the water conveyance facilities (CM1)  
25 and fish passage improvements (CM2), and inundation during tidal marsh restoration (CM4). The  
26 construction losses would occur on Coney Island, within the Middle River dredging corridor, and in  
27 the Yolo Bypass. Approximately 40 acres of the inundation and construction-related losses from  
28 CM4 would occur in the near-term. These losses would occur throughout several of the ROAs  
29 mapped in Figure 12-1.

30 The losses would be spread across a 10-year near-term timeframe. These losses would be offset by  
31 planned restoration of 400 acres and protection of 25 acres of nontidal marsh scheduled for the first  
32 10 years of Alternative 9 implementation (CM3 and CM10). Also, AMM1, AMM2, AMM6, AMM7, and  
33 AMM10 would be implemented to minimize impacts. Because of these offsetting near-term  
34 restoration activities and AMMs, impacts would be less than significant. Typical project-level  
35 mitigation ratios (1:1 for restoration and 1:1 for protection) would indicate that 91 acres of  
36 restoration and 91 acres of protection would be needed to offset (i.e., mitigate) the 91 acres of loss.  
37 While the Plan includes just 25 acres of protection in the near-term, it includes well in excess of the  
38 typical 1:1 restoration acreage (which includes protection in perpetuity), and therefore  
39 compensates for the shortfall in protection. The restoration and protection would be initiated at the  
40 beginning of Alternative 9 implementation to minimize any time lag in the availability of this habitat  
41 to special-status species, and would result in a net gain in acreage of this sensitive natural  
42 community.

1 **Late Long-Term Timeframe**

2 At the end of the Plan period, 150 acres of the natural community would be removed, 1,200 acres of  
3 nontidal marsh would be restored (BDCP Objective NFEW/NPANC1.1) and 50 acres of nontidal  
4 marsh would be protected (BDCP Objective TRBL1.1). There would be no net permanent reduction  
5 in the acreage of this sensitive natural community within the study area. Therefore, Alternative 9  
6 would not have a substantial adverse effect on this natural community; the impact would be  
7 beneficial.

8 **Impact BIO-16: Increased Frequency, Magnitude and Duration of Periodic Inundation of**  
9 **Nontidal Freshwater Perennial Emergent Wetland Natural Community**

10 Two Alternative 9 conservation measures would modify the inundation/flooding regimes of both  
11 natural and man-made waterways in the study area. CM2, which is designed to improve fish passage  
12 and shallow flooded habitat for Delta fishes in the Yolo Bypass, would increase periodic inundation  
13 of nontidal freshwater perennial emergent wetland natural community on small acreages, while  
14 CM5 would expose this community to additional flooding as channel margins are modified and  
15 levees are set back to improve fish habitat along some of the major rivers and waterways  
16 throughout the study area.

- 17 ● *CM2 Yolo Bypass Fisheries Enhancement*: Operation of the Yolo Bypass under Alternative 9 would  
18 result in an increase in the frequency and duration of inundation of 6-8 acres of nontidal  
19 freshwater perennial emergent wetland natural community. The methods used to estimate  
20 these inundation acreages are described in BDCP Appendix 5.J, *Effects on Natural Communities,*  
21 *Wildlife, and Plants*. The area more frequently affected by inundation would vary with the flow  
22 volume that would pass through the newly constructed notch in the Fremont Weir. The 6-acre  
23 increase in inundation would be associated with a notch flow of 1,000 cubic feet per second  
24 (cfs), and the 8-acre increase would result from a notch flow of 6,000 cfs. Plan-related increases  
25 in flow through Fremont Weir would be expected in 30% of the years. This community occurs in  
26 small stringers and isolated patches along the Tule Canal and western channel in the north end  
27 of the bypass. These areas are not connected to other adjacent marsh and open water habitats;  
28 they are surrounded by riparian habitat, scoured grassland and agricultural lands. The  
29 anticipated change in management of flows in the Yolo Bypass includes more frequent releases  
30 in flows into the bypass from the Fremont and Sacramento Weirs, and in some years, later  
31 releases into the bypass in spring months (April and May). The modification of periodic  
32 inundation events would not adversely affect the ecological function of this natural community  
33 and would not substantially modify its value for special-status or common wildlife species.  
34 Nontidal freshwater perennial emergent wetland plant species in the Yolo Bypass have  
35 developed under a long-term regime of periodic inundation events. The extended inundation  
36 would be designed to expand foraging and spawning habitat for Delta fishes. The effects of this  
37 increased inundation on terrestrial wildlife and plant species are described in detail in later  
38 sections of this chapter.
- 39 ● *CM5 Seasonally Inundated Floodplain Restoration*: Floodplain restoration would result in an  
40 increase in the frequency and duration of inundation of an estimated 8 acres of nontidal  
41 freshwater perennial emergent wetland habitat. Specific locations for this restoration activity  
42 have not been identified, but they would likely be focused in the south Delta area, along the  
43 major rivers and Delta channels. The reconnection of these wetlands to stream flooding events  
44 would be beneficial to the ecological function of nontidal freshwater perennial emergent

1 wetland habitats, as they relate to BDCP target aquatic species. The added exposure to  
2 inundation could also encourage germination of nontidal marsh plant species. Foraging activity  
3 and refuge sites would be expanded into areas currently unavailable or infrequently available to  
4 some aquatic species.

5 In summary, 14-16 acres of nontidal freshwater perennial emergent wetland community in the  
6 study area would be subjected to more frequent inundation as a result of implementing two  
7 Alternative 9 conservation measures (CM2 and CM5). This community would not be adversely  
8 affected because its habitats in the Yolo Bypass have developed under a long-term regime of  
9 periodic inundation events and inundation along expanded river floodplains would be infrequent.

10 **NEPA Effects:** The increased inundation of nontidal freshwater perennial emergent wetland natural  
11 community in the Yolo Bypass and in the southern Delta would not reduce the acreage of this  
12 natural community and could encourage germination of emergent wetland vegetation. The  
13 increased inundation would not be an adverse effect.

14 **CEQA Conclusion:** An estimated 14-16 acres of nontidal freshwater perennial emergent wetland  
15 community in the study area would be subjected to more frequent inundation as a result of  
16 implementing CM2 and CM5 under Alternative 9. This community would not be significantly  
17 impacted because its habitats in the Yolo Bypass have developed under a long-term regime of  
18 periodic inundation events and inundation along expanded river floodplains would be infrequent.  
19 The periodic inundation would not result in a net permanent reduction in the acreage of this  
20 community in the study area. Therefore, there would be no substantial adverse effect on the  
21 community. The impact would be less than significant.

## 22 **Impact BIO-17: Modification of Nontidal Freshwater Perennial Emergent Wetland Natural** 23 **Community from Ongoing Operation, Maintenance and Management Activities**

24 Once the physical facilities associated with Alternative 9 are constructed and the stream flow regime  
25 associated with changed water management is in effect, there would be new ongoing and periodic  
26 actions associated with operation, maintenance and management of the BDCP facilities and  
27 conservation lands that could affect nontidal freshwater perennial emergent wetland natural  
28 community in the study area. The ongoing actions include modified operation of upstream  
29 reservoirs, the diversion of Sacramento River flows at two newly screened diversions at Georgianna  
30 Slough and Delta Cross Channel, the operation of multiple operable barriers in Delta waterways, and  
31 modified diversions from south Delta channels. These actions are associated with CM1 (see the  
32 impact discussion above for effects associated with CM2). The periodic actions would involve access  
33 road and conveyance facility repair, vegetation management at the various water conveyance  
34 facilities and habitat restoration sites (CM11), levee repair and replacement of levee armoring,  
35 channel dredging, and habitat enhancement in accordance with natural community management  
36 plans. The potential effects of these actions are described below.

- 37 ● *Modified releases and water levels in upstream reservoirs.* Modified releases and water levels at  
38 Shasta Lake, Lake Oroville, Whiskeytown Lake, Lewiston Lake, and Folsom Lake would not affect  
39 nontidal freshwater perennial emergent wetland natural community. These reservoirs do not  
40 support significant stands of freshwater emergent wetlands. Changes in releases that would  
41 influence downstream river flows are discussed below.
- 42 ● *Modified river flows upstream of and within the study area and modified diversions from south*  
43 *Delta channels.* Changes in releases from reservoirs upstream of the study area, modified

1 diversion of Sacramento River flows at Georgianna Slough and Delta Cross Channel, and  
2 modified diversions from south Delta channels (Operational Scenario G) would not result in the  
3 permanent reduction in acreage of the nontidal freshwater perennial emergent wetland natural  
4 community in the study area. Flow levels in the upstream rivers would not change such that the  
5 acreage of nontidal freshwater perennial emergent wetland community would be reduced on a  
6 permanent basis. Some minor increases and some decreases could be expected to occur during  
7 some seasons and in some water-year types, but there would be no permanent loss. Similarly,  
8 modified diversions of Sacramento River flows at Georgianna Slough and Delta Cross Channel  
9 would not result in a permanent reduction in nontidal freshwater perennial emergent wetland  
10 community downstream of these diversions. Flow volumes in these two diversions and in the  
11 downstream channels that had been dredged (Middle River and Victoria Canal) would increase  
12 under certain Sacramento River flow conditions and water year types. However, tidal influence  
13 in the Sacramento River and Delta waterways would continue to be dominant such that there  
14 would be no substantial change in water levels that might affect in-stream and adjacent  
15 vegetation. Modified diversions from south Delta channels would not create a reduction in this  
16 natural community.

- 17 • *Access road, water conveyance facility and levee repair.* Periodic repair of access roads, water  
18 conveyance facilities and levees associated with the BDCP actions have the potential to require  
19 removal of adjacent vegetation and could entail earth and rock work in nontidal freshwater  
20 perennial emergent wetland habitats. This activity could lead to increased soil erosion, turbidity  
21 and runoff entering nontidal freshwater perennial habitats. These activities would be subject to  
22 normal erosion, turbidity and runoff control management practices, including those developed  
23 as part of *AMM2 Construction Best Management Practices and Monitoring* and *AMM4 Erosion and*  
24 *Sediment Control Plan*. Any vegetation removal or earth work adjacent to or within aquatic  
25 habitats would require use of sediment and turbidity barriers, soil stabilization and revegetation  
26 of disturbed surfaces. Proper implementation of these measures would avoid permanent  
27 adverse effects on this community.
- 28 • *Vegetation management.* Vegetation management, in the form of physical removal and chemical  
29 treatment, would be a periodic activity associated with the long-term maintenance of water  
30 conveyance facilities and restoration sites(*CM11 Natural Communities Enhancement and*  
31 *Management*). Use of herbicides to control nuisance vegetation could pose a long-term hazard to  
32 nontidal freshwater perennial emergent wetland natural community at or adjacent to treated  
33 areas. The hazard could be created by uncontrolled drift of herbicides, uncontrolled runoff of  
34 contaminated stormwater onto the natural community, or direct discharge of herbicides to  
35 nontidal perennial wetland areas being treated for invasive species removal. Environmental  
36 commitments and *AMM5 Spill Prevention, Containment, and Countermeasure Plan* have been  
37 made part of the BDCP to reduce hazards to humans and the environment from use of various  
38 chemicals during maintenance activities, including the use of herbicides. These commitments  
39 are described in Appendix 3B, including the commitment to prepare and implement spill  
40 prevention, containment, and countermeasure plans and stormwater pollution prevention  
41 plans. Best management practices, including control of drift and runoff from treated areas, and  
42 use of herbicides approved for use in aquatic environments would also reduce the risk of  
43 affecting natural communities adjacent to water conveyance features and levees associated with  
44 restoration activities.

45 Herbicides to remove aquatic invasive species as part of CM13 would be used to restore the  
46 normal ecological function of tidal and nontidal aquatic habitats in planned restoration areas.

1 The treatment activities would be conducted in concert with the California Department of  
2 Boating and Waterways' invasive species removal program. Eliminating large stands of water  
3 hyacinth and Brazilian waterweed would improve habitat conditions for some aquatic species  
4 by removing cover for nonnative predators, improving water flow and removing barriers to  
5 movement (see Chapter 11, *Fish and Aquatic Resources*). These habitat changes should also  
6 benefit terrestrial species that use tidal and nontidal freshwater perennial emergent wetland  
7 natural community for movement corridors and for foraging. Vegetation management effects on  
8 individual species are discussed in the species sections on following pages.

- 9 • *Channel dredging.* Channel dredging associated with Alternative 9 would not affect this natural  
10 community. Nontidal freshwater perennial emergent wetlands are not directly connected to the  
11 tidal channels that would be dredged. *AMM2 Construction Best Management Practices and*  
12 *Monitoring, AMM3 Stormwater Pollution Prevention Plan, AMM4 Erosion and Sediment Control*  
13 *Plan, AMM5 Spill Prevention, Containment, and Countermeasure Plan, AMM6 Disposal and Reuse of*  
14 *Spoils, Reusable Tunnel Material, and Dredged Material, and AMM10 Restoration of Temporarily*  
15 *Affected Natural Communities* are part of the Plan and would require actions to avoid or  
16 minimize dredging effects on adjacent sensitive vegetation.
- 17 • *Habitat enhancement.* The BDCP includes a long-term management element for the natural  
18 communities within the Plan Area (CM11). For nontidal freshwater perennial emergent wetland  
19 natural community, a management plan would be prepared that specifies actions to improve the  
20 value of the habitats for covered species. Actions would include control of invasive nonnative  
21 plant and animal species, fire management, restrictions on vector control and application of  
22 herbicides, and maintenance of infrastructure that would allow for movement through the  
23 community. The enhancement efforts would improve the long-term value of this community for  
24 both special-status and common species.

25 The various operations and maintenance activities described above could alter acreage of nontidal  
26 freshwater perennial emergent wetland natural community in the study area through changes in  
27 flow patterns and changes in periodic inundation of this community. Activities could also introduce  
28 sediment and herbicides that would reduce the value of this community to common and sensitive  
29 plant and wildlife species. Other periodic activities associated with the Plan, including management,  
30 protection and enhancement actions associated with *CM3 Natural Communities Protection and*  
31 *Restoration* and *CM11 Natural Communities Enhancement and Management*, would be undertaken to  
32 enhance the value of the community. While some of these activities could result in small changes in  
33 acreage, these changes would be greatly offset by restoration activities planned as part of *CM10*  
34 *Nontidal Marsh Restoration* and protection actions associated with *CM3 Natural Communities*  
35 *Protection and Restoration*. The management actions associated with levee repair and control of  
36 invasive plant species would also result in a long-term benefit to the species associated with  
37 nontidal freshwater perennial emergent wetland habitats by improving water movement.

38 **NEPA Effects:** Ongoing operation, maintenance and management activities associated with  
39 Alternative 9 would not result in a net permanent reduction in the nontidal freshwater perennial  
40 emergent wetland natural community within the study area. Therefore, there would be no adverse  
41 effect on this natural community.

42 **CEQA Conclusion:** The operation and maintenance activities associated with Alternative 9 would  
43 have the potential to create minor changes in total acreage of nontidal freshwater perennial  
44 emergent wetland natural community in the study area, and could create temporary increases in

1 turbidity and sedimentation. The activities could also introduce herbicides periodically to control  
2 nonnative, invasive plants. Implementation of environmental commitments and AMM2, AMM3,  
3 AMM4, AMM5, AMM6, and AMM10 would minimize these impacts, and other operations and  
4 maintenance activities, including management, protection and enhancement actions associated with  
5 *CM3 Natural Communities Protection and Restoration* and *CM11 Natural Communities Enhancement*  
6 *and Management*, would create positive effects, including improved water movement in and  
7 adjacent to these habitats. Long-term restoration activities associated with *CM10 Nontidal Marsh*  
8 *Restoration* and protection actions associated with *CM3 Natural Communities Protection and*  
9 *Restoration* would greatly expand this natural community in the study area. Ongoing operation,  
10 maintenance and management activities would not result in a net permanent reduction in this  
11 sensitive natural community within the study area. Therefore, there would be a less-than-significant  
12 impact.

### 13 **Alkali Seasonal Wetland Complex**

14 Construction, operation, maintenance and management associated with the conservation  
15 components of Alternative 9 would have no long-term adverse effects on the habitats associated  
16 with the alkali seasonal wetland complex natural community. Initial development and construction  
17 of CM2 and CM4 would result in permanent removal of this community (see Table 12-9-7). Full  
18 implementation of Alternative 9 would also include the following conservation actions over the term  
19 of the BDCP to benefit the alkali seasonal wetland natural community.

- 20 ● Protect 150 acres of alkali seasonal wetland in Conservation Zones 1, 8 and/or 11 among a  
21 mosaic of protected grasslands and vernal pool complex (Objective ASWNC1.1, associated with  
22 CM3).
- 23 ● Restore or create alkali seasonal wetlands in Conservation Zones 1, 8, and/or 11 to achieve no  
24 net loss of wetted acres (up to 72 acres of alkali seasonal wetland complex restoration)  
25 (Objective ASWNC1.2, associated with CM3 and CM9).
- 26 ● Provide appropriate seasonal flooding characteristics for supporting and sustaining alkali  
27 seasonal wetland species (Objective ASWNC2.1, associated with CM3 and CM11).

28 There is a variety of other, less specific conservation goals and objectives in BDCP Chapter 3, Section  
29 3.3 that would improve the value of alkali seasonal wetland natural community for terrestrial  
30 species. As explained below, with the protection, restoration, and enhancement of the amounts of  
31 habitat listed in the BDCP objectives, in addition to implementation of AMMs, impacts on this natural  
32 community would not be adverse for NEPA purposes and would be less than significant for CEQA  
33 purposes.

1 **Table 12-9-7. Changes in Alkali Seasonal Wetland Complex Natural Community Associated with**  
2 **Alternative 9 (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Permanent		Temporary		Periodic <sup>d</sup>	
	NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	0	0	0	0	0	0
CM2	45	45	0	0	264-744	0
CM4	13	27	0	0	0	0
CM5	0	0	0	0	0	0
CM6	Unk.	Unk.	Unk.	Unk.	0	0
<b>TOTAL IMPACTS</b>	<b>58</b>	<b>72</b>	<b>0</b>	<b>0</b>	<b>264-744</b>	<b>0</b>

<sup>a</sup> See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

Unk. = unknown

3

4 **Impact BIO-18: Changes in Alkali Seasonal Wetland Complex Natural Community as a Result**  
5 **of Implementing BDCP Conservation Measures**

6 Construction, land grading and habitat restoration activities that would accompany the  
7 implementation of CM2 and CM4 would permanently eliminate an estimated 72 acres of alkali  
8 seasonal wetland complex natural community in the study area. These modifications represent  
9 approximately 2% of the 3,723 acres of the community that is mapped in the study area. Most of the  
10 losses (58 acres or 80%) would occur during the first 10 years of Alternative 9 implementation, as  
11 Yolo Bypass improvements and habitat restoration is initiated. Alkali seasonal wetland complex  
12 protection (120 acres) and restoration (an estimated 58 acres, but determined by actual level of  
13 effect) would be initiated during the same period, which would offset the losses. By the end of the  
14 Plan period, 150 acres of this natural community would be protected and 72 acres would be  
15 restored. The BDCP beneficial effects analysis for this community (BDCP Chapter 5, Section 5.4.7.2)  
16 states that Alternative 4 would protect 150 acres of alkali seasonal wetland in Conservation Zones 1,  
17 8, or 11, in a mosaic of protected grasslands and vernal pool complex. This would protect currently  
18 unprotected high-value alkali seasonal wetland complex in the Plan Area. These same conservation  
19 actions would be implemented under Alternative 9.

20 The individual effects of each relevant conservation measure are addressed below. A summary  
21 statement of the combined impacts and NEPA and CEQA conclusions follows the individual  
22 conservation measure discussions.

- 23 • *CM1 Water Facilities and Operation*: Construction of the Alternative 9 water conveyance facilities  
24 would not directly affect alkali seasonal wetland complex natural community. The construction

1 activity associated with CM1, however, has the potential to indirectly cause increased nitrogen  
2 deposition in alkali seasonal wetland habitats in the vicinity of Clifton Court Forebay. A  
3 significant number of cars, trucks, and land grading equipment involved in construction of the  
4 canals around Clifton Court Forebay would emit small amounts of atmospheric nitrogen from  
5 fuel combustion; this material could be deposited in sensitive alkali seasonal wetland areas that  
6 are located west of the major construction areas at the forebay. Nitrogen deposition can pose a  
7 risk of adding a fertilizer to nitrogen-limited soils and their associated plants. Nonnative  
8 invasive species can be encouraged by the added nitrogen available. BDCP Appendix 5.J,  
9 *Attachment 5J.A, Construction-Related Nitrogen Deposition on BDCP Natural Communities*,  
10 addresses this issue in detail. It has been concluded that this potential deposition would pose a  
11 low risk of changing the alkali seasonal wetland complex in the construction area because the  
12 construction would occur primarily downwind of the natural community and the construction  
13 would contribute a negligible amount of nitrogen to regional projected emissions. No adverse  
14 effect is expected.

- 15 ● *CM2 Yolo Bypass Fisheries Enhancement*: Implementation of CM2 involves a number of  
16 construction activities within the Yolo and Sacramento Bypasses, including Fremont Weir and  
17 stilling basin improvements, Putah Creek realignment activities, Lisbon Weir modification and  
18 Sacramento Weir improvements. Realignment of Putah Creek could involve excavation and  
19 grading in alkali seasonal wetland complex as a new channel is constructed. Based on  
20 hypothetical construction footprints, a total of 45 acres could be permanently lost. This complex  
21 is located immediately south of the existing Putah Creek channel within the bypass and is a  
22 relatively large, moderate to high value, contiguous expanse of this community. This loss would  
23 occur in the near-term timeframe.
- 24 ● *CM3 Natural Communities Protection and Restoration*: CM3 proposes to protect at least 150 acres  
25 of alkali seasonal wetland complex in CZs 1, 8 and 11 (BDCP Objective ASWNC1.1). The  
26 protection would occur in areas containing a mosaic of grassland and vernal pool complex in  
27 unfragmented natural landscapes supporting a diversity of native plant and wildlife species.  
28 These areas would be both protected and enhanced to increase the cover of alkali seasonal  
29 wetland plants relative to nonnative species.
- 30 ● *CM4 Tidal Natural Communities Restoration*: Based on the use of hypothetical restoration  
31 footprints, implementation of CM4 would permanently inundate or remove 13 acres of alkali  
32 seasonal wetland complex in the near-term and inundate or remove 27 acres by the end of the  
33 Plan timeframe. The losses would be expected to occur in the Cache Slough and Suisun Marsh  
34 ROAs established for tidal restoration (see Figure 12-1). The largest losses would likely occur in  
35 the Lindsay Slough area and on the northern fringes of Suisun Marsh, north of the Potrero Hills.  
36 These losses would not fragment the alkali seasonal wetland communities adjacent to these  
37 sloughs because the losses would occur on the edges of the existing habitat.
- 38 ● *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*: CM9 includes both vernal  
39 pool complex and alkali seasonal wetland complex restoration goals. The intent of the  
40 conservation measure is to match the acreage of restoration with the actual acreage lost to other  
41 conservation measures (primarily CM2 and CM4). The current estimate for alkali seasonal  
42 wetland complex restoration is 58 acres in the near-term and a total of 72 acres by the end of  
43 the BDCP restoration period. The goal is for no net loss of this natural community, consistent  
44 with BDCP Objective ASWNC1.2. Restoration in the Lindsay Slough area of the Cache Slough ROA  
45 and the northern region of the Suisun Marsh ROA would be consistent with essential habitat

1 connectivity goals mapped in Figure 12-2 and described in Table 3.2-3 of BDCP Chapter 3,  
2 *Conservation Strategy*.

3 The following paragraphs summarize the combined effects discussed above and describe other  
4 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA impact conclusions are  
5 also included.

### 6 ***Near-Term Timeframe***

7 During the near-term timeframe (the first 10 years of BDCP implementation), Alternative 9 would  
8 affect the alkali seasonal wetland complex natural community through CM2 construction losses (45  
9 acres). These losses would occur in the Yolo Bypass south of Putah Creek. Approximately 13 acres of  
10 the inundation and construction-related losses in habitat from CM4 would occur in the near-term.  
11 These losses would occur primarily in the Cache Slough and Suisun Marsh ROAs mapped in Figure  
12 12-1.

13 The construction losses of this special-status natural community would represent an adverse effect  
14 if they were not offset by avoidance and minimization measures and restoration actions associated  
15 with BDCP conservation components. Loss of alkali seasonal wetland complex natural community  
16 would be considered both a loss in acreage of a sensitive natural community and a loss of wetland as  
17 defined by Section 404 of the CWA. However, the protection of 120 acres of alkali seasonal wetland  
18 complex as part of CM3 and the restoration of 58 acres of this community as part of CM9 during the  
19 first 10 years of Alternative 9 implementation would offset this near-term loss, avoiding any adverse  
20 effect. Typical project-level mitigation ratios (2:1 for protection and 1:1 for restoration) would  
21 indicate 116 acres of protection and 58 acres of restoration would be needed to offset (i.e., mitigate)  
22 the 58 acres of loss.

23 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
24 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
25 *Plan*, *AMM4 Erosion and Sediment Control Plan*, and *AMM10 Restoration of Temporarily Affected*  
26 *Natural Communities*. All of these AMMs include elements that avoid or minimize the risk of affecting  
27 habitats at work areas. The AMMs are described in detail in BDCP Appendix 3.C.

### 28 ***Late Long-Term Timeframe***

29 Implementation of Alternative 9 as a whole would result in relatively minor (2%) losses of alkali  
30 seasonal wetland natural community in the study area. These losses (72 acres) would be associated  
31 with construction of Yolo Bypass fish improvements (CM2) and inundation during tidal marsh  
32 restoration (CM4). Inundation losses would occur through the course of the BDCP restoration  
33 activities, primarily in the Cache Slough and Suisun Marsh ROAs.

34 ***NEPA Effects:*** In the first 10 years of implementing Alternative 9 conservation measures, 120 acres  
35 of alkali seasonal wetland complex would be protected as part of CM3 and 58 acres of this  
36 community would be restored as part of CM9. These conservation actions would offset the near-  
37 term loss of this community associated with CM2 and CM4, avoiding any adverse effect. By the end  
38 of the Plan timeframe, Alternative 9 would protect a total of 150 acres of alkali seasonal wetland  
39 natural community (CM3) and would restore up to 72 acres (CM9). The protection and restoration  
40 would occur primarily in CZ 1, CZ 8 and/or CZ 11, in the Cache Slough, Suisun Marsh and Clifton  
41 Court Forebay areas. Therefore, Alternative 9 would not have an adverse effect on the alkali  
42 seasonal wetland complex natural community.

1 **CEQA Conclusion:**

2 **Near-Term Timeframe**

3 Alternative 9 would result in the permanent loss of approximately 58 acres of alkali seasonal  
4 wetland complex natural community due to construction of fish passage improvements (CM2) and  
5 inundation during tidal marsh restoration (CM4). The construction losses would occur primarily in  
6 the area just south of Putah Creek in the Yolo Bypass, while inundation losses would occur in the  
7 Cache Slough and Suisun Marsh ROAs. The losses would be spread across a 10-year near-term  
8 timeframe.

9 The construction losses of this special-status natural community would represent an adverse effect  
10 if they were not offset by avoidance and minimization measures and other actions associated with  
11 BDCP conservation components. Loss of alkali seasonal wetland complex natural community would  
12 be considered both a loss in acreage of a sensitive natural community and a loss of wetland as  
13 defined by Section 404 of the CWA. However, the protection of 120 acres of alkali seasonal wetland  
14 complex as part of CM3 and the restoration of 58 acres of this community as part of CM9 during the  
15 first 10 years of Alternative 9 implementation would offset this near-term loss, avoiding any  
16 significant impact. Typical project-level mitigation ratios (2:1 for protection and 1:1 for restoration)  
17 would indicate 116 acres of protection and 58 acres of restoration would be needed to offset (i.e.,  
18 mitigate) the 58 acres of loss. Also, AMM1, AMM2, AMM3, AMM4, and AMM10 would be  
19 implemented to minimize impacts. Because of the offsetting protection and restoration activities  
20 and AMMs, impacts would be less than significant.

21 **Late Long-Term Timeframe**

22 At the end of the Plan period, 72 acres of alkali seasonal wetland complex natural community would  
23 be permanently removed by conservation actions, 150 acres would be protected and up to 72 acres  
24 would be restored. The restoration acres actually developed would depend on the number of acres  
25 affected during Plan implementation. There would be no net permanent reduction in the acreage of  
26 this natural community within the study area. Therefore, Alternative 9 would have a less-than-  
27 significant impact on this natural community.

28 **Impact BIO-19: Increased Frequency, Magnitude and Duration of Periodic Inundation of**  
29 **Alkali Seasonal Wetland Complex Natural Community**

30 *CM2 Yolo Bypass Fisheries Enhancement* would modify the inundation regime of the Yolo Bypass, a  
31 man-made waterway. CM2, which is designed to improve fish passage and shallow flooded habitat  
32 for Delta fishes in the Yolo Bypass, would increase periodic inundation of alkali seasonal wetland  
33 complex natural community at scattered locations in the central and southern sections of the  
34 bypass.

35 Operation of the Yolo Bypass under Alternative 9 would result in an increase in the frequency,  
36 magnitude and duration of inundation on an estimated 264–744 acres of alkali seasonal wetland  
37 complex natural community. The methods used to estimate these inundation acreages are described  
38 in BDCP Appendix 5.J, *Effects on Natural Communities, Wildlife, and Plants*. The area more frequently  
39 affected by inundation would vary with the flow volume that would pass through the newly  
40 constructed notch in the Fremont Weir. The 264-acre increase in inundation would be associated  
41 with a notch flow of 1,000 cubic feet per second (cfs), and the 744-acre increase would result from a  
42 notch flow of 4,000 cfs. Plan-related increases in flow through Fremont Weir would be expected in

1 30% of the years. The alkali seasonal wetland complex natural community occurs primarily in the  
2 central and southern reaches of the bypass, south of Putah Creek. The stands in this location are  
3 relatively large, with moderate to high value for associated plant and wildlife species. The  
4 anticipated change in management of flows in the Yolo Bypass includes more frequent releases in  
5 flows into the bypass from the Fremont and Sacramento Weirs, and in some years, later releases  
6 into the bypass in spring months (April and May).

7 **NEPA Effects:** The modification of periodic inundation events in the Yolo Bypass associated with  
8 Alternative 9 would not adversely affect alkali seasonal wetland complex habitats, as they have  
9 persisted under similar high flows and extended inundation periods. There is the potential for some  
10 change in plant species composition as a result of longer inundation periods, but the natural  
11 community would persist.

12 **CEQA Conclusion:** An estimated 264–744 acres of alkali seasonal wetland complex natural  
13 community in the Yolo Bypass would be subjected to more frequent inundation as a result of  
14 implementing CM2 under Alternative 9. This natural community is conditioned to periodic  
15 inundation; the slight increase in periodic inundation would not result in a net permanent reduction  
16 in the acreage of this community in the study area, although some change in plant species  
17 composition could occur. Increasing periodic inundation of alkali seasonal wetland complex natural  
18 community in the Yolo Bypass would have a less-than-significant impact on the natural community.  
19 The effects of this inundation on wildlife and plant species are described in detail in later sections of  
20 this chapter.

## 21 **Impact BIO-20: Modification of Alkali Seasonal Wetland Complex Natural Community from** 22 **Ongoing Operation, Maintenance and Management Activities**

23 Once the physical facilities associated with Alternative 9 are constructed and the stream flow regime  
24 associated with changed water management is in effect, there would be new ongoing and periodic  
25 actions associated with operation, maintenance and management of the BDCP facilities and  
26 conservation lands that could affect alkali seasonal wetland complex natural community in the study  
27 area. The ongoing actions include the diversion of Sacramento River flows at two newly screened  
28 diversions at Georgianna Slough and Delta Cross Channel, modified diversions from south Delta  
29 channels, and recreation in and adjacent to Plan reserves. These actions are associated with CM1  
30 and CM11 (see the impact discussion above for effects associated with CM2). The periodic actions  
31 would involve access road and conveyance facility repair, vegetation management at the various  
32 water conveyance facilities and habitat restoration sites (CM11), levee repair and replacement of  
33 levee armoring, channel dredging, and habitat enhancement in accordance with natural community  
34 management plans. The potential effects of these actions are described below.

- 35 • *Modified river flows upstream of and within the study area and modified diversions from south*  
36 *Delta channels.* Changes in releases from reservoirs upstream of the study area, modified  
37 diversion of Sacramento River flows at Georgianna Slough and Delta Cross Channel, and  
38 modified diversions from south Delta channels (Operational Scenario G) would not affect alkali  
39 seasonal wetland complex natural community. This natural community does not exist within or  
40 adjacent to the active Sacramento River system channels and Delta waterways that would be  
41 affected by modified flow levels.
- 42 • *Access road, water conveyance facility and levee repair.* Periodic repair of access roads, water  
43 conveyance facilities and levees associated with the BDCP actions have the potential to require  
44 removal of adjacent vegetation and could entail earth and rock work in or adjacent to alkali

1 seasonal wetland complex habitats. This activity could lead to increased soil erosion and runoff  
2 entering these habitats. These activities would be subject to normal erosion and runoff control  
3 management practices, including those developed as part of *AMM2 Construction Best*  
4 *Management Practices and Monitoring* and *AMM4 Erosion and Sediment Control Plan*. Any  
5 vegetation removal or earth work adjacent to or within alkali seasonal wetland complex habitats  
6 would require use of sediment barriers, soil stabilization and revegetation of disturbed surfaces  
7 as required by *AMM10 Restoration of Temporarily Affected Natural Communities*. Proper  
8 implementation of these measures would avoid permanent adverse effects on this community.

- 9 • *Vegetation management.* Vegetation management, in the form of physical removal and chemical  
10 treatment, would be a periodic activity associated with the long-term maintenance of water  
11 conveyance facilities and restoration sites (CM11 Natural Communities Enhancement and  
12 Management). Use of herbicides to control nuisance vegetation could pose a long-term hazard to  
13 alkali seasonal wetland complex natural community at or adjacent to treated areas. The hazard  
14 could be created by uncontrolled drift of herbicides, uncontrolled runoff of contaminated  
15 stormwater onto the natural community, or direct discharge of herbicides to alkali seasonal  
16 wetland complex areas being treated for invasive species removal. Environmental commitments  
17 and *AMM5 Spill Prevention, Containment, and Countermeasure Plan* have been made part of the  
18 BDCP to reduce hazards to humans and the environment from use of various chemicals during  
19 maintenance activities, including the use of herbicides. These commitments are described in  
20 Appendix 3B, including the commitment to prepare and implement spill prevention,  
21 containment, and countermeasure plans and stormwater pollution prevention plans. Best  
22 management practices, including control of drift and runoff from treated areas, and use of  
23 herbicides approved for use in terrestrial environments would also reduce the risk of affecting  
24 natural communities adjacent to water conveyance features and levees associated with  
25 restoration activities.
- 26 • *Habitat enhancement.* The BDCP includes a long-term management element for the natural  
27 communities within the Plan Area (CM11). For the alkali seasonal wetland complex natural  
28 community, a management plan would be prepared that specifies actions to improve the value  
29 of the habitats for covered species. Actions would include control of invasive nonnative plant  
30 and animal species, fire management, restrictions on vector control and application of  
31 herbicides, and maintenance of infrastructure that would allow for movement through the  
32 community. The enhancement efforts would improve the long-term value of this community for  
33 both special-status and common species.
- 34 • *Recreation.* The BDCP would allow for certain types of recreation in and adjacent to alkali  
35 seasonal wetland natural community in the reserve system. The activities could include wildlife  
36 and plant viewing and hiking. *CM11 Natural Communities Enhancement and Management* (BDCP  
37 Chapter 3, Section 3.4.11) describes this program and identifies applicable restrictions on  
38 recreation that might adversely affect alkali seasonal wetland habitat. BDCP also includes an  
39 avoidance and minimization measure (AMM37) that further dictates limits on recreation  
40 activities that might affect this natural community. Most recreation would be docent-led wildlife  
41 and botanical tours, using existing trails and roads in the vicinity of the reserves. No new trails  
42 would be constructed.

43 The various operations and maintenance activities described above could alter acreage of alkali  
44 seasonal wetland complex natural community in the study area. Activities could introduce sediment  
45 and herbicides that would reduce the value of this community to common and sensitive plant and

1 wildlife species. Other periodic activities associated with the Plan, including management,  
2 protection and enhancement actions associated with *CM3 Natural Communities Protection and*  
3 *Restoration* and *CM11 Natural Communities Enhancement and Management*, would be undertaken to  
4 enhance the value of the community. While some of these activities could result in small changes in  
5 acreage, these changes would be offset by protection and restoration activities planned as part of  
6 *CM3 Natural Communities Protection and Restoration*, and *CM9 Vernal Pool and Alkali Seasonal*  
7 *Wetland Complex Restoration*, or minimized by implementation of AMM2, AMM4, AMM5, AMM10,  
8 and AMM37. The management actions associated with control of invasive plant species would also  
9 result in a long-term benefit to the species associated with alkali seasonal wetland complex habitats  
10 by eliminating competitive, invasive species of plants.

11 **NEPA Effects:** Ongoing operation, maintenance and management activities associated with  
12 Alternative 9 would not result in a net permanent reduction in the alkali seasonal wetland natural  
13 community within the study area. Therefore, there would be no adverse effect on this natural  
14 community.

15 **CEQA Conclusion:** The operation and maintenance activities associated with Alternative 9 would  
16 have the potential to create minor changes in total acreage of alkali seasonal wetland complex  
17 natural community in the study area, and could create temporary increases in sedimentation in this  
18 community. The activities could also introduce herbicides periodically to control nonnative, invasive  
19 plants. Implementation of environmental commitments and AMM2, AMM4, AMM5, AMM10 and  
20 AMM37 would minimize these impacts, and other operations and maintenance activities, including  
21 management, protection and enhancement actions associated with *CM3 Natural Communities*  
22 *Protection and Restoration* and *CM11 Natural Communities Enhancement and Management*, would  
23 create positive effects, including reduced competition from invasive, nonnative plants in these  
24 habitats. Long-term restoration activities associated with *CM9 Vernal Pool and Alkali Seasonal*  
25 *Wetland Complex Restoration* and protection actions associated with *CM3 Natural Communities*  
26 *Protection and Restoration* would ensure that the acreage of this natural community would not  
27 decrease in the study area. Ongoing operation, maintenance and management activities would not  
28 result in a net permanent reduction in this natural community within the study area. Therefore,  
29 there would be a less-than-significant impact.

### 30 **Vernal Pool Complex**

31 Construction, operation, maintenance and management associated with the conservation  
32 components of Alternative 9 would have no long-term adverse effects on the habitats associated  
33 with the vernal pool complex natural community. Initial development and construction of CM4  
34 would result in permanent removal of 372 acres of this community (see Table 12-9-8). Full  
35 implementation of Alternative 9 would also include the following conservation actions over the term  
36 of the BDCP to benefit the vernal pool complex natural community.

- 37 ● Protect 600 acres of existing vernal pool complex in Conservation Zones 1, 8, and 11, primarily  
38 in core vernal pool recovery areas (Objective VPNC1.1, associated with CM3).
- 39 ● Restore vernal pool complex in Conservation Zones 1, 8, and/or 11 to achieve no net loss of  
40 vernal pool acreage (up to 67 acres of vernal pool complex restoration, assuming that all  
41 anticipated impacts [10 wetted acres] occur and that the restored vernal pool complex has 15%  
42 density of vernal pools) (Objective VPNC1.2, associated with CM3 and CM9).

1 There is a variety of other, less specific conservation goals and objectives in BDCP Chapter 3, Section  
 2 3.3 that would improve the value of vernal pool complex natural community for terrestrial species.  
 3 As explained below, with the protection, restoration and enhancement of the amounts of habitat  
 4 listed in the BDCP objectives, in addition to implementation of AMMs, impacts on this natural  
 5 community would not be adverse for NEPA purposes and would be less than significant for CEQA  
 6 purposes.

7 **Table 12-9-8. Changes in Vernal Pool Complex Natural Community Associated with Alternative 9**  
 8 **(acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Permanent		Temporary		Periodic <sup>d</sup>	
	NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	0	0	0	0	0	0
CM2	0	0	0	0	0-4	0
CM4	201	372	0	0	0	0
CM5	0	0	0	0	0	0
CM6	Unk.	Unk.	Unk.	Unk.	0	0
<b>TOTAL IMPACTS</b>	<b>201</b>	<b>372</b>	<b>0</b>	<b>0</b>	<b>0-4</b>	<b>0</b>

<sup>a</sup> See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

Unk. = unknown

9

10 **Impact BIO-21: Changes in Vernal Pool Complex Natural Community as a Result of**  
 11 **Implementing BDCP Conservation Measures**

12 Construction, land grading and habitat restoration activities that would accompany the  
 13 implementation of CM4 could permanently eliminate an estimated 372 acres of vernal pool complex  
 14 natural community in the study area. This modification represents approximately 3% of the 12,133  
 15 acres of the community that is mapped in the study area. An estimated 201 acres of this loss would  
 16 occur during the first 10 years of Alternative 9 implementation, as tidal marsh restoration is  
 17 initiated. Vernal pool complex protection (400 acres) and restoration (an estimated 40 acres, with  
 18 actual restoration based on level of effect) would be initiated during the same period to counteract  
 19 the loss of habitat. By the end of the Plan period, 600 acres of this natural community would be  
 20 protected and up to 67 acres would be restored. There is also a commitment to having restoration  
 21 activities keep pace with actual loss of vernal pool habitat through the course of CM4 activities  
 22 (BDCP Chapter 3, Section 3.4.4.27). Because of the high sensitivity of this natural community and its  
 23 shrinking presence in the Plan Area, avoidance and minimization measures have been built into the  
 24 BDCP to eliminate the majority of this potential loss. The BDCP beneficial effect analysis (BDCP

1 Chapter 5, Section 5.4.8.2) indicates that implementation of Alternative 4 would protect at least 600  
2 acres of vernal pool complex in Conservation Zones 1, 8, and 11 and additional vernal pool complex  
3 would be restored to achieve no net loss of this community. The same conservation actions would be  
4 implemented under Alternative 9.

5 The individual effects of the relevant conservation measure are addressed below. A summary  
6 statement of the combined impacts and NEPA and CEQA conclusions follows the individual  
7 conservation measure discussions.

- 8 • *CM1 Water Facilities and Operations*: Construction of the Alternative 9 water conveyance  
9 facilities would not directly affect vernal pool complex natural community. Because of the close  
10 proximity of construction activity to adjacent vernal pool complex near Clifton Court Forebay,  
11 there is the potential for indirect loss or damage to vernal pools from changes in pool hydrology  
12 or deposition of construction-related sediment. These potential indirect effects are discussed in  
13 detail in the vernal pool crustaceans impact analysis later in this chapter.

14 The construction activity associated with CM1 also has the potential to lead indirectly to  
15 increased nitrogen deposition in vernal pool complex habitats in the vicinity of Clifton Court  
16 Forebay. A significant number of cars, trucks, and land grading equipment involved in  
17 construction of canals in the vicinity of the forebay would emit small amounts of atmospheric  
18 nitrogen from fuel combustion; this material could be deposited in sensitive vernal pool areas  
19 that are located west of the major construction areas at Clifton Court Forebay. Nitrogen  
20 deposition can pose a risk of adding a fertilizer to nitrogen-limited soils and their associated  
21 plants. Nonnative invasive species can be encouraged by the added nitrogen available. BDCP  
22 Appendix 5.J, Attachment 5J.A, *Construction-Related Nitrogen Deposition on BDCP Natural*  
23 *Communities*, addresses this issue in detail. It has been concluded that this potential deposition  
24 would pose a low risk of changing the vernal pool complex in the construction areas because the  
25 construction would contribute a negligible amount of nitrogen to regional projected emissions.  
26 Also, the construction at Clifton Court Forebay would occur primarily downwind of the natural  
27 community. No adverse effect is expected.

- 28 • *CM3 Natural Communities Protection and Restoration*: CM3 proposes to protect at least 600 acres  
29 of vernal pool complex in CZs 1, 8 and 11 (BDCP Objective VPNC1.1). The protection would  
30 occur in areas containing a mosaic of grassland and vernal pool complex in unfragmented  
31 natural landscapes supporting a diversity of native plant and wildlife species. These areas would  
32 be both protected and enhanced to increase the cover of vernal pool complex plants relative to  
33 nonnative species.
- 34 • *CM4 Tidal Natural Communities Restoration*: Based on the use of hypothetical restoration  
35 footprints, implementation of CM4 tidal marsh restoration in CZs 1 and 11 (Cache Slough and  
36 Suisun Marsh ROAs; see Figure 12-1) could permanently inundate or remove 201 acres of vernal  
37 pool complex in the near-term timeframe. By the end of the Plan period, a total of 372 acres  
38 could be affected. The principal areas likely to be affected include the Cache Slough drainage just  
39 west of the Yolo Bypass and the Nurse Slough drainage just east of the Potrero Hills.
- 40 • *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*: BDCP CM9 includes both  
41 vernal pool complex and alkali seasonal wetland complex restoration goals. The current  
42 estimate for vernal pool complex restoration is 40 acres in the near-term and a total of 67 acres  
43 by the end of the BDCP restoration period. This restoration conservation measure includes a "  
44 no net loss" policy normally applied to this natural community (BDCP Objective VPNC1.2).

1 The following paragraphs summarize the combined effects discussed above and describe other  
2 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA impact conclusions are  
3 also included.

#### 4 ***Near-Term Timeframe***

5 During the near-term timeframe (the first 10 years of BDCP implementation), Alternative 9 could  
6 affect 201 acres of vernal pool complex natural community through inundation or construction-  
7 related losses in habitat from CM4 activities. This loss would likely occur in the Cache Slough or  
8 Suisun Marsh ROAs mapped in Figure 12-1.

9 The construction or inundation loss of this special-status natural community would represent an  
10 adverse effect if it were not offset by avoidance and minimization measures and restoration actions  
11 associated with BDCP conservation components. Loss of vernal pool complex natural community  
12 would be considered both a loss in acreage of a sensitive natural community and a loss of wetland as  
13 defined by Section 404 of the CWA. The protection of 400 acres of vernal pool complex as part of  
14 CM3 and the restoration of up to 40 acres of this community as part of CM9 during the first 10 years  
15 of Alternative 9 implementation would partially offset this near-term loss. The Plan focuses this  
16 protection in the core vernal pool areas identified in the USFWS vernal pool recovery plan (U.S. Fish  
17 and Wildlife Service 2005). The core areas exist in CZ 1, CZ 8 and CZ 11 (see Figure 12-1). Typical  
18 project-level mitigation ratios (2:1 for protection and 1:1 for restoration) would indicate 402 acres  
19 of protection and 201 acre of restoration would be needed to offset (i.e., mitigate) the 201 acre of  
20 loss. Without additional avoidance and minimization measures to reduce the potential effect, the  
21 proposed protection and restoration would not meet the typical mitigation for vernal pool complex  
22 losses.

23 To avoid this adverse effect, the Plan includes commitments to implement *AMM1 Worker Awareness*  
24 *Training*, *AMM2 Construction Best Management Practices and Monitoring*, *AMM3 Stormwater*  
25 *Pollution Prevention Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM10 Restoration of*  
26 *Temporarily Affected Natural Communities*, and *AMM12 Vernal Pool Crustaceans*. AMM12 limits the  
27 direct removal of vernal pool crustacean habitat to no more than 10 wetted acres and the indirect  
28 effect to no more than 20 wetted acres through the life of the Plan. This is equivalent to the direct  
29 removal of approximately 67 acres and the indirect removal of approximately 134 acres of vernal  
30 pool complex natural community. The AMMs are described in detail in BDCP Appendix 3.C. With  
31 these AMMs in place, Alternative 9 would not adversely affect vernal pool complex natural  
32 community in the near-term.

#### 33 ***Late Long-Term Timeframe***

34 The late long-term effect on vernal pool complex natural community would be 372 acres of  
35 permanent loss. These losses would be associated with the ongoing restoration of tidal wetland in  
36 the Cache Slough and Suisun Marsh ROAs. However, 600 acres would be protected (CM3) and up to  
37 67 acres would be restored (CM9) through the course of the BDCP implementation. In addition, the  
38 avoidance and minimization measures listed above would reduce the actual loss of this community  
39 to no more than 10 wetted acres of vernal pool crustacean habitat from direct activities and 20 acres  
40 of habitat from indirect effects.

41 ***NEPA Effects:*** The conservation measures associated with Alternative 9 include protection of 400  
42 acres (CM3) and restoration of an estimated 40 acres (CM9) of vernal pool complex in the near-term  
43 time frame. The Plan focuses the protection in the core vernal pool areas identified in the USFWS

1 vernal pool recovery plan (U.S. Fish and Wildlife Service 2005). The core areas exist in CZ 1, CZ 8 and  
2 CZ 11 (see Figure 12-1). In addition, Alternative 9 includes AMM12 which limits the removal of  
3 vernal pool crustacean habitat to no more than 10 wetted acres and the indirect effect to no more  
4 than 20 wetted acres through the life of the Plan. With this and other AMMs in place, Alternative 9  
5 would not adversely affect vernal pool complex natural community in the near-term. With these  
6 conservation measures and AMMs in effect through the entire Plan period, Alternative 9 would not  
7 have an adverse effect on the vernal pool complex natural community in the long term.

#### 8 ***CEQA Conclusion:***

#### 9 ***Near-Term Timeframe***

10 During the 10-year near-term time frame, Alternative 9 could result in the loss of approximately 201  
11 acres of vernal pool complex natural community due to inundation during tidal marsh restoration  
12 (CM4). The loss would likely occur in the Cache Slough or Suisun Marsh ROAs.

13 The inundation loss of this special-status natural community would represent a significant impact if  
14 it were not offset by avoidance and minimization measures and other actions associated with BDCP  
15 conservation components. Loss of vernal pool complex natural community would be considered  
16 both a loss in acreage of a sensitive natural community and a loss of wetland as defined by Section  
17 404 of the CWA. The protection of 400 acres of vernal pool complex as part of CM3 and the  
18 restoration of an estimated 40 acres of this community as part of CM9 during the first 10 years of  
19 Alternative 9 implementation would partially offset this near-term loss. CM9 also includes a  
20 commitment to have vernal pool restoration keep pace with loss of this natural community. Typical  
21 project-level mitigation ratios (2:1 for protection and 1:1 for restoration) would indicate 402 acres  
22 of protection and 201 acres of restoration would be needed to offset (i.e., mitigate) the 201 acre of  
23 loss. Without additional avoidance and minimization measures to reduce the potential impact, the  
24 proposed protection and restoration would not meet the typical mitigation for vernal pool complex  
25 losses. However, Alternative 9 also includes AMM1, AMM2, AMM3, AMM4, AMM10, and AMM12 to  
26 minimize impacts. AMM12 places a strict limit on the acres of wetted vernal pool crustacean habitat  
27 that can be lost to conservation actions (10 acres of direct and 20 acres of indirect loss; equivalent to  
28 approximately 67 acres of direct loss and 134 acres of indirect loss of vernal pool natural  
29 community). Because of the offsetting protection and restoration activities and implementation of  
30 AMMs, impacts would be less than significant.

#### 31 ***Late Long-Term Timeframe***

32 At the end of the Plan period, 372 acres of vernal pool complex natural community could be  
33 permanently removed. Through CM3 and CM9, 600 acres of vernal pool complex natural community  
34 would be protected and up to 67 acres would be restored. In addition, AMM12 would limit the acres  
35 of wetted vernal pool crustacean habitat loss to 10 acres from direct actions and 20 acres from  
36 indirect actions. There would be no net permanent reduction in the acreage of this natural  
37 community within the study area. Alternative 9 would have a less-than-significant impact on this  
38 natural community.

#### 39 **Impact BIO-22: Increased Frequency, Magnitude and Duration of Periodic Inundation of** 40 **Vernal Pool Complex Natural Community**

41 *CM2 Yolo Bypass Fisheries Enhancement* would modify the inundation regime of the Yolo Bypass, a  
42 man-made waterway. CM2, which is designed to improve fish passage and shallow flooded habitat

1 for Delta fishes in the Yolo Bypass, could increase periodic inundation of a small acreage of vernal  
2 pool complex natural community in the southern section of the bypass, south of Putah Creek.

3 Operation of the Yolo Bypass under Alternative 9 would result in an increase in the frequency,  
4 magnitude and duration of inundation on an estimated 0–4 acres of vernal pool complex natural  
5 community. The methods used to estimate this inundation acreage are described in BDCP Appendix  
6 5.J, *Effects on Natural Communities, Wildlife, and Plants*. The area more frequently affected by  
7 inundation would vary with the flow volume that would pass through the newly constructed notch  
8 in the Fremont Weir. The 4-acre increase in inundation would only occur at the highest modeled  
9 flow regime, 8,000 cfs. Plan-related increases in flow through Fremont Weir would be expected in  
10 30% of the years. The vernal pool complex natural community that would likely be affected occurs  
11 in the southern reaches of the bypass, south of Putah Creek. There are several relatively large,  
12 contiguous areas of vernal pools on the western edge of the bypass in this area. The anticipated  
13 change in management of flows in the Yolo Bypass includes more frequent releases in flows into the  
14 bypass from the Fremont and Sacramento Weirs, and in some years, later releases into the bypass in  
15 spring months (April and May).

16 **NEPA Effects:** The modification of periodic inundation events in the Yolo Bypass associated with  
17 Alternative 9 water operations would not adversely affect vernal pool complex habitats, as they  
18 have persisted under similar high flows and extended inundation periods. There is the potential,  
19 however, for some change in plant species composition as a result of longer inundation periods.

20 **CEQA Conclusion:** An estimated 0–4 acres of vernal pool complex natural community in the Yolo  
21 Bypass would be subjected to more frequent inundation as a result of implementing CM2 under  
22 Alternative 9. This natural community is conditioned to periodic inundation; the slight increase in  
23 periodic inundation would not result in a net permanent reduction in the acreage of this community  
24 in the study area, although some change in plant species composition could occur. Increasing  
25 periodic inundation of vernal pool complex natural community in the Yolo Bypass would have a less-  
26 than-significant impact on the community.

### 27 **Impact BIO-23: Modification of Vernal Pool Complex Natural Community from Ongoing** 28 **Operation, Maintenance and Management Activities**

29 Once the physical facilities associated with Alternative 9 are constructed and the stream flow regime  
30 associated with changed water management is in effect, there would be new ongoing and periodic  
31 actions associated with operation, maintenance and management of the BDCP facilities and  
32 conservation lands that could affect vernal pool complex natural community in the study area. The  
33 ongoing actions include the diversion of Sacramento River flows into newly screened diversion  
34 structures at Georgianna Slough and Delta Cross Channel, operation of multiple operable barriers in  
35 Delta waterways, modified diversions from south Delta channels, and recreation activities in Plan  
36 reserves. These actions are associated with CM1 and CM11 (see the impact discussion above for  
37 effects associated with CM2). The periodic actions would involve access road and conveyance facility  
38 repair, vegetation management at the various water conveyance facilities and habitat restoration  
39 sites (CM11), levee repair and replacement of levee armoring, channel dredging, and habitat  
40 enhancement in accordance with natural community management plans. The potential effects of  
41 these actions are described below.

- 42 • *Modified river flows upstream of and within the study area and modified diversions from south*  
43 *Delta channels.* Changes in releases from reservoirs upstream of the study area, modified  
44 diversion of Sacramento River flows at newly screened diversions into Georgianna Slough and

1 Delta Cross Channel, operation of multiple operable barriers in Delta waterways, and modified  
2 diversions from south Delta channels (Operational Scenario G) would not affect vernal pool  
3 complex natural community. This natural community does not exist within or adjacent to the  
4 active Sacramento River system channels and Delta waterways.

- 5 • *Access road, water conveyance facility and levee repair.* Periodic repair of access roads, water  
6 conveyance facilities and levees associated with the BDCP actions have the potential to require  
7 removal of adjacent vegetation and could entail earth and rock work adjacent to vernal pool  
8 complex habitats. This activity could lead to increased soil erosion and runoff entering these  
9 habitats. These activities would be subject to normal erosion and runoff control management  
10 practices, including those developed as part of *AMM2 Construction Best Management Practices*  
11 *and Monitoring* and *AMM4 Erosion and Sediment Control Plan*. Any vegetation removal or earth  
12 work adjacent to vernal pool complex habitats would require use of sediment barriers, soil  
13 stabilization and revegetation of disturbed surfaces as part of *AMM10 Restoration of Temporarily*  
14 *Affected Natural Communities*. Proper implementation of these measures would avoid  
15 permanent adverse effects on this community.
- 16 • *Vegetation management.* Vegetation management, in the form of physical removal and chemical  
17 treatment, would be a periodic activity associated with the long-term maintenance of water  
18 conveyance facilities and restoration sites (*CM11 Natural Communities Enhancement and*  
19 *Management*). Use of herbicides to control nuisance vegetation could pose a long-term hazard to  
20 vernal pool complex natural community at or adjacent to treated areas. The hazard could be  
21 created by uncontrolled drift of herbicides, uncontrolled runoff of contaminated stormwater  
22 onto the natural community, or direct discharge of herbicides to vernal pool complex areas  
23 being treated for invasive species removal. Environmental commitments and *AMM5 Spill*  
24 *Prevention, Containment, and Countermeasure Plan* have been made part of the BDCP to reduce  
25 hazards to humans and the environment from use of various chemicals during maintenance  
26 activities, including the use of herbicides. These commitments are described in Appendix 3B,  
27 including the commitment to prepare and implement spill prevention, containment, and  
28 countermeasure plans and stormwater pollution prevention plans. Best management practices,  
29 including control of drift and runoff from treated areas, and use of herbicides approved for use  
30 in terrestrial or aquatic environments would also reduce the risk of affecting natural  
31 communities adjacent to water conveyance features and levees associated with restoration  
32 activities.
- 33 • *Habitat enhancement.* The BDCP includes a long-term management element for the natural  
34 communities within the Plan Area (CM11). For the vernal pool complex natural community, a  
35 management plan would be prepared that specifies actions to improve the value of the habitats  
36 for covered species. Actions would include control of invasive nonnative plant and animal  
37 species, fire management, restrictions on vector control and application of herbicides, and  
38 maintenance of infrastructure that would allow for movement through the community. The  
39 enhancement efforts would improve the long-term value of this community for both special-  
40 status and common species.
- 41 • *Recreation.* The BDCP would allow for certain types of recreation in and adjacent to vernal pool  
42 complexes in the reserve system. The activities could include wildlife and plant viewing and  
43 hiking. *CM11 Natural Communities Enhancement and Management* (BDCP Chapter 3, Section  
44 3.4.11) describes this program and identifies applicable restrictions on recreation that might  
45 adversely affect vernal pool habitat. BDCP also includes an avoidance and minimization measure

1 (AMM37) that further dictates limits on recreation activities that might affect vernal pools.  
2 Recreational trails would be limited to existing trails and roads. New trail construction would be  
3 prohibited within the vernal pool complex reserves. It is expected that most activities would be  
4 docent-led tours of reserves, minimizing adverse effects.

5 The various operations and maintenance activities described above could alter acreage of vernal  
6 pool complex natural community in the study area. Activities could introduce sediment and  
7 herbicides that would reduce the value of this community to common and sensitive plant and  
8 wildlife species. Other periodic activities associated with the Plan, including management,  
9 protection and enhancement actions associated with *CM3 Natural Communities Protection and*  
10 *Restoration* and *CM11 Natural Communities Enhancement and Management*, would be undertaken to  
11 enhance the value of the community. While some of these activities could result in small changes in  
12 acreage, these changes would be greatly offset by restoration activities planned as part of *CM9*  
13 *Vernal Pool and Alkali Seasonal Wetland Complex Restoration*, or minimized by implementation of  
14 AMM2, AMM4, AMM5, AMM10 and AMM37. The management actions associated with control of  
15 invasive plant species would also result in a long-term benefit to the species associated with vernal  
16 pool complex habitats by eliminating competitive, invasive species of plants.

17 **NEPA Effects:** Ongoing operation, maintenance and management activities associated with  
18 Alternative 9 would not result in a net permanent reduction in the vernal pool complex natural  
19 community within the study area. Therefore, there would be no adverse effect on this community.

20 **CEQA Conclusion:** The operation and maintenance activities associated with Alternative 9 would  
21 have the potential to create minor changes in total acreage of vernal pool complex natural  
22 community in the study area, and could create temporary increases in sedimentation or damage  
23 from recreational activity in this community. The activities could also introduce herbicides  
24 periodically to control nonnative, invasive plants. Implementation of environmental commitments  
25 and AMM2, AMM4, AMM5, AMM10 and AMM37 would minimize these impacts, and other  
26 operations and maintenance activities, including management, protection and enhancement actions  
27 associated with *CM3 Natural Communities Protection and Restoration* and *CM11 Natural*  
28 *Communities Enhancement and Management*, would create positive effects, including reduced  
29 competition from invasive, nonnative plants in these habitats. Long-term restoration activities  
30 associated with *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration* and protection  
31 actions associated with *CM3 Natural Communities Protection and Restoration* would ensure that the  
32 acreage of this natural community would not decrease in the study area. Ongoing operation,  
33 maintenance and management activities would not result in a net permanent reduction in this  
34 natural community within the study area. Therefore, there would be a less-than-significant impact.

### 35 **Managed Wetland**

36 The conservation components of Alternative 9 would reduce the acreage of managed wetland  
37 currently found in the study area. Initial development and construction of CM1, CM2, CM4, and CM6  
38 would result in both permanent and temporary removal of this community (see Table 12-9-9). Full  
39 implementation of Alternative 9 would also include the following conservation action over the term  
40 of the BDCP to benefit the managed wetland natural community.

- 41 • Protect and enhance 8,100 acres of managed wetland, at least 1,500 acres of which are in the  
42 Grizzly Island Marsh Complex (Objective MWNC1.1, associated with CM3).

- Create 320 acres of managed wetlands consisting of greater sandhill crane roosting habitat in minimum patch sizes of 40 acres within the Greater Sandhill Crane Winter Use Area in Conservation Zones 3, 4, 5, or 6, with consideration of sea level rise and local seasonal flood events (Objective GSHC1.3, associated with CM10).
- Create two wetland complexes within the SLNWR refuge boundary. Each complex will consist of at least three wetlands totaling 90 acres of greater sandhill crane roosting habitat. One of the wetland complexes may be replaced by 180 acres of cultivated lands that are flooded following harvest for crane roosting and foraging habitat (Objective GSHC1.4, associated with CM10).

In addition to this conservation action, creation of similar habitat values by restoring tidal brackish emergent wetland and tidal freshwater emergent wetland as part of CM4 would further offset the losses of managed wetland. The net effect would be a substantial decrease in the amount of managed wetlands, but an increase in similar habitat value for special-status and common species as the managed wetland is converted to tidal marsh. Impacts to this natural community would not be adverse for NEPA purposes and would be less than significant for CEQA purposes. Refer to the *Shorebirds and Waterfowl* impact discussion at the end of this section (Section 12.3.3.16) for further consideration of the effects of removing managed wetland natural community.

**Table 12-9-9. Changes in Managed Wetland Associated with Alternative 9 (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Permanent		Temporary		Periodic <sup>d</sup>	
	NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	9	9	23	23	0	0
CM2	24	24	44	44	931-2,612	0
CM4	5,718	13,746	0	0	0	0
CM5	0	0	0	0	0	6
CM6	Unk.	Unk.	Unk.	Unk.	0	0
<b>TOTAL IMPACTS</b>	<b>5,751</b>	<b>13,779</b>	<b>67</b>	<b>67</b>	<b>931-2,612</b>	<b>6</b>

<sup>a</sup> See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

Unk. = unknown

**Impact BIO-24: Changes in Managed Wetland Natural Community as a Result of Implementing BDCP Conservation Measures**

Construction, channel dredging, land grading and habitat restoration activities that would accompany the implementation of CM1, CM2, CM4, and CM6 would permanently eliminate an estimated 13,779 acres of managed wetland in the study area. This modification represents

1 approximately 19% of the 70,798 acres of managed wetland that is mapped in the study area. This  
2 loss would occur through the course of BDCP restoration activity, as construction and tidal marsh  
3 restoration proceeds. Managed wetland protection (8,100 acres) and restoration (500 acres) would  
4 take place over the same period, but would not replace the acreage lost. The BDCP beneficial effects  
5 analysis for Alternative 4 (BDCP Chapter 5, Section 5.4.9.2) states that at least 8,100 acres of  
6 managed wetlands will be protected, of which at least 1,500 acres will be located within the Grizzly  
7 Island marsh complex, consistent with the U.S. Fish and Wildlife Service salt marsh harvest mouse  
8 recovery plan. Although the primary purpose of the 1,500 acres of protection is to protect and  
9 enhance habitat for the salt marsh harvest mouse, it is also expected to benefit the managed wetland  
10 natural community and the diversity of species that use it, including migratory waterfowl and the  
11 western pond turtle. These same conservation actions would be implemented under Alternative 9.

12 The individual effects of the relevant conservation measure are addressed below. A summary  
13 statement of the combined impacts and NEPA and CEQA conclusions follows the individual  
14 conservation measure discussions.

- 15 • *CM1 Water Facilities and Operation:* Construction of the Alternative 9 water conveyance facilities  
16 would permanently remove 9 acres and temporarily remove 23 acres of managed wetland  
17 community. The permanent losses would occur at canal construction sites over the Old River  
18 just south of Clifton Court Forebay and across Coney Island, and at a spoil storage site adjacent  
19 to the operable barrier constructed at the northern junction of Old River and the San Joaquin  
20 River at Franks Tract. The temporary losses would occur at the Old River canal crossing adjacent  
21 to Clifton Court Forebay, at the Old River/San Joaquin River operable barrier at Franks Tract,  
22 and at a work area adjacent to the Delta Cross Channel diversion construction site (see  
23 Terrestrial Biology Mapbook). These losses would take place during the near-term construction  
24 period.
- 25 • *CM2 Yolo Bypass Fisheries Enhancement:* Implementation of CM2 involves a number of  
26 construction activities that could permanently or temporarily remove managed wetland,  
27 including west side channels modifications, Putah Creek realignment activities, Lisbon Weir  
28 modification and Sacramento Weir improvements. All of these activities could involve  
29 excavation and grading in managed wetland areas to improve passage of fish through the  
30 bypasses. Based on hypothetical construction footprints, a total of 24 acres could be  
31 permanently removed and 44 acres could be temporarily removed. This activity would occur in  
32 the near-term timeframe.
- 33 • *CM4 Tidal Natural Communities Restoration:* Based on the use of hypothetical restoration  
34 footprints, implementation of CM4 would permanently inundate or remove 13,746 acres of  
35 managed wetland community. These losses would be expected to occur primarily in the Suisun  
36 Marsh ROA, but could also occur in the Cache Slough and West Delta ROAs (see Figure 12-1).  
37 These acres of managed wetland would be converted to natural wetland, including large  
38 acreages of tidal brackish emergent wetland and tidal freshwater emergent wetland. These  
39 natural wetlands provide comparable or improved habitat for the special-status species that  
40 occupy managed wetland. The newly created tidal marsh would not create a barrier or result in  
41 fragmentation of managed wetland, as most species are capable of utilizing both communities.  
42 An estimated 500 acres of managed wetland would be restored and 8,100 acres would be  
43 enhanced and protected through *CM3 Natural Communities Protection and Restoration*, as  
44 established by BDCP Objective MWNC1.1. All of the restoration and 4,800 acres of the protection  
45 would occur during the first 10 years of Alternative 9 implementation, which would coincide

1 with the timeframe of water conveyance facilities construction and early implementation of  
2 CM4. The remaining restoration would be spread over the following 30 years. Managed wetland  
3 restoration is expected to include at least 320 acres in CZs 3, 4, 5 and 6 (Figure 12-1) to benefit  
4 sandhill crane, as stated in BDCP Objective GSHC1.3. The enhancement and protection would be  
5 focused in Suisun Marsh, but could also occur in CZs with existing managed wetland (CZs 1, 2, 4,  
6 5, 6, and 7).

- 7 • *CM6 Channel Margin Enhancement*: Channel margin habitat enhancement could result in filling  
8 of small amounts of managed wetland habitat along 20 miles of river and sloughs. The extent of  
9 this loss cannot be quantified at this time, but the majority of the enhancement activity would  
10 occur on the edges of tidal perennial aquatic habitat, including levees and channel banks.  
11 Managed wetland adjacent to these tidal areas could be affected. The improvements would  
12 occur within the study area on sections of the Sacramento, San Joaquin and Mokelumne Rivers,  
13 and along Steamboat and Sutter Sloughs.

14 The following paragraphs summarize the combined effects discussed above and describe other  
15 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA impact conclusions are  
16 also included.

#### 17 ***Near-Term Timeframe***

18 During the near-term timeframe (the first 10 years of BDCP implementation), Alternative 9 would  
19 permanently remove 5,751 acres and temporarily remove 67 acres of managed wetland through  
20 inundation or construction-related losses in habitat from CM1, CM2, and CM4 activities. Thirty-two  
21 acres of this loss would be associated with construction of the water conveyance facilities (CM1).  
22 These losses would occur in various locations, but the majority of the near-term loss would occur in  
23 Suisun Marsh and the lower Yolo Bypass as tidal marsh is restored.

24 The construction or inundation loss of this special-status natural community would represent an  
25 adverse effect if it were not offset by other conservation actions. Loss of managed wetland natural  
26 community would be considered both a loss in acreage of a sensitive natural community and  
27 potentially a loss of wetland as defined by Section 404 of the CWA. Many managed wetland areas are  
28 interspersed with small natural wetlands that would be regulated under Section 404. The  
29 restoration of 500 acres (CM10) and protection and enhancement of 4,800 acres (CM3) of managed  
30 wetland during the first 10 years of Alternative 9 implementation would fully offset the losses  
31 associated with CM1, but would only partially offset the total near-term loss. The typical project-  
32 level mitigation ratio (1:1 for protection) would indicate 32 acres of protection would be needed to  
33 offset the 32 acres of loss associated with CM1; a total of 5,818 acres of protection would be needed  
34 to offset (i.e., mitigate) the 5,818 acres of permanent and temporary loss from all near-term actions.  
35 The combined protection and restoration proposed for managed wetland in the near-term would  
36 fall 518 acres short of full replacement. However, the CM4 marsh restoration activities that would be  
37 creating this loss would be simultaneously creating 2,000 acres of tidal brackish emergent wetland  
38 and 8,850 acres of tidal freshwater emergent wetland in place of the managed wetland in the near-  
39 term. This acreage would significantly exceed the number of acres of managed wetlands lost.  
40 Mitigation measures would also be undertaken to reduce the effects of managed wetland loss on  
41 waterfowl in Suisun Marsh (Mitigation Measure BIO-179a) and the Yolo/Delta basins (Mitigation  
42 Measure 179b) if the protection and enhancement actions of CM3 and CM10 were not sufficient to  
43 replace the value of managed wetlands for waterfowl in these basins. Refer to the *General Terrestrial*  
44 *Biology Effects* discussion later in this section (Section 12.3.3.16).

1 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
2 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
3 *Plan*, *AMM4 Erosion and Sediment Control Plan*, and *AMM10 Restoration of Temporarily Affected*  
4 *Natural Communities*. All of these AMMs include elements that avoid or minimize the risk of affecting  
5 habitats at work areas. The AMMs are described in detail in BDCP Appendix 3.C.

6 In spite of the managed wetland protection, restoration and avoidance measures contained in  
7 Alternative 9, there would be a net reduction in the acreage of this special-status natural community  
8 in the near-term. This would be an adverse effect when judged by the significance criteria listed  
9 earlier in this chapter. However, the conversion of these managed habitats to natural tidal wetland  
10 types that support similar ecological functions (2,000 acres of tidal brackish emergent wetland and  
11 8,850 acres of tidal freshwater emergent wetland) would offset this adverse effect. Also, there are  
12 other conservation actions contained in the BDCP (CM3 and CM11) that would improve  
13 management and enhance existing habitat values, further offsetting the effects of managed wetland  
14 loss on covered and noncovered special-status terrestrial species and on common species that rely  
15 on this natural community for some life phase. As a result, there would be no adverse effect.

### 16 ***Late Long-Term Timeframe***

17 At the end of the Plan period, 13,779 acres of managed wetland natural community would be  
18 permanently removed by conservation actions, 8,100 acres would be protected and 500 acres would  
19 be restored. There would be a net permanent reduction in the acreage of this special-status natural  
20 community within the study area. Simultaneously, there would be the creation of 6,000 acres of tidal  
21 brackish emergent wetland and 24,000 acres of tidal freshwater emergent wetland in place of this  
22 managed wetland.

23 ***NEPA Effects:*** Alternative 9 would result in a loss 13,779 acres of managed wetland within the study  
24 area; however, it would also protect and enhance 8,100 acres and restore 500 acres of this habitat.  
25 In addition, Alternative 9 would restore 6,000 acres of tidal brackish emergent wetland and 24,000  
26 acres of tidal freshwater emergent wetland that support similar ecological functions to those of  
27 managed wetland. Therefore, there would be no adverse effect on managed wetland natural  
28 community.

### 29 ***CEQA Conclusion:***

#### 30 ***Near-Term Timeframe***

31 During the near-term timeframe (the first 10 years of BDCP implementation), Alternative 9 would  
32 permanently remove 5,571 acres and temporarily remove 67 acres of managed wetland through  
33 inundation or construction-related losses in habitat from CM1, CM2, and CM4 activities. Thirty-two  
34 acres of this loss would be associated with construction of the water conveyance facilities (CM1).  
35 These losses would occur in various locations, but the majority of the near-term loss would occur in  
36 Suisun Marsh and the lower Yolo Bypass as tidal marsh is restored.

37 The construction or inundation loss of this special-status natural community would represent a  
38 significant impact if it were not offset by other conservation actions. Loss of managed wetland  
39 natural community would be considered both a loss in acreage of a sensitive natural community and  
40 potentially a loss of wetland as defined by Section 404 of the CWA. The restoration of 500 acres and  
41 protection and enhancement of 4,800 acres of managed wetland as part of CM3 and CM10 during  
42 the first 10 years of Alternative 9 implementation would fully offset the losses associated with CM1,

1 but would only partially offset the total near-term loss. The typical project-level mitigation ratio (1:1  
2 for protection) would indicate 32 acres of protection would be needed to offset the 32 acres of loss  
3 associated with CM1; a total of 5,818 acres of protection would be needed to offset (i.e., mitigate) the  
4 5,818 acres of permanent and temporary loss from all near-term actions. The combined protection  
5 and restoration proposed for managed wetland in the near-term would fall 518 acres short of full  
6 replacement. However, the CM4 marsh restoration activities that would be creating this loss would  
7 be simultaneously creating 2,000 acres of tidal brackish emergent wetland and 4,800 acres of tidal  
8 freshwater emergent wetland in place of the managed wetland in the near-term. This acreage would  
9 significantly exceed the number of acres of managed wetland lost. Mitigation measures would also  
10 be undertaken to reduce the effects of managed wetland loss on waterfowl in Suisun Marsh  
11 (Mitigation Measure BIO-179a) and the Yolo/Delta basins (Mitigation Measure 179b) if the  
12 protection and enhancement actions of CM3 and CM10 were not sufficient to replace the value of  
13 managed wetlands for waterfowl in these basins. Refer to the *General Terrestrial Biology Effects*  
14 discussion later in this section (Section 12.3.3.16).

15 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
16 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
17 *Plan*, *AMM4 Erosion and Sediment Control Plan*, and *AMM10 Restoration of Temporarily Affected*  
18 *Natural Communities*. All of these AMMs include elements that avoid or minimize the risk of affecting  
19 habitats at work areas. The AMMs are described in detail in BDCP Appendix 3.C.

20 In spite of the managed wetland protection, restoration and avoidance measures contained in  
21 Alternative 9, there would be a net reduction in the acreage of this special-status natural community  
22 in the near-term. This would be a significant impact when judged by the significance criteria listed  
23 earlier in this chapter. However, the conversion of these managed habitats to natural tidal wetland  
24 types that support similar ecological functions (2,000 acres of tidal brackish emergent wetland and  
25 4,800 acres of tidal freshwater emergent wetland) would eliminate this significant impact. Also,  
26 there are other conservation actions contained in the BDCP (CM3 and CM11) that would improve  
27 management and enhance existing habitat values, further offsetting the impacts of managed wetland  
28 loss on covered and noncovered special-status terrestrial species and on common species that rely  
29 on this natural community for some life phase. As a result, there would be a less-than-significant  
30 impact.

### 31 ***Late Long-Term Timeframe***

32 At the end of the Plan period, 13,779 acres of managed wetland natural community would be  
33 permanently removed by conservation actions, 8,100 acres would be protected and 500 acres would  
34 be restored. There would be a net permanent reduction in the acreage of this special-status natural  
35 community within the study area. Simultaneously, there would be the creation of 6,000 acres of tidal  
36 brackish emergent wetland and 24,000 acres of tidal freshwater emergent wetland in place of this  
37 managed wetland. Because these natural wetlands support similar ecological functions to those of  
38 managed wetland, there would be a less-than-significant impact.

### 39 **Impact BIO-25: Increased Frequency, Magnitude and Duration of Periodic Inundation of** 40 **Managed Wetland Natural Community**

41 Two Alternative 9 conservation measures would modify the inundation/flooding regimes of both  
42 natural and man-made waterways in the study area. CM2, which is designed to improve fish passage  
43 and shallow flooded habitat for Delta fishes in the Yolo Bypass, would increase periodic inundation

1 of managed wetland on wildlife management areas and duck clubs scattered up and down the  
2 central and southern bypass. CM5 would expose this community to additional flooding as channel  
3 margins are modified and levees are set back to improve fish habitat along some of the major rivers  
4 and waterways in the south Delta.

- 5 • *CM2 Yolo Bypass Fisheries Enhancement*: Operation of the Yolo Bypass under Alternative 9 would  
6 result in an increase in the frequency, magnitude and duration of inundation of 931-2,612 acres  
7 of managed wetland natural community. The methods used to estimate these inundation  
8 acreages are described in BDCP Appendix 5.J, *Effects on Natural Communities, Wildlife, and*  
9 *Plants*. The area more frequently affected by inundation would vary with the flow volume that  
10 would pass through the newly constructed notch in the Fremont Weir. The 931-acre increase in  
11 inundation would be associated with a notch flow of 8,000 cubic feet per second (cfs), and the  
12 2,612-acre increase would result from a notch flow of 4,000 cfs. Plan-related increases in flow  
13 through Fremont Weir would be expected in 30% of the years. Based on the theoretical  
14 modeling that has been completed to-date, the largest acreages would be associated with the  
15 Sacramento Bypass Wildlife Area, the Yolo Bypass Wildlife Area, and private managed wetlands  
16 south of Putah Creek. The anticipated change in management of flows in the Yolo Bypass  
17 includes more frequent releases in flows into the bypass from the Fremont and Sacramento  
18 Weirs, and in some years, later releases into the bypass in spring months (April and May). With  
19 larger flows, the water depths may also increase over Existing Conditions. While the managed  
20 wetlands of the Yolo Bypass are conditioned to periodic inundation events, the more frequent  
21 and extended inundation periods may make it more difficult to actively manage the areas for  
22 maximum food production for certain species (waterfowl primarily) and may alter the plant  
23 assemblages in some years. The effects of this periodic inundation on birds and other terrestrial  
24 species are discussed later in this chapter. The additional inundation would not be expected to  
25 reduce the acreage of managed wetland on a permanent basis. The extended inundation would  
26 be designed to expand foraging and spawning habitat for Delta fishes.
- 27 • *CM5 Seasonally Inundated Floodplain Restoration*: Floodplain restoration would result in an  
28 increase in the frequency and duration of inundation of an estimated 6 acres of managed  
29 wetland. Specific locations for this restoration activity have not been identified, but they would  
30 likely be focused in the south Delta area, along the major rivers and Delta channels. The  
31 connection of these wetlands to stream flooding events would be beneficial to the ecological  
32 function of managed wetlands, especially as they relate to BDCP target aquatic species. Foraging  
33 activity and refuge sites would be expanded into areas currently unavailable or infrequently  
34 available to some aquatic species. The more frequent flooding would periodically interfere with  
35 management activities associated with terrestrial species (primarily waterfowl) and may result  
36 in changes in plant composition and management strategies over time.

37 In summary, 937-2,618 acres of managed wetland community in the study area would be subjected  
38 to more frequent inundation as a result of implementing two Alternative 9 conservation measures  
39 (CM2 and CM5).

40 **NEPA Effects:** Managed wetland community would not be adversely affected because much of the  
41 acreage affected is conditioned to periodic inundation. The more frequent inundation could create  
42 management problems associated with certain species, especially waterfowl, and result in changes  
43 over time in plant species composition. The total acreage of managed wetland would not be  
44 expected to change permanently as a result of the periodic inundation.

1 **CEQA Conclusion:** An estimated 937-2,618 acres of managed wetland community in the study area  
2 would be subjected to more frequent inundation as a result of implementing CM2 and CM5 under  
3 Alternative 9. Managed wetland community would not be significantly impacted because periodic  
4 inundation is already experienced by most of the land that would be affected. There could be  
5 increased management problems and a long-term shift in plant species composition. The periodic  
6 inundation would not be expected to result in a net permanent reduction in the acreage of this  
7 community in the study area. Therefore, there would be a less-than-significant impact on the  
8 community.

9 **Impact BIO-26: Modification of Managed Wetland Natural Community from Ongoing**  
10 **Operation, Maintenance and Management Activities**

11 Once the physical facilities associated with Alternative 9 are constructed and the stream flow regime  
12 associated with changed water management is in effect, there would be new ongoing and periodic  
13 actions associated with operation, maintenance and management of the BDCP facilities and  
14 conservation lands that could affect managed wetland natural community in the study area. The  
15 ongoing actions include the diversion of Sacramento River flows into two newly screened diversions  
16 at Georgianna Slough and Delta Cross Channel, operation of multiple operable barriers in Delta  
17 waterways, modified diversions from south Delta channels, and recreational use of reserve areas.  
18 These actions are associated with CM1 and CM11 (see the above impact discussion for effects  
19 associated with CM2). The periodic actions would involve access road and conveyance facility  
20 repair, vegetation management at the various water conveyance facilities and habitat restoration  
21 sites (CM11), levee repair and replacement of levee armoring, channel dredging, and habitat  
22 enhancement in accordance with natural community management plans. The potential effects of  
23 these actions are described below.

- 24 • *Modified river flows upstream of and within the study area and modified diversions from south*  
25 *Delta channels.* Changes in releases from reservoirs upstream of the study area, modified  
26 diversion of Sacramento River flows at two newly screened diversions at Georgianna Slough and  
27 Delta Cross Channel, operation of multiple operable barriers in Delta waterways, and modified  
28 diversions from south Delta channels (Operational Scenario G) would not result in the reduction  
29 in acreage of the managed wetland natural community in the study area. Flow levels in the  
30 upstream rivers would not change to the degree that water levels in adjacent managed wetlands  
31 would be altered. Similarly, modified diversions of Sacramento River flows in at Georgianna  
32 Slough and Delta Cross Channel would not result in a permanent reduction in the managed  
33 wetland community downstream of these diversions. The majority of the managed wetlands  
34 below the diversions is not directly connected to the rivers. Modified diversions from south  
35 Delta channels would not create a reduction in this natural community.
- 36 • *Access road, water conveyance facility and levee repair.* Periodic repair of access roads, water  
37 conveyance facilities and levees associated with the BDCP actions have the potential to require  
38 removal of adjacent vegetation and could entail earth and rock work in managed wetland  
39 habitats. This activity could lead to increased soil erosion, turbidity and runoff entering  
40 managed wetlands. These activities would be subject to normal erosion, turbidity and runoff  
41 control management practices, including those developed as part of *AMM2 Construction Best*  
42 *Management Practices and Monitoring* and *AMM4 Erosion and Sediment Control Plan*. Any  
43 vegetation removal or earth work adjacent to or within managed wetland habitats would  
44 require use of sediment and turbidity barriers, soil stabilization and revegetation of disturbed

1 surfaces. Proper implementation of these measures would avoid permanent adverse effects on  
2 this community.

- 3 • *Vegetation management.* Vegetation management, in the form of physical removal and chemical  
4 treatment, would be a periodic activity associated with the long-term maintenance of water  
5 conveyance facilities and restoration sites(*CM11 Natural Resources Enhancement and*  
6 *Management*). Use of herbicides to control nuisance vegetation could pose a long-term hazard to  
7 managed wetland natural community at or adjacent to treated areas. The hazard could be  
8 created by uncontrolled drift of herbicides, uncontrolled runoff of contaminated stormwater  
9 onto the community, or direct discharge of herbicides to managed wetland areas being treated  
10 for invasive species removal. Environmental commitments and *AMM5 Spill Prevention,*  
11 *Containment, and Countermeasure Plan* have been made part of the BDCP to reduce hazards to  
12 humans and the environment from use of various chemicals during maintenance activities,  
13 including the use of herbicides. These commitments are described in Appendix 3B, including the  
14 commitment to prepare and implement spill prevention, containment, and countermeasure  
15 plans and stormwater pollution prevention plans. Best management practices, including control  
16 of drift and runoff from treated areas, and use of herbicides approved for use in aquatic and  
17 terrestrial environments would also reduce the risk of affecting natural communities adjacent to  
18 water conveyance features and levees associated with restoration activities.

19 Herbicides to remove aquatic invasive species as part of CM13 would be used to restore the  
20 normal ecological function of tidal and nontidal aquatic habitats in planned restoration areas.  
21 The treatment activities would be conducted in concert with the California Department of  
22 Boating and Waterways' invasive species removal program. Eliminating large stands of water  
23 hyacinth and Brazilian waterweed would improve habitat conditions for some aquatic species  
24 by removing cover for nonnative predators, improving water flow and removing barriers to  
25 movement (see Chapter 11, *Fish and Aquatic Resources*). These habitat changes should also  
26 benefit terrestrial species that use managed wetland natural community for movement  
27 corridors and for foraging. Vegetation management effects on individual species are discussed in  
28 the species sections on following pages.

- 29 • *Habitat enhancement.* The BDCP includes a long-term management element for the natural  
30 communities within the Plan Area (CM11). For the managed wetland natural community, a  
31 management plan would be prepared that specifies actions to improve the value of the habitats  
32 for covered species. Actions would include control of invasive nonnative plant and animal  
33 species, fire management, restrictions on vector control and application of herbicides, and  
34 maintenance of infrastructure that would allow for movement through the community. The  
35 enhancement efforts would improve the long-term value of this community for both special-  
36 status and common species.
- 37 • *Recreation.* The BDCP would allow hunting, fishing and hiking in managed wetland reserve  
38 areas. *CM11 Natural Communities Enhancement and Management* (BDCP Chapter 3, Section  
39 3.4.11) describes this program and identifies applicable restrictions on recreation that might  
40 adversely affect managed wetland habitat. BDCP also includes an avoidance and minimization  
41 measure (AMM37) that further dictates limits on recreation activities that might affect this  
42 natural community. Hunting would be the dominant activity in fall and winter months, while  
43 fishing and hiking would be allowed in non-hunting months.

44 The various operations and maintenance activities described above could alter acreage of managed  
45 wetland natural community in the study area through facilities maintenance, vegetation

1 management and recreation. Activities could also introduce sediment and herbicides that would  
2 reduce the value of this community to common and sensitive plant and wildlife species. Other  
3 periodic activities associated with the Plan, including management, protection and enhancement  
4 actions associated with *CM3 Natural Communities Protection and Restoration* and *CM11 Natural*  
5 *Communities Enhancement and Management*, would be undertaken to enhance the value of the  
6 community. While some of these activities could result in small changes in acreage, these changes  
7 would be offset by restoration activities planned as part of *CM4 Tidal Natural Communities*  
8 *Restoration*, *CM10 Nontidal Marsh Restoration* and protection and restoration actions associated  
9 with *CM3 Natural Communities Protection and Restoration*. Recreation activity effects would be  
10 minimized by AMM37 (BDCP Appendix 3.C). The management actions associated with levee repair  
11 and control of invasive plant species would also result in a long-term benefit to the species  
12 associated with managed wetland habitats by improving water movement.

13 **NEPA Effects:** Ongoing operation, maintenance and management activities associated with  
14 Alternative 9 would not result in a net permanent reduction in acreage of the managed wetland  
15 natural community within the study area. Therefore, there would be no adverse effect on this  
16 natural community.

17 **CEQA Conclusion:** The operation and maintenance activities associated with Alternative 9 would  
18 have the potential to create minor changes in total acreage of managed wetland natural community  
19 in the study area, and could create temporary increases in turbidity and sedimentation. The  
20 activities could also introduce herbicides periodically to control nonnative, invasive plants. Hunting  
21 could intermittently reduce the availability of this community to special-status and common wildlife  
22 species. Implementation of environmental commitments and AMM2, AMM4, AMM5 and AMM37  
23 would minimize these impacts, and other operations and maintenance activities, including  
24 management, protection and enhancement actions associated with *CM3 Natural Communities*  
25 *Protection and Restoration* and *CM11 Natural Communities Enhancement and Management*, would  
26 create positive effects, including improved water movement in and adjacent to these habitats. Long-  
27 term restoration activities associated with *CM10 Nontidal Marsh Restoration* and *CM4 Tidal Natural*  
28 *Communities Restoration* and protection and restoration actions associated with *CM3 Natural*  
29 *Communities Protection and Restoration* would expand the ecological functions of this natural  
30 community in the study area. Ongoing operation, maintenance and management activities would not  
31 result in a net permanent reduction in this sensitive natural community within the study area.  
32 Therefore, there would be a less-than-significant impact.

### 33 **Other Natural Seasonal Wetland**

34 The other natural seasonal wetlands natural community encompasses all the remaining natural (not  
35 managed) seasonal wetland communities other than vernal pools and alkali seasonal wetlands.  
36 These areas mapped by CDFW (Hickson and Keeler-Wolf 2007) and ICF biologists (the eastern area  
37 of additional analysis; see Figure 12-1) consist of seasonally ponded, flooded, or saturated soils  
38 dominated by grasses, sedges, or rushes. The largest segments of this community in the study area  
39 are located along the Cosumnes River northeast of Thornton, and in the eastern extension of the  
40 study area northwest of Rio Vista. Most of the smaller mapped areas are located in the Suisun Marsh  
41 ROA on the western edge of the Montezuma Hills and in the interior of the Potrero Hills. There are  
42 also other natural seasonal wetlands mapped along Old River and Middle River in CZ 7 (Figure 12-  
43 1). The only BDCP conservation component that would potentially affect this natural community is  
44 the seasonally inundated floodplain restoration conservation measure (CM5) (see Table 12-9-10).

1 **Table 12-9-10. Changes in Other Natural Seasonal Wetland Associated with Alternative 9 (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Permanent		Temporary		Periodic <sup>d</sup>	
	NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	0	0	0	0	0	0
CM2	0	0	0	0	0	0
CM4	0	0	0	0	0	0
CM5	0	0	0	0	0	2
CM6	Unk.	Unk.	Unk.	Unk.	0	0
<b>TOTAL IMPACTS</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

<sup>a</sup> See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only.

NT = near-term

LLT = late long-term

Unk. = unknown

2

3 **Impact BIO-27: Modification of Other Natural Seasonal Wetland Natural Community as a**  
4 **Result of Implementing BDCP Conservation Measures**

5 Based on theoretical footprints for this activity, *CM5 Seasonally Inundated Floodplain Restoration*  
6 could expose 2 acres of other natural seasonal wetland community to additional flooding as channel  
7 margins are modified and levees are set back to improve fish habitat along some of the major rivers  
8 and waterways throughout the study area. Specific locations for this restoration activity have not  
9 been identified, but they would likely be focused in the south Delta area, along the major rivers and  
10 Delta channels, including the channels of Old River and Middle River. Several small patches of other  
11 natural seasonal wetland natural community are mapped along these waterways. The exposure of  
12 these seasonal wetlands to increased but infrequent episodes of stream flooding would not alter  
13 their ecological function or species composition. Their value to special-status and common plants  
14 and wildlife in the study area would not be affected. The effects of this inundation on wildlife and  
15 plant species are described in detail in later sections of this chapter.

16 **NEPA Effects:** Alternative 9 conservation actions would not adversely affect other natural seasonal  
17 wetland natural community because the small increase in periodic flooding of up to 2 acres would  
18 not alter its function or general species makeup.

19 **CEQA Conclusion:** An estimated 2 acres of other natural seasonal wetland community in the study  
20 area would be subjected to more frequent inundation from flood flows as a result of implementing  
21 CM5 under Alternative 9. This community would not be significantly impacted because a small  
22 increase in periodic flooding would not alter its ecological function or species composition. The  
23 periodic inundation would not result in a net permanent reduction in the acreage of this community

1 in the study area. Therefore, there would be no substantial adverse effect on the community. The  
2 impact would be less than significant.

3 **Impact BIO-28: Modification of Other Natural Seasonal Wetland Natural Community from**  
4 **Ongoing Operation, Maintenance and Management Activities**

5 Once the physical facilities associated with Alternative 9 are constructed and the stream flow regime  
6 associated with changed water management is in effect, there would be new ongoing and periodic  
7 actions associated with operation, maintenance and management of the BDCP facilities and  
8 conservation lands that could affect other natural seasonal wetland natural community in the study  
9 area. The ongoing actions include the diversion of Sacramento River flows at Georgianna Slough and  
10 Delta Cross Channel, operation of multiple operable barriers in Delta waterways, and modified  
11 diversions from south Delta channels. These actions are associated with CM1. The periodic actions  
12 would involve access road and conveyance facility repair, vegetation management at the various  
13 water conveyance facilities and habitat restoration sites (CM11), levee repair and replacement of  
14 levee armoring, channel dredging, and habitat enhancement in accordance with natural community  
15 management plans. The potential effects of these actions are described below.

- 16 • *Modified river flows upstream of and within the study area and modified diversions from south*  
17 *Delta channels.* Changes in releases from reservoirs upstream of the study area, modified  
18 diversion of Sacramento River flows at Georgianna Slough and Delta Cross Channel, operation of  
19 multiple operable barriers in Delta waterways, and modified diversions from south Delta  
20 channels (Operational Scenario G) would not affect other natural seasonal wetland natural  
21 community. The small areas mapped in the study area are not in or adjacent to streams that  
22 would experience changes in water levels as a result of these operations.
- 23 • *Access road, water conveyance facility and levee repair.* Periodic repair of access roads, water  
24 conveyance facilities and levees associated with the BDCP actions have the potential to require  
25 removal of adjacent vegetation and could entail earth and rock work in or adjacent to other  
26 natural seasonal wetland habitats. This activity could lead to increased soil erosion and runoff  
27 entering these habitats. These activities would be subject to normal erosion and runoff control  
28 management practices, including those developed as part of *AMM2 Construction Best*  
29 *Management Practices and Monitoring* and *AMM4 Erosion and Sediment Control Plan*. Any  
30 vegetation removal or earth work adjacent to or within other natural seasonal wetland habitats  
31 would require use of sediment barriers, soil stabilization and revegetation of disturbed surfaces,  
32 as required by *AMM10 Restoration of Temporarily Affected Natural Communities*. Proper  
33 implementation of these measures would avoid permanent adverse effects on this community.
- 34 • *Vegetation management.* Vegetation management, in the form of physical removal and chemical  
35 treatment, would be a periodic activity associated with the long-term maintenance of water  
36 conveyance facilities and restoration sites (*CM11 Natural Communities Enhancement and*  
37 *Management*). Use of herbicides to control nuisance vegetation could pose a long-term hazard to  
38 the other natural seasonal wetland natural community at or adjacent to treated areas. The  
39 hazard could be created by uncontrolled drift of herbicides, uncontrolled runoff of contaminated  
40 stormwater onto the natural community, or direct discharge of herbicides to wetland areas  
41 being treated for invasive species removal. Environmental commitments and *AMM5 Spill*  
42 *Prevention, Containment, and Countermeasure Plan* have been made part of the BDCP to reduce  
43 hazards to humans and the environment from use of various chemicals during maintenance  
44 activities, including the use of herbicides. These commitments are described in Appendix 3B,

1 including the commitment to prepare and implement spill prevention, containment, and  
2 countermeasure plans and stormwater pollution prevention plans. Best management practices,  
3 including control of drift and runoff from treated areas, and use of herbicides approved for use  
4 in terrestrial or aquatic environments would also reduce the risk of affecting natural  
5 communities adjacent to water conveyance features and levees associated with restoration  
6 activities.

- 7 • *Habitat enhancement.* The BDCP includes a long-term management element for the natural  
8 communities within the Plan Area (CM11). For the other natural seasonal wetland natural  
9 community, a management plan would be prepared that specifies actions to improve the value  
10 of the habitats for covered species. Actions would include control of invasive nonnative plant  
11 and animal species, fire management, restrictions on vector control and application of  
12 herbicides, and maintenance of infrastructure that would allow for movement through the  
13 community. The enhancement efforts would improve the long-term value of this community for  
14 both special-status and common species.

15 The various operations and maintenance activities described above could alter acreage of other  
16 natural seasonal wetland natural community in the study area. Activities could introduce sediment  
17 and herbicides that would reduce the value of this community to common and sensitive plant and  
18 wildlife species. Other periodic activities associated with the Plan, including management,  
19 protection and enhancement actions associated with *CM3 Natural Communities Protection and*  
20 *Restoration* and *CM11 Natural Communities Enhancement and Management*, would be undertaken to  
21 enhance the value of the community. While some of these activities could result in small changes in  
22 acreage, these changes would be minor when compared to the restoration activities planned as part  
23 of *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*, or minimized by  
24 implementation of AMM2, AMM4, AMM5, and AMM10. The vernal pool complex conservation  
25 measure includes restoration of 139 acres of seasonal wetlands with similar ecological values as the  
26 other natural seasonal wetland community. The management actions associated with control of  
27 invasive plant species would also result in a long-term benefit to the species associated with other  
28 natural seasonal wetland habitats by eliminating competitive, invasive species of plants.

29 **NEPA Effects:** Ongoing operation, maintenance and management activities associated with  
30 Alternative 9 would not result in a net permanent reduction in the other natural seasonal wetland  
31 natural community within the study area. Therefore, there would be no adverse effect on this  
32 natural community.

33 **CEQA Conclusion:** The operation and maintenance activities associated with Alternative 9 would  
34 have the potential to create minor changes in total acreage of other natural seasonal wetland natural  
35 community in the study area, and could create temporary increases sedimentation. The activities  
36 could also introduce herbicides periodically to control nonnative, invasive plants. Implementation of  
37 environmental commitments and AMM2, AMM4, AMM5, and AMM10 would minimize these impacts,  
38 and other operations and maintenance activities, including management, protection and  
39 enhancement actions associated with *CM3 Natural Communities Protection and Restoration* and  
40 *CM11 Natural Communities Enhancement and Management*, would create positive effects, including  
41 reduced competition from invasive, nonnative plants in these habitats. Long-term restoration  
42 activities associated with *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration* and  
43 protection actions associated with *CM3 Natural Communities Protection and Restoration* would  
44 ensure that the ecological values provided by this small natural community would not decrease in  
45 the study area. Ongoing operation, maintenance and management activities would not result in a net

1 permanent reduction in this natural community within the study area. Therefore, there would be a  
2 less-than-significant impact.

### 3 **Grassland**

4 Construction, operation, maintenance and management associated with the conservation  
5 components of Alternative 9 would have no long-term adverse effects on the habitats associated  
6 with the grassland natural community. Initial development and construction of CM1, CM2, CM4,  
7 CM5, CM6, CM7, CM11 and CM18 would result in both permanent and temporary removal of this  
8 community (see Table 12-9-11). Full implementation of Alternative 9 would also include the  
9 following conservation actions over the term of the BDCP to benefit the grassland natural  
10 community.

- 11 • Protect 8,000 acres of grassland with at least 2,000 acres protected in Conservation Zone 1, at  
12 least 1,000 acres protected in Conservation Zone 8, and at least 2,000 acres protected in  
13 Conservation Zone 11 (Objective GNC1.1, associated with CM3).
- 14 • Restore 2,000 acres of grasslands to connect fragmented patches of protected grassland and to  
15 provide upland habitat adjacent to riparian, tidal, and nontidal natural communities for wildlife  
16 foraging and upland refugia (Objective GNC1.2, associated with CM3 and CM8).
- 17 • Of the 8,000 acres of grassland protected and at least 2,000 acres of grassland restored, protect  
18 or restore grasslands adjacent to restored tidal brackish emergent wetlands to provide 200 feet  
19 of adjacent grasslands beyond the sea level rise accommodation (Objective GNC1.4, associated  
20 with CM3 and CM8).

21 There is a variety of other, less specific conservation goals and objectives in BDCP Chapter 3, Section  
22 3.3 that would improve the value of grassland natural community for terrestrial species. As  
23 explained below, with the protection, restoration and enhancement of the amounts of habitat listed  
24 in the BDCP objectives, in addition to implementation of AMMs, impacts on this natural community  
25 would not be adverse for NEPA purposes and would be less than significant for CEQA purposes.

1 **Table 12-9-11. Changes in Grassland Natural Community Associated with Alternative 9 (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Permanent		Temporary		Periodic <sup>d</sup>	
	NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	82	82	344	344	0	0
CM2	388	388	239	239	385–1,277	0
CM4	448	1,122	0	0	0	0
CM5	0	51	0	34	0	514
CM6	Unk.	Unk.	Unk.	Unk.	0	0
CM7	4	410	0	0	0	0
CM11	13	50	0	0	0	0
CM18	35	35	0	0	0	0
<b>TOTAL IMPACTS</b>	<b>970</b>	<b>2,138</b>	<b>583</b>	<b>617</b>	<b>385–1,277</b>	<b>514</b>

<sup>a</sup> See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

Unk. = unknown

2

3 **Impact BIO-29: Changes in Grassland Natural Community as a Result of Implementing BDCP**  
4 **Conservation Measures**

5 Construction, channel dredging, land grading and habitat restoration activities that would  
6 accompany the implementation of CM1, CM2, CM4, CM5, CM6, CM7, CM11 and CM18 would  
7 permanently eliminate an estimated 2,138 acres and temporarily remove 617 acres of grassland  
8 natural community in the study area. These modifications represent approximately 3% of the  
9 78,047 acres of the community that is mapped in the study area. Approximately 56% (1,553 acres)  
10 of the permanent and temporary losses would occur during the first 10 years of Alternative 9  
11 implementation, as water conveyance facilities are constructed and habitat restoration is initiated.  
12 Grassland protection (2,000 acres) and restoration (1,140 acres) would be initiated during the same  
13 period. By the end of the Plan period, 2,000 acres of this natural community would be restored and  
14 8,000 acres would be protected. There would be a net reduction in grassland acreage, but an  
15 increase in grassland value in the study area. The BDCP beneficial effects analysis for grassland,  
16 which was developed for Alternative 4 (BDCP Chapter 5, Section 5.4.11.2), indicates that 8,000 acres  
17 of grasslands would be protected in Conservation Zones 1, 2, 4, 5, 7, 8, and 11, and 2,000 acres of  
18 grassland would be restored. Grassland protection and restoration would improve connectivity  
19 among habitat areas in and adjacent to the Plan Area, improve genetic interchange among native  
20 species' populations, and contribute to the long-term conservation of grassland-associated covered  
21 species. The same conservation actions would be implemented for Alternative 9.

1 The individual effects of each relevant conservation measure are addressed below. A summary  
2 statement of the combined impacts and NEPA and CEQA conclusions follows the individual  
3 conservation measure discussions.

4 • *CM1 Water Facilities and Operation*: Construction of the Alternative 9 water conveyance facilities  
5 would permanently remove 82 acres and temporarily remove 344 acres of grassland natural  
6 community. The permanent losses would occur at numerous locations where dredging,  
7 construction of operable barriers and canals, and channel enlargement would be undertaken.  
8 The main locations affected and the types of grassland lost are listed below (see Terrestrial  
9 Biology Mapbook for location details).

- 10 ○ Permanent and temporary losses of thin bands of ruderal herbaceous grasses and forbs at  
11 the canal construction site connecting Clifton Court Forebay with the export pipelines.
- 12 ○ Permanent and temporary losses of thin bands of ruderal herbaceous grasses and forbs at  
13 the canal construction site that connects Clifton Court Forebay with Victoria Canal.
- 14 ○ Permanent and temporary losses of thin bands of ruderal herbaceous grasses and forbs  
15 along Victoria Canal where access roads and a barge unloading facility would be  
16 constructed.
- 17 ○ Permanent and temporary losses of thin bands of ruderal herbaceous grasses and forbs  
18 along the edges of Middle River between Victoria Canal and Mildred Island where access  
19 roads and dredging work areas would be established.
- 20 ○ Permanent losses of rye grassland from the channel enlargement connecting the  
21 Sacramento River with the Meadows Slough.
- 22 ○ Permanent and temporary losses of rye grassland from channel enlargement in the  
23 Meadows Slough east of the Sacramento River.
- 24 ○ Permanent and temporary losses of ruderal herbaceous grasses and forbs at intake and fish  
25 screen construction sites at Delta Cross Channel junction with Sacramento River.
- 26 ○ Permanent and temporary losses of thin bands of ruderal herbaceous grasses and forbs at  
27 these operable barrier construction sites (some with barge unloading facilities):
  - 28 • Connection Slough at its junction with Middle River.
  - 29 • Middle River just south of its junction with Victoria Canal.
  - 30 • Old River at its northern junction with the San Joaquin River.
  - 31 • Fishermans Cut at its junction with the San Joaquin River.
  - 32 • Three Mile Slough at its junction with the Sacramento River.

33 These losses would take place during the near-term construction period.

34 The construction activity associated with CM1 also has the potential to lead to increased nitrogen  
35 deposition in grassland habitats in the vicinity of Clifton Court Forebay. A significant number of cars,  
36 trucks, and land grading equipment involved in construction of canals in and around the forebay  
37 would emit small amounts of atmospheric nitrogen from fuel combustion; this material could be  
38 deposited in sensitive grassland areas that are located west of the major construction areas at  
39 Clifton Court Forebay. Nitrogen deposition can pose a risk of adding a fertilizer to nitrogen-limited  
40 soils and their associated plants. Nonnative invasive species can be encouraged by the added

1 nitrogen available. BDCP Appendix 5.J, Attachment 5J.A, *Construction-Related Nitrogen Deposition on*  
2 *BDCP Natural Communities*, addresses this issue in detail. It has been concluded that this potential  
3 deposition would pose a low risk of changing the grassland in and adjacent to the construction areas  
4 because the construction would contribute a negligible amount of nitrogen to regional projected  
5 emissions and the existing grassland is dominated by nonnative invasive species of plants. Also, the  
6 construction at Clifton Court Forebay would occur primarily downwind of the natural community.  
7 No adverse effect is expected.

- 8 • *CM2 Yolo Bypass Fisheries Enhancement*: Implementation of CM2 involves a number of  
9 construction activities within the Yolo and Sacramento Bypasses, including Fremont Weir and  
10 stilling basin improvements, Putah Creek realignment activities, Toe Drain/Tule Canal and  
11 Lisbon Weir modification and Sacramento Weir improvements. All of these activities could  
12 involve excavation and grading in grassland areas to improve passage of fish through the  
13 bypasses. Based on hypothetical construction footprints, a total of 388 acres could be  
14 permanently lost and another 239 acres could be temporarily removed. Most of the grassland  
15 losses would occur at the north end of the bypass below Fremont Weir where a large expanse of  
16 grassland is present, along the Toe Drain/Tule Canal, and along the west side channels. These  
17 grasslands are composed primarily of upland annual grassland and forbs. Some of this grassland  
18 removal along the side channels of the bypass could pose barriers to grassland species moving  
19 within the bypass. These losses would occur primarily in the near-term timeframe.
- 20 • *CM4 Tidal Natural Communities Restoration*: Based on the use of hypothetical restoration  
21 footprints, implementation of CM4 would permanently inundate or remove 448 acres of  
22 grassland in the near-term and inundate or remove 1,122 acres of grassland by the end of the  
23 Plan timeframe. The losses would occur in a number of ROAs established for tidal restoration  
24 (see Figure 12-1). The largest losses would likely occur in the vicinity of Cache Slough, on  
25 Decker Island in the West Delta ROA, on the upslope fringes of Suisun Marsh, and along narrow  
26 bands adjacent to waterways in the South Delta ROA. Most of this grassland is ruderal  
27 herbaceous vegetation with low habitat value; some of the larger patches of grassland in the  
28 Cache Slough ROA are annual grassland with higher values.
- 29 • *CM5 Seasonally Inundated Floodplain Restoration*: Floodplain restoration levee construction  
30 would permanently remove 51 acres and temporarily remove 34 acres of grassland natural  
31 community. The construction-related losses would be considered a permanent removal of the  
32 habitats. These losses would be expected to occur along the San Joaquin River and other major  
33 waterways in CZ 7 (see Figure 12-1). The grassland in this area is primarily composed of narrow  
34 bands and small patches of ruderal herbaceous grasses and forbs. This activity is scheduled to  
35 start following construction of water conveyance facilities, which is expected to take 10 years.
- 36 • *CM6 Channel Margin Enhancement*: Channel margin habitat enhancement could result in  
37 removal of small amounts of grassland natural community along 20 miles of river and sloughs.  
38 The extent of this loss cannot be quantified at this time, but the majority of the enhancement  
39 activity would occur along waterway margins where grassland habitat stringers exist, including  
40 along levees and channel banks. The improvements would occur within the study area on  
41 sections of the Sacramento, San Joaquin and Mokelumne Rivers, and along Steamboat and Sutter  
42 Sloughs.
- 43 • *CM7 Riparian Natural Community Restoration*: Riparian natural community restoration would  
44 occur in a variety of settings in the Plan Area, with an emphasis on improving connectivity of  
45 existing riparian areas and stream/river corridors, to benefit the movement and interchange of

1 special-status and common species that use these areas. Large tracts would be restored in  
2 concert with floodplain restoration (CM5), while narrower bands would be developed as part of  
3 channel margin enhancement (CM6) and tidal marsh restoration (CM4). In the process of  
4 expanding woody riparian habitat, existing nonnative grassland would be removed. While  
5 specific locations for these restoration activities have not been fully developed, use of  
6 theoretical footprints for this activity indicate that up to 410 acres of grassland could be lost  
7 through the course of Alternative 9 implementation. A majority of this activity would occur in  
8 the South Delta and Cosumnes/Mokelumne ROAs (see Figure 12-1).

- 9 ● *CM8 Grassland Natural Community Restoration*: The grassland natural community would be  
10 restored primarily on the fringes of the Delta, where upland areas merge with Delta wetland and  
11 agricultural lands. Restoration would focus on CZs 1, 8, and 11, as proposed by BDCP Objective  
12 GNC1.1 (Figure 12-1), with a goal of improving habitat connectivity and increasing the diversity  
13 of grassland species (BDCP Objective GNC1.2). Some of the planned 2,000 acres of restoration  
14 would occur around existing populations of giant garter snake in the east Delta and the Yolo  
15 Bypass area.
- 16 ● *CM11 Natural Communities Enhancement and Management*: Natural communities enhancement  
17 and management would include a wide range of activities designed to improve habitat  
18 conditions in restored and protected lands associated with the BDCP. This measure also  
19 promotes sound use of pesticides, vector control activities, invasive species control and fire  
20 management in preserve areas. To improve the public's ability to participate in recreational  
21 activities in and adjacent to restored and protected habitats, a system of trails is proposed. The  
22 location and extent of this system are not yet known, so the analysis of this activity is  
23 programmatic. At the current level of planning, it is assumed that the trail system would be  
24 located entirely in grassland habitats and would include up to 50 acres of habitat loss.
- 25 ● *CM18. Conservation Hatcheries*: The BDCP includes a proposal to design and construct a  
26 conservation hatchery to maintain populations of delta smelt and longfin smelt. The location of  
27 this facility is not yet firmly established, but for planning purposes it has been assumed that it  
28 would be constructed in the vicinity of Rio Vista and would be located in grassland habitat. The  
29 grassland in the Rio Vista area includes both California annual grassland and ruderal herbaceous  
30 grasses and forbs. The current estimate of the land needed for this facility is 35 acres.

31 The following paragraphs summarize the combined effects discussed above and describe other  
32 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA impact conclusions are  
33 also included.

#### 34 ***Near-Term Timeframe***

35 During the near-term timeframe (the first 10 years of BDCP implementation), Alternative 9 would  
36 affect the grassland natural community through CM1 construction losses (82 acres permanent and  
37 344 acres temporary), CM2 construction losses (388 acres permanent and 239 acres temporary),  
38 CM11 recreational trail construction (13 acres permanent), CM18 fish hatchery construction (35  
39 acres permanent), and CM7 riparian habitat restoration (4 acres permanent). These losses would  
40 occur at multiple locations, including canal, channel enlargement and operable barrier construction  
41 sites; adjacent to dredging operations along Middle River; in the northern Yolo Bypass; along the  
42 east and west channels within the Yolo Bypass; and at currently unspecified sites for hatchery and  
43 recreational trail construction and riparian restoration. Approximately 448 acres of the inundation

1 and construction-related losses in habitat from CM4 would occur in the near-term. These tidal  
2 restoration-related losses would occur throughout the ROAs mapped in Figure 12-1.

3 The construction losses of this natural community would not represent an adverse effect based on  
4 the significance criteria used for this chapter because grassland is not considered a special-status or  
5 sensitive natural community. Most Central Valley grasslands are dominated by nonnative annual  
6 grasses and herbs. However, the importance of grassland as a habitat that supports life stages of  
7 numerous special-status plants and wildlife is well documented (see BDCP Chapter 3, *Conservation*  
8 *Strategy*). The significance of losses in grassland habitat is, therefore, discussed in more detail in  
9 species analyses later in this chapter. The combination of restoring 1,140 acres (CM8) and  
10 protecting 2,000 acres (CM3) of grassland natural community during the first 10 years of BDCP  
11 implementation, and the commitment to restore temporarily affected grassland (583 acres) to its  
12 pre-project condition within 1 year of completing construction as required by *AMM10 Restoration of*  
13 *Temporarily Affected Natural Communities*, would offset this near-term loss, avoiding any loss in the  
14 value of this habitat for special-status species. The restoration of grassland would include protection  
15 in perpetuity, and the protected and restored habitat would be managed and enhanced to benefit  
16 special-status and common wildlife species (CM3 and CM11). The typical project-level mitigation  
17 ratio (2:1 for protection) would indicate that 3,106 acres of protection would be needed to offset  
18 (i.e., mitigate) the 1,553 acres of near-term temporary and permanent loss. The combination of  
19 protection and restoration (2,000 acres of protection and 1,140 acres of restoration), along with the  
20 enhancement and management associated with CM3 and CM11 contained in the BDCP is designed to  
21 avoid a temporal lag in the value of grassland habitat available to sensitive species. There would be  
22 no adverse effect.

23 The Plan also includes commitments to implement *AMM1 Worker Awareness training*, *AMM2*  
24 *Construction Best Management Practices and Monitoring*, *AMM6 Disposal and Reuse of Spoils*,  
25 *Reusable Tunnel Material*, and *Dredged Material*, and *AMM7 Barge Operations Plan*. All of these  
26 AMMs include elements that avoid or minimize the risk of affecting habitats at work areas and  
27 storage sites. The AMMs are described in detail in BDCP Appendix 3.C.

### 28 **Late Long-Term Timeframe**

29 Implementation of Alternative 9 as a whole would result in approximately 3% losses of grassland  
30 natural community in the study area. These losses (2,138 acres of permanent and 617 acres of  
31 temporary loss) would be largely associated with construction of the water conveyance facilities  
32 (CM1), construction of Yolo Bypass fish improvements (CM2), inundation during tidal marsh  
33 restoration (CM4), and riparian habitat restoration (CM7). Inundation losses would occur through  
34 the course of BDCP restoration activities at various tidal restoration sites throughout the study area.

35 **NEPA Effects:** By the end of the Plan timeframe, a total of 2,000 acres of this natural community  
36 would be restored (CM8) and 8,000 acres would be protected (CM3). The restoration would occur  
37 primarily in CZ 1, CZ 8, and CZ 11, in the Cache Slough, Suisun Marsh and Clifton Court Forebay  
38 areas. Temporarily affected grassland would also be restored following construction activity. The  
39 2,000 acres of restoration associated with CM8, and the restoration of temporarily affected  
40 grassland required by AMM10 (617 acres for Alternative 9) would not totally replace the grassland  
41 acres lost through the Plan timeframe (2,755 acres). There would be a permanent loss of 138 acres  
42 of grassland in the study area. However, the combination of restoration, protection and  
43 enhancement of grassland associated with Alternative 9 would improve the habitat value of this

1 community in the study area; there would not be an adverse effect on the grassland natural  
2 community.

3 ***CEQA Conclusion:***

4 ***Near-Term Timeframe***

5 Alternative 9 would result in the loss of approximately 1,553 acres of grassland natural community  
6 in the near-term (a combination of the temporary and permanent losses listed in Table 12-9-11) due  
7 to construction of the water conveyance facilities (CM1), fish passage improvements (CM2), riparian  
8 habitat restoration (CM7), recreational trail development (CM11), fish hatchery construction  
9 (CM18), and inundation during tidal marsh restoration (CM4). The construction losses would occur  
10 at multiple canal and operable barrier construction sites, at channel enlargement sites, at dredging  
11 locations along Middle River and Victoria Canal, within the northern section of the Yolo Bypass, and  
12 at currently unspecified sites for hatchery and recreational trail construction and riparian habitat  
13 restoration. Inundation losses would occur at various tidal restoration sites throughout the study  
14 area. The construction losses would be spread across a 10-year near-term timeframe.

15 The construction losses of this natural community would not represent a significant impact based  
16 on the significance criteria used for this chapter because grassland is not considered a special-status  
17 or sensitive natural community. Nonetheless, these losses would be offset by planned restoration of  
18 1,140 acres and protection of 2,000 acres of grassland natural community scheduled for the first 10  
19 years of Alternative 9 implementation, and restoration of temporarily affected grassland (583 acres  
20 for Alternative 9) as dictated by AMM10. Also, AMM1, AMM2, AMM6, and AMM7 would be  
21 implemented to minimize impacts. Because of these offsetting near-term restoration and protection  
22 activities and AMMs, impacts would be less than significant. Typical project-level mitigation ratios  
23 (2:1 for protection) would indicate that 3,106 acres of protection would be needed to offset (i.e.,  
24 mitigate) the 1,553 acres of loss. The combination of two approaches (protection and restoration)  
25 contained in the BDCP conservation measures and avoidance and minimization measures is  
26 designed to avoid a temporal lag in the value of grassland habitat available to special-status species.  
27 The protection and restoration would be initiated at the beginning of Alternative 9 implementation  
28 to minimize any time lag in the availability of this habitat to special-status species.

29 ***Late Long-Term Timeframe***

30 At the end of the Plan period, 2,755 acres of grassland natural community would be permanently or  
31 temporarily removed by conservation actions, 2,000 acres would be restored and 8,000 acres would  
32 be protected. Temporarily affected areas would also be restored (617 acres for Alternative 9). While  
33 there would be a net permanent reduction in the acreage of this natural community within the study  
34 area (total loss of 138 acres), there would be an increase in the value of grassland for special-status  
35 and common species in the study area through the combination of conservation actions (CM3 and  
36 CM8) and avoidance and minimization measures (AMM1, AMM2, AMM6, AMM7, and AMM10).  
37 Therefore, Alternative 9 would have a less-than-significant impact on this natural community.

38 **Impact BIO-30: Increased Frequency, Magnitude and Duration of Periodic Inundation of**  
39 **Grassland Natural Community**

40 Two Alternative 9 conservation measures would modify the inundation/flooding regimes of both  
41 natural and man-made waterways in the study area. CM2, which is designed to improve fish passage  
42 and shallow flooded habitat for Delta fishes in the Yolo Bypass, would increase periodic inundation

1 of grassland natural community at scattered locations, while CM5 would expose this community to  
2 additional flooding as channel margins are modified and levees are set back to improve fish habitat  
3 along some of the major rivers and waterways of the study area.

- 4 • *CM2 Yolo Bypass Fisheries Enhancement*: Operation of the Yolo Bypass under Alternative 9 would  
5 result in an increase in the frequency, magnitude and duration of inundation of 385–1,277 acres  
6 of grassland natural community. The methods used to estimate this inundation acreage are  
7 described in BDCP Appendix 5.J, *Effects on Natural Communities, Wildlife, and Plants*. The area  
8 more frequently affected by inundation would vary with the flow volume that would pass  
9 through the newly constructed notch in the Fremont Weir. The 385-acre increase in inundation  
10 would occur at the 1,000 cfs flow regime, while the 1,277-acre increase would occur at the 4,000  
11 cfs flow regime. Plan-related increases in flow through Fremont Weir would be expected in 30%  
12 of the years. The grassland community occurs throughout the bypass, including a large acreage  
13 just below Fremont Weir in the north end of the bypass, in stringers along the internal  
14 waterways of the bypass and in larger patches in the lower bypass. The anticipated change in  
15 management of flows in the Yolo Bypass includes more frequent releases in flows into the  
16 bypass from the Fremont and Sacramento Weirs, and in some years, later releases into the  
17 bypass in spring months (April and May). The modification of periodic inundation events would  
18 not adversely affect grassland habitats, as they have persisted under similar high flows and  
19 extended inundation periods. There is the potential for some change in grass species  
20 composition as a result of longer inundation periods. The effects of this inundation on wildlife  
21 and plant species are described in detail in later sections of this chapter.
- 22 • *CM5 Seasonally Inundated Floodplain Restoration*: Floodplain restoration would result in an  
23 increase in the frequency and duration of inundation of 85 acres of grassland habitats (a  
24 combination of the temporary and permanent losses listed in Table 12-9-11). Specific locations  
25 for this restoration activity have not been identified, but they would likely be focused in the  
26 south Delta area, along the major rivers and Delta channels in CZ 7 (see Figure 12-1). The  
27 increase in periodic stream flooding events would not adversely affect the habitat values and  
28 functions of grassland natural community.

29 In summary, 899-1,791 acres of grassland natural community in the study area would be subjected  
30 to more frequent inundation as a result of implementing two Alternative 9 conservation measures  
31 (CM2 and CM5).

32 **NEPA Effects:** The grasslands in the Yolo Bypass and along river floodplains in the south Delta are  
33 conditioned to periodic inundation; therefore, periodic inundation would not result in a net  
34 permanent reduction in the acreage and value of this community in the study area. Increasing  
35 periodic inundation of grassland natural community in the Yolo Bypass and along south Delta  
36 waterways would not constitute an adverse effect.

37 **CEQA Conclusion:** An estimated 899–1,791 acres of grassland natural community in the study area  
38 would be subjected to more frequent inundation as a result of implementing CM2 and CM5 under  
39 Alternative 9. The grassland natural community is conditioned to periodic inundation; therefore,  
40 periodic inundation would not result in a net permanent reduction in the acreage of this community  
41 in the study area. Increasing periodic inundation of grassland natural community in the Yolo Bypass  
42 and along south Delta waterways would have a less-than-significant impact on the community.

1 **Impact BIO-31: Modification of Grassland Natural Community from Ongoing Operation,**  
2 **Maintenance and Management Activities**

3 Once the physical facilities associated with Alternative 9 are constructed and the stream flow regime  
4 associated with changed water management is in effect, there would be new ongoing and periodic  
5 actions associated with operation, maintenance and management of the BDCP facilities and  
6 conservation lands that could affect grassland natural community in the study area. The ongoing  
7 actions include the diversion of Sacramento River flows at two newly screened sites at Georgianna  
8 Slough and Delta Cross Channel in the north Delta, operation of multiple operable barriers in Delta  
9 waterways, and modified diversions from south Delta channels. These actions are associated with  
10 CM1 (see the impact discussion above for effects associated with CM2). The periodic actions would  
11 involve access road and conveyance facility repair, vegetation management at the various water  
12 conveyance facilities and habitat restoration sites (CM13), levee repair and replacement of levee  
13 armoring, channel dredging, and habitat enhancement in accordance with natural community  
14 management plans. The potential effects of these actions are described below.

- 15 • *Modified river flows upstream of and within the study area and modified diversions from south*  
16 *Delta channels* Changes in releases from reservoirs upstream of the study area, modified  
17 diversion of Sacramento River flows at Georgianna Slough and Delta Cross Channel in the north  
18 Delta, modified diversions from south Delta channels (Operational Scenario G) would not result  
19 in the permanent reduction in acreage of grassland natural community in the study area. Flow  
20 levels in the upstream rivers would not change such that the acreage of this community would  
21 be reduced on a permanent basis. The grassland along rivers upstream of planned north Delta  
22 diversions is primarily ruderal vegetation on levee banks and is dependent on winter and spring  
23 rains for germination and growth rather than river levels. Similarly, modified diversions of  
24 Sacramento River flows at Georgianna Slough and Delta Cross Channel would not result in a  
25 permanent reduction in grassland natural community downstream of these diversions. The  
26 reductions in flows below the intakes would occur primarily in the wet months when the  
27 existing nonnative annual grasslands along river levees are dormant, and like upstream  
28 grassland, this community is dependent on winter and spring rains for germination and growth  
29 in the winter and spring months, not on river stage. Anticipated small changes in river salinity in  
30 the west Delta and Suisun Marsh would not create a substantial change in grassland acreage in  
31 these areas. Modified diversions from south Delta channels would not create a reduction in this  
32 natural community.
- 33 • *Access road, water conveyance facility and levee repair.* Periodic repair of access roads, water  
34 conveyance facilities and levees associated with the BDCP actions have the potential to require  
35 removal of adjacent vegetation and could entail earth and rock work in grassland habitats. This  
36 activity could lead to increased soil erosion and runoff entering these habitats. These activities  
37 would be subject to normal erosion and runoff control management practices, including those  
38 developed as part of *AMM2 Construction Best Management Practices and Monitoring* and *AMM4*  
39 *Erosion and Sediment Control Plan*. Any vegetation removal or earth work adjacent to or within  
40 grassland habitats would require use of sediment barriers, soil stabilization and revegetation of  
41 disturbed surfaces (*AMM10 Restoration of Temporarily Affected Natural Communities*). Proper  
42 implementation of these measures would avoid permanent adverse effects on this community.
- 43 • *Vegetation management.* Vegetation management, in the form of physical removal and chemical  
44 treatment, would be a periodic activity associated with the long-term maintenance of water  
45 conveyance facilities and restoration sites (*CM11 Natural Communities Enhancement and*

1           *Management*). Use of herbicides to control nuisance vegetation could pose a long-term hazard to  
2           grassland natural community at or adjacent to treated areas. The hazard could be created by  
3           uncontrolled drift of herbicides, uncontrolled runoff of contaminated stormwater onto the  
4           natural community, or direct discharge of herbicides to grassland areas being treated for  
5           invasive species removal. Environmental commitments and *AMM5 Spill Prevention, Containment,*  
6           *and Countermeasure Plan* have been made part of the BDCP to reduce hazards to humans and  
7           the environment from use of various chemicals during maintenance activities, including the use  
8           of herbicides. These commitments are described in Appendix 3B, including the commitment to  
9           prepare and implement spill prevention, containment, and countermeasure plans and  
10          stormwater pollution prevention plans. Best management practices, including control of drift  
11          and runoff from treated areas, and use of herbicides approved for use in terrestrial  
12          environments would also reduce the risk of affecting natural communities adjacent to water  
13          conveyance features and levees associated with restoration activities.

- 14          • *Channel dredging.* Long-term operation of the Alternative 9 intakes at Georgianna Slough and  
15          Delta Cross Channel would include periodic dredging of sediments that might accumulate in  
16          front of intake screens. Periodic dredging would also be needed to maintain channel capacity in  
17          Middle River and Victoria Canal. The dredging could occur adjacent to grassland natural  
18          community. This activity should not permanently reduce the acreage of grassland natural  
19          community because it is periodic in nature; the grassland in the vicinity of the proposed intakes  
20          and dredged channels is ruderal grasses and herbs with low habitat value. *AMM2 Construction*  
21          *Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention Plan, AMM4*  
22          *Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and Countermeasure*  
23          *Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged Material,* and  
24          *AMM10 Restoration of Temporarily Affected Natural Communities* are part of the Plan and would  
25          require actions to avoid or minimize dredging effects on adjacent sensitive vegetation.
- 26          • *Habitat enhancement.* The BDCP includes a long-term management element for the natural  
27          communities within the Plan Area (CM11). For the grassland natural community, a management  
28          plan would be prepared that specifies actions to improve the value of the habitats for covered  
29          species. Actions would include control of invasive nonnative plant and animal species, fire  
30          management, restrictions on vector control and application of herbicides, and maintenance of  
31          infrastructure that would allow for movement through the community. The enhancement efforts  
32          would improve the long-term value of this community for both special-status and common  
33          species.

34          The various operations and maintenance activities described above could alter acreage of grassland  
35          natural community in the study area through changes in flow patterns and periodic facilities  
36          maintenance and dredging. Activities could also introduce sediment and herbicides that would  
37          reduce the value of this community to common and sensitive plant and wildlife species. Other  
38          periodic activities associated with the Plan, including management, protection and enhancement  
39          actions associated with *CM3 Natural Communities Protection and Restoration* and *CM11 Natural*  
40          *Communities Enhancement and Management,* would be undertaken to enhance the value of the  
41          community. While some of these activities could result in small changes in acreage, these changes  
42          would be offset by restoration activities planned as part of *CM8 Grassland Natural Community*  
43          *Restoration,* or minimized by implementation of AMM2, AMM3, AMM4, AMM5, AMM6, and AMM10.  
44          The management actions associated with levee repair, periodic dredging and control of invasive  
45          plant species would also result in a long-term benefit to the species associated with grassland

1 habitats by improving water movement in adjacent waterways and by eliminating competitive,  
2 invasive species of plants.

3 **NEPA Effects:** Ongoing operation, maintenance and management activities associated with  
4 Alternative 9 would not result in a net permanent reduction in the grassland natural community  
5 within the study area. Therefore, there would be no adverse effect on this natural community.

6 **CEQA Conclusion:** The operation and maintenance activities associated with Alternative 9 would  
7 have the potential to create minor changes in total acreage of grassland natural community in the  
8 study area, and could create temporary increases sedimentation. The activities could also introduce  
9 herbicides periodically to control nonnative, invasive plants. Implementation of environmental  
10 commitments and AMM2, AMM3, AMM4, AMM5, AMM6, and AMM10 would minimize these impacts,  
11 and other operations and maintenance activities, including management, protection and  
12 enhancement actions associated with *CM3 Natural Communities Protection and Restoration* and  
13 *CM11 Natural Communities Enhancement and Management*, would create positive effects, including  
14 reduced competition from invasive, nonnative plants in these habitats. Long-term restoration  
15 activities associated with *CM8 Grassland Natural Community Restoration* and protection actions  
16 associated with *CM3 Natural Communities Protection and Restoration* would increase the value of  
17 this natural community in the study area. Ongoing operation, maintenance and management  
18 activities would not result in a net permanent reduction in the value of this natural community  
19 within the study area. Therefore, there would be a less-than-significant impact.

## 20 **Inland Dune Scrub**

21 The inland dune scrub natural community is composed of vegetated, stabilized sand dunes  
22 associated with river and estuarine systems. In the study area, the inland dune scrub community  
23 includes approximately 19 acres of remnants of low-lying ancient stabilized dunes related to the  
24 Antioch Dunes formation located near the town of Antioch (CZ 10; see Figure 12-1). While this  
25 community is within the BDCP Plan Area, none of the Alternative 9 conservation measures or  
26 covered actions is expected to affect it.

## 27 **Cultivated Lands**

28 Cultivated lands is the major land cover type in the study area (487,106 acres; see Table 12-1). The  
29 Delta, the Yolo Bypass and the Cache Slough drainage are dominated by various types of agricultural  
30 activities, with crop production the dominant element (see Figure 12-1). Major crops and cover  
31 types in agricultural production include grain and hay crops (wheat, oats and barley), field crops  
32 (corn, beans and safflower), truck crops (tomatoes, asparagus and melons), pasture (alfalfa, native  
33 and nonnative pasture), rice, orchards, and vineyards. Tables 12-2 and 12-3 list special-status  
34 wildlife species supported by cultivated lands.

35 The effects of Alternative 9 on cultivated lands are discussed from various perspectives in this  
36 document. Chapter 14, *Agricultural Resources*, includes a detailed analysis of cropland conversion as  
37 it relates to agricultural productivity. Many of the discussions of individual terrestrial plant and  
38 wildlife species in this chapter also focus on the relevance of cultivated land loss. Because cultivated  
39 lands is not a natural community and because the effects of its loss are captured in the individual  
40 species analyses below, there is no separate analysis of this land cover type presented here. Table  
41 14-8 in Chapter 14 provides a comparison of important farmland losses that would result from  
42 construction of CM1 water conveyance facilities for each alternative, and Table 14A-1 in Appendix

1 14A, *Individual Crop Effects as a Result of BDCP Water Conveyance Facility Construction*, provides a  
2 similar comparison for losses of individual crops. Table 12-ES-1 in this chapter's Summary of Effects  
3 identifies the total cultivated land loss for all project alternatives. For Alternative 9, the total loss  
4 (permanent and temporary) is estimated to be 55,091 acres. The majority of the permanent loss  
5 would be associated with habitat restoration activities, including Yolo Bypass fisheries enhancement  
6 (CM2; 629 acres), tidal marsh restoration (CM4; 39,565 acres), floodplain restoration (CM5; 2,087  
7 acres), riparian natural community restoration (CM7; 960 acres), grassland restoration (CM8; 2,000  
8 acres) and nontidal marsh restoration (CM10; 1,950 acres). Construction of the through-Delta water  
9 conveyance facilities (CM1) would permanently remove 350 acres of cultivated land.

## 10 **Developed Lands**

11 Additional lands in the study area that were not designated with a natural community type have  
12 been characterized here as developed lands. Developed lands include lands with residential,  
13 industrial, and urban land uses, as well as landscaped areas, riprap, road surfaces and other  
14 transportation facilities. Developed lands support some common plant and wildlife species, whose  
15 abundance and species richness vary with the intensity of development. One special-status species,  
16 the giant garter snake, is closely associated with a small element of developed lands; specifically,  
17 embankments and levees near water that are covered with riprap. There are approximately 90,660  
18 acres of developed lands in the study area.

19 As with cultivated lands, no effort has been made to analyze the effects of BDCP covered actions on  
20 this land cover type. It is not a natural community. The effects of its conversion are discussed in  
21 Chapter 13, *Land Use*. Where the loss of developed lands may affect individual special-status species  
22 or common species, the impact analysis is contained in that species discussion.

## 23 **Wildlife Species**

### 24 **Vernal Pool Crustaceans**

25 This section describes the effects of Alternative 9, including water conveyance facilities construction  
26 and implementation of other conservation components, on vernal pool crustaceans (California  
27 linderiella, Conservancy fairy shrimp, longhorn fairy shrimp, midvalley fairy shrimp, vernal pool  
28 fairy shrimp, and vernal pool tadpole shrimp). The habitat model used to assess effects for the  
29 vernal pool crustaceans consists of: vernal pool complex, which consists of vernal pools and uplands  
30 that display characteristic vernal pool and swale visual signatures that have not been significantly  
31 affected by agricultural or development practices; alkali seasonal wetlands in CZ 8; and degraded  
32 vernal pool complex, which consists of low-value ephemeral habitat ranging from areas with vernal  
33 pool and swale visual signatures that display clear evidence of significant disturbance due to  
34 plowing, discing, or leveling to areas with clearly artificial basins such as shallow agricultural  
35 ditches, depressions in fallow fields, and areas of compacted soils in pastures. For the purpose of the  
36 effects analysis, vernal pool complex is categorized as high-value for vernal pool crustaceans and  
37 degraded vernal pool complex is categorized as low-value for these species. Alkali seasonal wetlands  
38 in CZ 8 were included in the model as high-value habitat for vernal pool crustaceans. Also included  
39 as low-value for vernal pool crustaceans are areas along the eastern boundary of Conservation Zone  
40 11 that are mapped as vernal pool complex because they flood seasonally and support typical vernal  
41 pool plants, but which do not include topographic depressions that are characteristic of vernal pool  
42 crustacean habitat.

1 Construction and restoration associated with Alternative 9 conservation measures would result in  
2 permanent losses (see Table 12-9-12) and indirect conversions of vernal pool crustacean modeled  
3 habitat. The majority of the losses would take place over an extended period of time as tidal marsh is  
4 restored in the Plan Area. Full implementation of Alternative 9 would also include the following  
5 conservation actions over the term of the BDCP to benefit vernal pool crustaceans (BDCP Chapter 3,  
6 *Conservation Strategy*).

- 7 • Protect 600 acres of vernal pool complex in CZ 1, CZ 8, or CZ 11, primarily in core vernal pool  
8 recovery areas (Objective VPNC1.1, associated with CM3).
- 9 • Restore vernal pool complex in CZ 1, CZ 8, and CZ 11 to achieve no net loss of vernal pool  
10 acreage (up to 67 acres of vernal pool complex restoration [10 wetted acres])(Objective  
11 VPNC1.2, associated with CM9).
- 12 • Increase size and connectivity of protected vernal pool complexes in plan area and increase  
13 connectivity with complexes outside the Plan Area (Objective VPNC1.3)
- 14 • Protect the range of inundation characteristics of vernal pools in the Plan Area (Objective  
15 VPNC1.4)
- 16 • Maintain and enhance vernal pool complexes to provide appropriate inundation (ponding) for  
17 supporting and sustaining vernal pool species (Objective VPNC2.1)
- 18 • Protect one currently unprotected occurrence of conservancy fairy shrimp (Objective VPC1.1)

19 As explained below, with the restoration or protection of these amounts of habitat, in addition to  
20 implementation of AMMs, impacts on vernal pool crustaceans would not be adverse for NEPA  
21 purposes and would be less than significant for CEQA purposes.

1 **Table 12-9-12. Changes in Vernal Pool Crustacean Modeled Habitat Associated with Alternative 9**  
2 **(acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	High-value	0	0	0	0	NA	NA
	Low-value	0	0	0	0	NA	NA
<b>Total Impacts CM1</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>		
CM2–CM18 <sup>b</sup>	High-value	0	0	0	0	0–4	0
	Low-value	201	372	0	0	0	0
<b>Total Impacts CM2–CM18</b>		<b>201</b>	<b>372</b>	<b>0</b>	<b>0</b>	<b>0–4</b>	<b>0</b>
<b>TOTAL IMPACTS</b>		<b>201</b>	<b>372</b>	<b>0</b>	<b>0</b>	<b>0–4</b>	<b>0</b>

<sup>a</sup> See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-32: Loss or Conversion of Habitat for and Direct Mortality of Vernal Pool**  
5 **Crustaceans**

6 Alternative 9 conservation measures would result in the direct, permanent loss of up to 372 acres  
7 modeled vernal pool crustacean habitat, all of which would be to low-value habitat and would all be  
8 based on the hypothetical footprints for tidal natural communities restoration (CM4). In addition,  
9 the conservation measures could result in the indirect conversion due to hydrologic changes of an  
10 additional 135 acres of vernal pool crustacean habitat (89 acres of high-value habitat and 45 acres of  
11 low-value habitat) from the hypothetical footprints for tidal restoration (CM4). Tidal restoration  
12 activities may result in the modification of hardpan and changes to the perched water table, which  
13 could lead to alterations in the rate, extent, and duration of inundation of nearby vernal pool  
14 crustacean habitat. USFWS typically considers construction within 250 feet of vernal pool  
15 crustacean habitat to constitute an a possible conversion of crustacean habitat unless more detailed  
16 information is provided to further refine the limits of any such effects. For the purposes of this  
17 analysis, the 250-foot buffer was applied to the water conveyance facilities work areas where  
18 surface and subsurface disturbance activities would take place and to restoration hypothetical  
19 footprints. Habitat enhancement and management activities (CM11), which include disturbance or  
20 removal of nonnative vegetation, could result in local adverse habitat effects.

21 Alternative 9 would also result in impacts on critical habitat for Conservancy fairy shrimp (248  
22 acres), vernal pool fairy shrimp (270 acres), and vernal pool tadpole shrimp (270 acres). The  
23 hypothetical tidal restoration (CM4) footprints in CZ 11 account for all of these effects. *AMM12*

1 *Vernal Pool Crustaceans* would ensure that there would be no adverse modification of the primary  
2 constituent elements of critical habitat for these species.

3 Because the estimates of habitat loss resulting from tidal inundation are based on projections of  
4 where restoration may occur, actual effects are expected to be lower because sites would be selected  
5 and restoration projects designed to minimize or avoid effects on the covered vernal pool  
6 crustaceans. As specified in *AMM12 Vernal Pool Crustaceans* and *CM9 Vernal Pool and Alkali Seasonal*  
7 *Wetland Complex Restoration*, the BDCP Implementation Office would ensure that tidal restoration  
8 projects and other covered activities would be designed such that no more than a total of 10 wetted  
9 acres of vernal pool crustacean habitat are permanently lost. *AMM12* would also ensure that no  
10 more than 20 wetted acres of vernal pool crustacean habitat are indirectly affected by alterations to  
11 hydrology resulting from adjacent BDCP covered activities, in particular tidal restoration. The term  
12 *wetted acres* refers to an area that would be defined by the three parameter wetland delineation  
13 method used by USACE to determine the limits of a wetland, which involves an evaluation of  
14 wetland soil, vegetation, and hydrology characteristics. This acreage differs from vernal pool  
15 complex acreages in that a vernal pool complex is composed of individual wetlands (vernal pools)  
16 and those upland areas that are in between and surrounding them, which provide the supporting  
17 hydrology (surface runoff and groundwater input), organic and nutrient inputs, and refuge for the  
18 terrestrial phase of some vernal pool species.

19 A summary statement of the combined impacts and NEPA and CEQA conclusions follows the  
20 individual conservation measure discussions.

- 21 • *CM4 Tidal Natural Communities Restoration*: Tidal natural communities restoration would result  
22 in the permanent loss of approximately 372 acres of low-value vernal pool crustacean habitat,  
23 which consists of degraded vernal pool complex. The BDCP describes degraded vernal pool  
24 complex as areas of low- value ephemeral habitat ranging from areas with vernal pool and swale  
25 visual signatures that display clear evidence of significant disturbance due to plowing, discing,  
26 or leveling to areas with clearly artificial basins such as shallow agricultural ditches, depressions  
27 in fallow fields, and areas of compacted soils in pastures. The actual density of vernal pools or  
28 other aquatic features in these areas is unknown, but a 2012 review of Google Earth imagery  
29 found that these habitats appear to generally have low densities. However, areas mapped as  
30 degraded vernal pool complex may still provide habitat for vernal pool crustaceans as evidenced  
31 by records of vernal pool fairy shrimp, vernal pool tadpole shrimp, and California linderiella  
32 occurring in degraded vernal pool complex in CZ 4 (California Department of Fish and Wildlife  
33 2013). Helm (1998) notes that many vernal pool crustaceans can occur in degraded vernal pool  
34 habitats and artificial habitats. In CZs 2 and 4, there are several records of covered vernal pool  
35 crustaceans occurring outside of modeled habitat in areas that appear to be road side ditches. So  
36 though degraded vernal pool complexes may not represent botanically diverse vernal pools they  
37 still can provide habitat for vernal pool crustaceans and thus the loss of 372 acres of degraded  
38 vernal pool complex may result in the loss of occupied vernal pool crustacean habitat. In  
39 addition, tidal restoration could result in the indirect conversion of 136 acres of vernal pool  
40 crustacean habitat, which consist of 89 acres of high-value and 45 acres of low-value habitat.  
41 The hypothetical restoration footprints overlap with a CNDDB record for vernal pool fairy  
42 shrimp near the current edge of Suisun Marsh. Tidal natural community restoration under  
43 Alternative 9 would also result in impacts on critical habitat for Conservancy fairy shrimp (248  
44 acres), vernal pool tadpole shrimp (270 acres), and vernal pool fairy shrimp (270 acres). *AMM12*

1            *Vernal Pool Crustaceans* would ensure that there would be no adverse modification of the  
2            primary constituent elements of critical habitat for these species.

- 3            • *CM11 Natural Communities Enhancement and Management*: As described in the BDCP,  
4            restoration/creation of vernal pools to achieve no net loss and the protection of 600 acres of  
5            vernal pool complex would benefit vernal pool crustaceans (Table 12-9-12). A variety of habitat  
6            management actions included in CM11 that are designed to enhance wildlife values in BDCP-  
7            protected habitats may result in localized ground disturbances that could temporarily affect  
8            vernal pool crustacean habitat. Ground-disturbing activities, such as removal of nonnative  
9            vegetation and road and other infrastructure maintenance, are expected to have minor effects  
10           on vernal pool crustacean habitat and are expected to result in overall improvements to and  
11           maintenance of vernal pool crustacean habitat values over the term of the BDCP. These effects  
12           cannot be quantified, but are expected to be minimal and would be avoided and minimized by  
13           the AMMs listed below.

14           The following paragraphs summarize the combined effects discussed above and describe other  
15           BDCP conservation actions that offset or avoid these effects. NEPA and CEQA impact conclusions are  
16           also included. Table 12-9-13 was prepared to further analyze BDCP effects on vernal pool  
17           crustaceans using wetted acres of habitat in order to compare the effects of this alternative with the  
18           effect limits established in BDCP Chapter 3, Section 3.3, *Biological Goals and Objectives*, and *AMM12*  
19           *Vernal Pool Crustaceans*, which are measured in wetted acres of vernal pool crustacean habitat.  
20           Wetted acres were estimated by using the BDCP's assumption that restored vernal pool complexes  
21           would have a 15% density of vernal pools (i.e., of 100 acres of vernal pool complex 15 acres would  
22           constitute vernal pools and the remaining 85 acres supporting uplands). Based on an informal  
23           evaluation of aerial photographs of the Plan Area it is likely that the actual densities within the Plan  
24           Area are approximately 10%, but the 15% density value was chosen as a conservative estimate for  
25           determining effects.

1 **Table 12-9-13. Estimated Effects on Wetted Vernal Pool Crustacean Habitat under Alternative 9**  
2 **(acres)**

		Direct Loss		Indirect Conversion	
		Near-Term	Late Long-Term	Near-Term	Late Long-Term
BDCP Impact Limit <sup>a</sup>		5	10	10	20
Alternative 9 Impact <sup>b</sup>	CM1 <sup>c</sup>	0	0	0	0
	CM4 <sup>d</sup>	30.2	55.8	11.0	20.3
<b>Total</b>		<b>30.2</b>	<b>55.8</b>	<b>11.0</b>	<b>20.3</b>

<sup>a</sup> Because roughly half of the impacts would occur in the near-term, it is assumed that the impact limit in the near-term would be 5 wetted acres for direct loss and 10 acres for indirect.

<sup>b</sup> These acreages were generated by assuming that the modeled habitat identified in Table 12-9-12 has densities of wetted vernal pool crustacean habitat at 15%. The direct effects numbers include permanent and temporary impacts.

<sup>c</sup> The temporary impacts from transmission line construction associated with CM1 would be zero because the commitment in AMM30, which calls for temporary transmission lines to avoid removal of alkali seasonal wetland and vernal pool wetted acres. This would lower CM1 impacts to 2.3 acres.

<sup>d</sup> These impacts are based on the hypothetical restoration footprints and would likely be lower based on the BDCP's commitment to minimize and avoid effects on vernal pool crustacean habitat as much as practicable. The values for near-term indirect effects were assumed to be slightly more than half of what the late long-term value would be.

3

4 ***Near-Term Timeframe***

5 Because the water conveyance facilities construction is being evaluated at the project level, the near-  
6 term BDCP conservation strategy has been evaluated to determine whether it would provide  
7 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the effects of  
8 construction would not be adverse under NEPA and would be less than significant under CEQA.  
9 Table 12-9-12 above lists the impacts on modeled vernal pool crustacean habitat that is based on  
10 the natural community mapping done within the study area. The impacts from tidal natural  
11 communities restoration (CM4) are based on hypothetical footprints and do not reflect actual  
12 impacts on vernal pool crustacean habitat considering the BDCP's commitment to design restoration  
13 projects to minimize or avoid effects on covered vernal pool crustaceans (see AMM12). As seen in  
14 Table 12-9-13, Alternative 9 would not meet the Plan's near-term biological goals and objectives for  
15 direct loss and indirect conversion unless near-term tidal restoration projects are designed to  
16 ensure that they do not exceed these impact limits.

17 Typical NEPA and CEQA project-level mitigation ratios for vernal pools affected by CM1 would be  
18 1:1 for restoration and 2:1 for protection. Typically, indirect conversion impacts are mitigated by  
19 protecting vernal pools at a 2:1 ratio. If impacts on wetted vernal pools from tidal restoration stay  
20 within the limit presented in Table 12-9-13, the near-term effects of tidal restoration would require  
21 up to 5 wetted acres of vernal pool restoration and up to 30 wetted acres of vernal pool protection  
22 (or 200 acres of vernal pool complex protection using the 15% density assumption).

23 The BDCP has committed to near-term goal of protecting 400 acres of vernal pool complex (see  
24 Table 3-4 in Chapter 3, *Description of Alternatives*) by protecting at least 2 wetted acres of vernal  
25 pools for each wetted acre directly or indirectly affected. The BDCP has also committed to

1 restoring/creating vernal pools such that there is no net loss of vernal pool acreage. The amount of  
2 restoration would be determined during implementation based on the following criteria.

- 3 • If restoration is completed (i.e., restored natural community meets all success criteria) prior to  
4 impacts, then 1.0 wetted acre of vernal pools would be restored for each wetted acre directly  
5 affected (1:1 ratio).
- 6 • If restoration takes place concurrent with impacts (i.e., restoration construction is completed,  
7 but restored habitat has not met all success criteria, prior to impacts occurring), then 1.5 wetted  
8 acres of vernal pools would be restored for each wetted acre directly affected (1.5:1 ratio).

9 The species-specific biological goals and objectives would also inform the near-term protection and  
10 restoration efforts. These Plan goals represent performance standards for considering the  
11 effectiveness of restoration actions. The acres of protection and restoration contained in the near-  
12 term Plan goals would keep pace with the loss of habitat and effects on vernal pool crustacean  
13 habitat.

14 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
15 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
16 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
17 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
18 *Material*, *AMM10 Restoration of Temporarily Affected Natural Communities*, *AMM12 Vernal Pool*  
19 *Crustaceans*, and *AMM37 Recreation*. All of these AMMs include elements that avoid or minimize the  
20 risk of affecting habitats and species adjacent to work areas. The AMMs are described in detail in  
21 BDCP Appendix 3.C.

### 22 **Late Long-Term Timeframe**

23 The BDCP states that covered activities would not result in more than 10 wetted acres of direct loss  
24 and no more than 20 wetted acres of indirect conversion effects on vernal pools by the late long-  
25 term (see Objective VPNC1.2 and AMM12). As seen in Table 12-9-13, Alternative 9 would not meet  
26 the Plan's late long-term biological goals and objectives for direct and indirect effects unless tidal  
27 restoration projects are designed to ensure that they do not exceed these impact limits.

28 The Plan has committed to a late long-term goal of protecting 600 acres of vernal pool complex in  
29 either Conservation Zones 1, 8, or 11, primarily in core vernal pool recovery areas (Objective  
30 VPNC1.1) by protecting at least 2 wetted acres of vernal pools protected for each wetted acre  
31 directly or indirectly affected. The Plan also includes a commitment to restore or create vernal pools  
32 such that the Plan results in no net loss of vernal pool acreage (Objective VPNC1.2). The protection  
33 and restoration would be achieved using the criteria presented above as well as by following the  
34 other specific biological goals and objectives, which include:

- 35 • Increasing the size and connectivity of protected vernal pool complexes (Objective VPNC1.3)
- 36 • Protecting the range of inundation characteristics that are currently represented by vernal pool  
37 throughout the Plan Area (Objective VPNC1.4)
- 38 • Protecting one currently unprotected occurrence of conservancy fairy shrimp (Objective  
39 VPC1.1)

40 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*  
41 *Plant Species*) estimates that the restoration and protection actions discussed above, as well as the

1 restoration and protection of alkali seasonal wetlands that could overlap with the species model,  
2 could result in the restoration of 51 acres and the protection of 608 acres of modeled habitat for  
3 vernal pool crustaceans.

4 **NEPA Effects:** The near-term loss of vernal pool crustacean habitat under Alternative 9 would not be  
5 adverse under NEPA because the BDCP has committed to avoiding and minimizing effects from tidal  
6 restoration and to restoring and protecting an acreage that meets or exceeds the typical mitigation  
7 ratios described above. In the absence of other conservation actions, the modification of vernal pool  
8 crustacean habitat and potential mortality of a special-status species resulting from Alternative 9 in  
9 the late long-term would represent an adverse effect. However, the BDCP has committed to impact  
10 limits for vernal pool crustacean habitat and to habitat protection, restoration, management, and  
11 enhancement associated with CM3, CM9, and CM11. This habitat protection, restoration,  
12 management and enhancement would be guided by species-specific goals and objectives, and by  
13 AMM1-AMM6, AMM10, AMM12, AMM30, and AMM37, which would be in place throughout the  
14 period of construction. Considering these commitments, losses and conversion of vernal pool  
15 crustacean habitat under Alternative 9 would not be an adverse effect.

16 **CEQA Conclusion:**

17 **Near-Term Timeframe**

18 Because the water conveyance facilities construction is being evaluated at the project level, the near-  
19 term BDCP conservation strategy has been evaluated to determine whether it would provide  
20 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the impacts of  
21 construction would be less than significant. Table 12-9-12 lists the impacts on modeled vernal pool  
22 crustacean habitat that is based on the natural community mapping done within the study area. The  
23 impacts from tidal natural communities restoration (CM4) are based on hypothetical footprints and  
24 do not reflect actual impacts on vernal pool crustacean habitat considering the BDCP's commitment  
25 to design restoration projects to minimize or avoid effects on covered vernal pool crustaceans (see  
26 AMM12). As seen in Table 12-9-13, Alternative 9 would not meet the Plan's near-term biological  
27 goals and objectives for direct and indirect effects unless near-term tidal restoration projects are  
28 designed to ensure that they do not exceed these impact limits.

29 Typical NEPA and CEQA project-level mitigation ratios for vernal pools affected by CM1 would be  
30 1:1 for restoration and 2:1 for protection. Typically, indirect conversion impacts are mitigated by  
31 protecting vernal pools at a 2:1 ratio. If impacts on wetted vernal pools from tidal restoration stay  
32 within the near-term effect limit presented in Table 12-9-13, the near-term effects of tidal  
33 restoration would require up to 5 wetted acres of vernal pool restoration and up to 30 wetted acres  
34 of vernal pool protection (or 200 acres of vernal pool complex protection using the 15% density  
35 assumption).

36 The BDCP has committed to near-term goal of protecting 400 acres of vernal pool complex (see  
37 Table 3-4 in Chapter 3, *Description of Alternatives*) by protecting at least 2 wetted acres of vernal  
38 pools for each wetted acre directly or indirectly affected. The BDCP has also committed to  
39 restoring/creating vernal pools such that there is no net loss of vernal pool acreage. The amount of  
40 restoration would be determined during implementation based on the following criteria.

- 41 ● If restoration is completed (i.e., restored natural community meets all success criteria) prior to  
42 impacts, then 1.0 wetted acre of vernal pools would be restored for each wetted acre directly  
43 affected (1:1 ratio).

- 1       • If restoration takes place concurrent with impacts (i.e., restoration construction is completed,  
2       but restored habitat has not met all success criteria, prior to impacts occurring), then 1.5 wetted  
3       acres of vernal pools would be restored for each wetted acre directly affected (1.5:1 ratio).

4       The species-specific biological goals and objectives would also inform the near-term protection and  
5       restoration efforts. These Plan goals represent performance standards for considering the  
6       effectiveness of restoration actions. The acres of protection and restoration contained in the near-  
7       term Plan goals would keep pace with the loss of habitat and effects on vernal pool crustacean  
8       habitat.

9       The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
10      *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
11      *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
12      *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
13      *Material*, *AMM10 Restoration of Temporarily Affected Natural Communities*, *AMM12 Vernal Pool*  
14      *Crustaceans*, and *AMM37 Recreation*. All of these AMMs include elements that avoid or minimize the  
15      risk of affecting habitats and species adjacent to work areas. The AMMs are described in detail in  
16      BDCP Appendix 3.C.

17      The natural community restoration and protection activities are expected to be concluded in the  
18      first 10 years of Plan implementation, which is close enough in time to the occurrence of impacts on  
19      constitute adequate mitigation for CEQA purposes. These commitments, implemented together with  
20      the AMMs and biological goals and objectives, are more than sufficient to support the conclusion  
21      that the near-term effects of Alternative 9 would be less than significant under CEQA.

### 22      **Late Long-Term Timeframe**

23      The BDCP states that covered activities would not result in more than 10 wetted acres of direct loss  
24      and no more than 20 wetted acres of indirect conversion effects on vernal pools by the late long-  
25      term (see Objective VPNC1.2 and AMM12). As seen in Table 12-9-13, Alternative 9 would not meet  
26      the Plan's late long-term biological goals and objectives for direct and indirect effects unless near-  
27      term tidal restoration projects are designed to ensure that that they do not exceed these impact  
28      limits.

29      The Plan has committed to late long-term goal of protecting 600 acres of vernal pool complex in  
30      either Conservation Zones 1, 8, or 11, primarily in core vernal pool recovery areas (Objective  
31      VPNC1.1) by protecting at least 2 wetted acres of vernal pools protected for each wetted acre  
32      directly or indirectly affected. The Plan also includes a commitment to restore or create vernal pools  
33      such that the Plan results in no net loss of vernal pool acreage. The protection and restoration would  
34      be achieved using the criteria presented above as well as by following the other specific biological  
35      goals and objectives, which include:

- 36      • Increasing the size and connectivity of protected vernal pool complexes (Objective VPNC1.3)
- 37      • Protecting the range of inundation characteristics that are currently represented by vernal pool  
38      throughout the Plan Area (Objective VPNC1.4)
- 39      • Protecting one currently unprotected occurrence of conservancy fairy shrimp (Objective  
40      VPC1.1)

1 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*  
2 *Plant Species*) estimates that the restoration and protection actions discussed above, as well as the  
3 restoration and protection of alkali seasonal wetlands that could overlap with the species model,  
4 could result in the restoration of 51 acres and the protection of 608 acres of modeled habitat for  
5 vernal pool crustaceans.

6 The effects on vernal pool crustacean habitat from Alternative 9 would represent an adverse effect  
7 as a result of habitat modification of a special-status species and potential for direct mortality in the  
8 absence of other conservation actions. However, the BDCP has committed to impact limits for vernal  
9 pool crustacean habitat and to habitat protection, restoration, and management and enhancement  
10 associated with CM3, CM9, and CM11. These conservation activities would be guided by species-  
11 specific goals and objectives, and by AMM1-AMM6, AMM10, AMM12, and AMM37, which would be  
12 in place throughout the time period any construction activity would be occurring. Considering these  
13 commitments, Alternative 9 over the term of the BDCP would not result in a substantial adverse  
14 effect through habitat modifications and would not substantially reduce the number or restrict the  
15 range of vernal pool crustaceans. Therefore, Alternative 9 would have a less-than-significant impact  
16 on vernal pool crustaceans.

### 17 **Impact BIO-33: Indirect Effects of Plan Implementation on Vernal Pool Crustaceans**

18 Construction and maintenance activities associated with restoration actions could indirectly affect  
19 vernal pool crustaceans and their habitat in the vicinity of construction and restoration areas, and  
20 maintenance activities. These potential effects would be minimized or avoided through AMM1-6, 10,  
21 and 12, which would be in effect throughout the Plan's construction phase.

22 **NEPA Effects:** Restoration activities could indirectly affect vernal pool crustaceans and their habitat  
23 in the vicinity of construction areas. Ground-disturbing activities, stockpiling of soils, and  
24 maintenance and refueling of heavy equipment could result in the inadvertent release of sediment  
25 and hazardous substances into this habitat. These potential effects would be avoided and minimized  
26 through AMM1-AMM6, which would be in effect throughout the Plan's construction phase. The  
27 indirect effects of Alternative 9 on vernal pool crustacean habitat would not be adverse under NEPA.

28 **CEQA Conclusion:** Construction and maintenance activities associated with water conveyance  
29 facilities, and restoration actions could indirectly impact vernal pool crustaceans and their habitat in  
30 the vicinity of construction and restoration areas, and maintenance activities. These potential  
31 impacts would be minimized or avoided through AMM1-AMM6, AMM10, and AMM12, which would  
32 be in effect throughout the construction phase. The indirect impacts of Alternative 9 would be less  
33 than significant under CEQA.

### 34 **Impact BIO-34: Periodic Effects of Inundation of Vernal Pool Crustacean Habitat as a Result of** 35 **Implementation of Conservation Components**

36 Flooding of the Yolo Bypass under *CM2 Yolo Bypass Fisheries Enhancement* would periodically affect  
37 0 to 4 acres of modeled vernal pool crustacean habitat (Table 12-9-12). There would be no periodic  
38 effects resulting from *CM5 Seasonally Inundated Floodplain Restoration*.

39 **NEPA Effects:** BDCP Appendix 5.J, *Effects on Natural Communities, Wildlife, and Plants*, describes the  
40 methods used to estimate periodic inundation effects in the Yolo Bypass. Based on this method,  
41 periodic inundation could affect vernal pool crustaceans occupying areas ranging from 0 acres of  
42 habitat during most notch flows to an estimated 4 acres during a notch flow of 6,000 cubic feet per

1 second (cfs). BDCP-associated inundation of areas that would not otherwise have been inundated is  
2 expected to occur in no more than 30% of all years, because Fremont Weir is expected to overtop  
3 the remaining 70% of all years, and during those years notch operations would not typically affect  
4 the maximum extent of inundation. In more than half of all years under Existing Conditions, an area  
5 greater than the BDCP-related inundation area already inundates in the bypass. Yolo Bypass  
6 flooding is expected to have a minimal effect on vernal pool crustaceans and would thus not be  
7 adverse under NEPA.

8 **CEQA Conclusion:** Alternative 9 would periodically inundate at most 4 acres of vernal pool  
9 crustacean habitat during the maximum flows over the Fremont Weir. The periodic inundation is  
10 not anticipated to result in a conversion of vernal pool crustacean habitat into different wetland  
11 habitat. BDCP-associated inundation of areas that would not otherwise have been inundated is  
12 expected to occur in no more than 30% of all years, because Fremont Weir is expected to overtop  
13 the remaining 70% of all years, and during those years notch operations would not typically affect  
14 the maximum extent of inundation. In more than half of all years under Existing Conditions, an area  
15 greater than the BDCP-related inundation area already inundates in the bypass. Yolo Bypass  
16 flooding is expected to have a minimal effect on vernal pool crustaceans and would thus result in  
17 less-than-significant impacts on the species.

#### 18 **Valley Elderberry Longhorn Beetle**

19 This section describes the effects of Alternative 9, including water conveyance facilities construction  
20 and implementation of other conservation measures, on the valley elderberry longhorn beetle. That  
21 habitat model used to assess the effects for valley elderberry longhorn beetle is based on riparian  
22 habitat and nonriparian habitat (channels and grasslands within 200 feet of channels). Construction  
23 and restoration associated with Alternative 9 conservation measures would result in both  
24 temporary and permanent losses of valley elderberry longhorn beetle modeled habitat as indicated  
25 in Table 12-9-14. The majority of the losses would take place over an extended period of time as the  
26 restoration conservation measures are being implemented. In addition, an estimated 15 elderberry  
27 shrubs could be impacted by the Alternative 9 conveyance alignment (CM1). Full implementation of  
28 the Alternative 9 would also include the following conservation actions over the term of the BDCP to  
29 benefit valley elderberry longhorn beetle (BDCP Chapter 3, *Conservation Strategy*).

- 30 ● Mitigate impacts on elderberry shrubs consistent with USFWS conservation guidelines for the  
31 species (Objective VELB1.1)
- 32 ● Site elderberry longhorn beetle habitat restoration adjacent to occupied habitat (Objective  
33 VELB1.2)
- 34 ● Restore 5,000 acres of valley/foothill riparian (Objective VFRNC1.1, associated with CM7)
- 35 ● Protect 750 acres of valley/foothill riparian (Objective VFRNC1.2, associated with CM3)
- 36 ● Maintain or increase the abundance and distribution of rare or uncommon vegetation alliances,  
37 such as *Sambuca nigra* (blue elderberry stands) alliance (Objective VFRNC3.1, associated with  
38 CM7 and CM11)

39 As explained below, with the restoration or protection of these amounts of habitat, impacts on valley  
40 elderberry longhorn beetle would not be adverse for NEPA purposes and would be less than  
41 significant for CEQA purposes.

1 **Table 12-9-14. Changes in Valley Elderberry Longhorn Beetle Modeled Habitat Associated with**  
2 **Alternative 9 (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	Riparian	61	61	248	248	NA	NA
	Nonriparian	75	75	280	280	NA	NA
<b>Total Impacts CM1</b>		<b>136</b>	<b>136</b>	<b>528</b>	<b>528</b>	<b>NA</b>	<b>NA</b>
CM2-CM18	Riparian	381	678	76	111	44-80	266
	Nonriparian	142	311	94	108	103-244	287
<b>Total Impacts CM2-CM18</b>		<b>523</b>	<b>989</b>	<b>170</b>	<b>219</b>	<b>161-325</b>	<b>553</b>
<b>TOTAL IMPACTS</b>		<b>659</b>	<b>1,125</b>	<b>698</b>	<b>747</b>	<b>161-325</b>	<b>553</b>

<sup>a</sup> See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-35: Loss of Valley Elderberry Longhorn Beetle Habitat**

5 Alternative 9 conservation measures would result in the permanent and temporary loss combined  
6 of up to 1,872 acres of modeled valley elderberry longhorn beetle habitat (1,098 acres of riparian  
7 habitat and 774 acres of nonriparian habitat), and an estimated 15 elderberry shrubs from CM1,  
8 which represent potential habitat for the species (Table 12-9-14). Due to the limitation of the habitat  
9 suitability model, all of these effects are assumed to be a large overestimate of the true effect on  
10 potential valley elderberry longhorn beetle habitat. Conservation measures that would result in  
11 these losses are conveyance facilities and transmission line construction, and establishment and use  
12 of borrow and spoil areas (CM1), Fremont Weir/Yolo Bypass improvements (CM2), tidal habitat  
13 restoration (CM4), and floodplain restoration (CM5). Habitat enhancement and management  
14 activities (CM11), which include ground disturbance or removal of nonnative vegetation, could  
15 result in local adverse habitat effects. In addition, maintenance activities associated with the long-  
16 term operation of the water conveyance facilities and other BDCP physical facilities could degrade  
17 or eliminate valley elderberry longhorn beetle habitat. Timely implementation of the near-term  
18 habitat protection and restoration contained in the Plan and implementation of AMMs committed to  
19 in the Plan would result in no adverse effects under NEPA and less-than-significant impacts under  
20 CEQA. Each of these activities is described below.

- 21 • *CM1 Water Facilities and Operation*: Construction of Alternative 9 conveyance facilities would  
22 result in the permanent and temporary combined loss of approximately 664 acres of modeled  
23 valley elderberry longhorn beetle habitat, composed of 309 acres of riparian habitat and 355

1 acres of nonriparian habitat (Table 12-9-14). In addition, an estimated 15 shrubs could be  
2 removed as a result of conveyance facility construction. The exact number of shrubs to be  
3 impacted would be determined during pre-construction surveys of the footprints of the  
4 conveyance facility and associated work areas as part of the implementation of *AMM15 Valley*  
5 *Elderberry Longhorn Beetle*. Most of these impacts are associated with the channel enlargement  
6 and operable barrier construction. There are no records of valley elderberry longhorn beetle  
7 within these impact areas. The portion of the above impacts that result from temporary habitat  
8 loss includes 528 acres of modeled valley elderberry longhorn beetle habitat (248 acres riparian  
9 and 280 acres nonriparian habitat). Elderberry shrubs could be affected from ground-disturbing  
10 activities associated with conveyance construction footprints, temporary access roads, and  
11 staging areas.

- 12 ● *CM2 Yolo Bypass Fisheries Enhancement*: Construction activity associated with fisheries  
13 improvements in the Yolo Bypass would result in the permanent and temporary removal of  
14 approximately 295 acres of modeled valley elderberry longhorn beetle habitat, composed of 159  
15 acres of riparian habitat and 136 acres of nonriparian habitat. Approximately 125 acres of  
16 permanent impacts (83 acres of riparian and 41 acres of nonriparian) would mostly occur at the  
17 north end of the Yolo Bypass from Fremont Weir improvements. The 170 acres of temporary  
18 impacts (76 acres of riparian and 94 acres of nonriparian) would mostly be from work on the  
19 Fremont Weir, the Sacramento Weir, and levees along the Bypass. Elderberry shrubs could be  
20 affected from ground-disturbing activities associated with the re-contouring of surface  
21 topography, excavation or modification of channels, levee modification, and removal of riprap  
22 and other protections from channel banks.
- 23 ● *CM4 Tidal Natural Communities Restoration*: Tidal natural communities restoration would result  
24 in the permanent loss of approximately 8131 acres of modeled valley elderberry longhorn  
25 beetle habitat, composed of 552 acres of riparian and 260 acres of nonriparian habitat. The  
26 majority of these impacts would be associated with tidal restoration in the Delta and only 42  
27 acres of these impacts (all nonriparian) would be from tidal restoration in Suisun Marsh.  
28 Elderberry shrubs could be affected from ground-disturbing activities associated with the re-  
29 contouring of surface topography, excavation or modification of channels, type conversion from  
30 riparian and grasslands to tidal habitat, levee removal and modification, and removal of riprap  
31 and other protections from channel banks.
- 32 ● *CM5 Seasonally Inundated Floodplain Restoration*: Levee construction associated with floodplain  
33 restoration in the south Delta (CZ 7) would result in the permanent and temporary removal of  
34 approximately 101 acres of valley elderberry longhorn beetle habitat, composed of 78 acres of  
35 riparian and 23 acres of nonriparian. Approximately half of these impacts (52 acres) would be  
36 permanent impacts from levee construction and the other half (49 acres) would be temporary  
37 impacts associated with the levee construction. There is one CNDDDB record of valley elderberry  
38 longhorn beetle occurring in CZ 7 just wet of Middle River on Union Island. This record and  
39 other elderberry shrubs could be affected from ground-disturbing activities associated with the  
40 re-contouring of surface topography, excavation or modification of channels, levee removal and  
41 modification, and removal of riprap and other protections from channel banks.
- 42 ● *CM11 Natural Communities Enhancement and Management*: Activities associated with natural  
43 communities enhancement and management, such as grazing practices and ground disturbance  
44 or herbicide use in the control of nonnative vegetation, intended to maintain and improve  
45 habitat functions of BDCP protected habitats for covered species could result in loss of

1 elderberry shrubs and the potential for injury or mortality to beetles. These effects cannot be  
2 quantified, but are expected to be minimal and would be avoided and minimized by the AMMs  
3 discussed below.

- 4 • Operations and maintenance: Postconstruction operation and maintenance of the above-ground  
5 water conveyance facilities and restoration infrastructure could result in ongoing but periodic  
6 disturbances that could affect valley elderberry beetle. Maintenance activities would include  
7 vegetation management, levee and structure repair, and re-grading of roads and permanent  
8 work areas could affect elderberry shrubs occupied by the species. These effects, however,  
9 would be reduced by AMMs described below.

10 The following paragraphs summarize the combined effects discussed above and describe other  
11 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA impact conclusions are  
12 also included.

### 13 ***Near-Term Timeframe***

14 Because the water conveyance facilities construction is being evaluated at the project level, the near-  
15 term BDCP conservation strategy has been evaluated to determine whether it would provide  
16 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the effects of  
17 construction would not be adverse under NEPA and would be less than significant under CEQA.  
18 Alternative 9 would result in permanent and temporary impacts on 1,357 acres of modeled habitat  
19 (766 acres of riparian and 591 acres of nonriparian) for valley elderberry longhorn beetle in the  
20 study area in the near-term. These effects would result from the construction of the water  
21 conveyance facilities (CM1, 309 acres of riparian and 355 acres of nonriparian), and implementing  
22 other conservation measures (Yolo Bypass fisheries improvements [CM2] and tidal restoration  
23 [CM4], 693 acres of modeled habitat). The other conservation measures account for 457 of the 766  
24 acres (60%) of impacts on riparian habitat. Based on the DHCCP survey data of the conveyance  
25 planning area, an estimated 15 elderberry shrubs would be impacted by conveyance construction in  
26 the near-term by CM1 (see Section 12.3.2.3 for a discussion on the methods used to make this  
27 estimate).

28 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by  
29 CM1 and that are identified as habitat for valley elderberry longhorn beetle in Chapter 3 of the BDCP  
30 would be 1:1 for restoration and 1:1 for protection for riparian habitat. Using these typical ratios  
31 would indicate that 309 acres of the riparian habitat should be restored/created and 309 acres of  
32 existing riparian should be protected to mitigate the CM1 losses of valley elderberry longhorn beetle  
33 habitat. The near-term effects of other conservation actions would require 457 acres of riparian  
34 restoration and 457 acres of riparian protection using the same typical NEPA and CEQA ratios (1:1  
35 for restoration and 1:1 for protection).

36 The BDCP has committed to near-term goals of protecting 750 acres of riparian and restoring 800  
37 acres of riparian habitat in the Plan Area. These conservation actions would occur in the same  
38 timeframe as the construction and early restoration losses. In addition, BDCP Objectives VELB 1.1  
39 and 1.2 call for implementing the USFWS conservation guidelines for valley elderberry longhorn  
40 beetle (transplanting elderberry shrubs and planting elderberry seedlings and associated natives)  
41 and siting elderberry restoration within drainages immediately adjacent to or in the vicinity of sites  
42 confirmed to be occupied by valley elderberry longhorn beetle. These objectives would be met  
43 through the implementation of CM7 *Riparian Natural Community Restoration*. CM7 *Riparian Natural*

1 *Community Restoration* specifically calls for the planting of elderberry shrubs in large, contiguous  
2 clusters with a mosaic of associated natives as part of riparian restoration consistent with USFWS  
3 conservation guidelines (U.S. Fish and Wildlife Service 1999a). These Plan goals represent  
4 performance standards for considering the effectiveness of restoration actions. The acres of  
5 protection proposed in the near-term Plan goals are just slightly less (16 acres less) than what  
6 would be considered the typical mitigation requirements for riparian natural community impacts.  
7 However, the Plan's commitments in BDCP Objectives VELB 1.1 and 1.2 would satisfy typical  
8 mitigation requirements for valley elderberry longhorn beetle and thus the Plan would sufficiently  
9 reduce the effects from CM1 and other near-term conservation measures.

10 The Plan also includes commitments to implement *AMM1 Worker Awareness training, AMM2*  
11 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*  
12 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
13 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
14 *Material, and AMM15 Valley Elderberry Longhorn Beetle. AMM15* requires surveys for elderberry  
15 shrubs within 100 feet of any ground disturbing activities, the implementation of avoidance and  
16 minimize measures for any shrubs that are identified within this 100-foot buffer, and transplanting  
17 shrubs that can't be avoided. All of these AMMs include elements that avoid or minimize the risk of  
18 affecting habitats and species adjacent to work areas and RTM storage sites. The AMMs are  
19 described in detail in BDCP Appendix 3.C.

#### 20 ***Late Long-Term Timeframe***

21 Based on modeled habitat, the study area supports approximately 34,456 acres of modeled habitat  
22 (17,786 acres of riparian and 16,670 acres of nonriparian) for valley elderberry longhorn beetle.  
23 Alternative 9 as a whole would result in the permanent loss of and temporary effects on 1,872 acres  
24 of modeled valley elderberry longhorn beetle habitat (1,098 acres of riparian habitat and 774 acres  
25 of nonriparian habitat) during the term of the Plan (5% of the modeled habitat in the study area).  
26 The locations of these losses are described above in the analyses of individual conservation  
27 measures. These losses would not fragment any known populations of valley elderberry longhorn  
28 beetle. The Plan includes a commitment to protect 750 acres of riparian habitat and  
29 restoring/creating 5,000 acres of riparian habitat in the Plan Area. According to Objective VELB1.2,  
30 the restoration of elderberry longhorn beetle habitat would occur adjacent to occupied habitat,  
31 which would provide connectivity between occupied and restored habitats and improve the species'  
32 ability to disperse within and outside the Plan Area. Other factors relevant to effects on valley  
33 elderberry longhorn beetle include:

- 34 ● Habitat loss is widely dispersed throughout the study area and would not be concentrated in  
35 any one location.
- 36 ● There would be a temporal loss of riparian habitat during the near-term evaluation period  
37 because most of the affected riparian vegetation would be removed during the near-term  
38 timeframe, while large quantities of riparian habitat would not be restored until the early and  
39 late long-term timeframes. Effects on valley elderberry longhorn beetle of this temporal loss of  
40 riparian vegetation are expected to be minimal because much of the riparian habitat in the Plan  
41 Area is not known to be currently occupied by the species, because all elderberry shrubs that  
42 are suitable for transplantation would be moved to conservation areas in the Plan Area, and  
43 because most of the affected community is composed of small patches of riparian scrub and

1 herbaceous vegetation that are fragmented and distributed across the agricultural landscape of  
2 the Plan Area and thus are likely to provide no or low-value habitat for the beetle.

- 3 • Temporarily disturbed areas would be restored within 1 year following completion of  
4 construction and management activities. Under AMM10, a restoration and monitoring plan  
5 would be developed prior to initiating any construction-related activities associated with the  
6 conservation measures or other covered activities that would result in temporary effects on  
7 natural communities.

8 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*  
9 *Plant Species*) estimates that the restoration and protection actions discussed above, as well as other  
10 actions that overlap with the nonriparian portions of the species model, could result in the  
11 restoration of 4,857 acres (riparian) and the protection of 2,363 acres (729 acres of riparian and  
12 1,634 acres of nonriparian channels and grassland) of modeled habitat for valley elderberry  
13 longhorn beetle.

14 **NEPA Effects:** The near-term loss of valley elderberry longhorn beetle habitat under Alternative 9  
15 would not be adverse because the BDCP has committed to restoring and protecting an acreage that  
16 exceeds the typical mitigation ratios described above, in addition to avoiding impacts on shrubs and  
17 transplanting those that can't be avoided. In the absence of other conservation actions, the losses of  
18 valley elderberry longhorn beetle habitat and potential for direct mortality of a special-status  
19 species associated with Alternative 9 in the late long-term would represent an adverse effect.  
20 However, with habitat protection and restoration associated with CM7, guided by species-specific  
21 goals and objectives and by AMM1–AMM6, AMM10, and AMM15, which would be in place  
22 throughout the construction period, the effects of Alternative 9 as a whole on valley elderberry  
23 longhorn beetle would not be adverse under NEPA.

#### 24 **CEQA Conclusion:**

##### 25 **Near-Term Timeframe**

26 Because the water conveyance facilities construction is being evaluated at the project level, the near-  
27 term BDCP conservation strategy has been evaluated to determine whether it would provide  
28 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the impacts of  
29 construction would be less than significant. Alternative 9 would result in permanent and temporary  
30 impacts on 1,357 acres of modeled habitat (766 acres of riparian and 591 acres of nonriparian) for  
31 valley elderberry longhorn beetle in the study area in the near-term. These impacts would result  
32 from the construction of the water conveyance facilities (CM1, 309 acres of riparian and 355 acres of  
33 nonriparian), and implementing other conservation measures (Yolo Bypass fisheries improvements  
34 [CM2] and tidal restoration [CM4], 693 acres of modeled habitat). The other conservation measures  
35 account for 457 of the 766 acres (60%) of impacts on riparian habitat. Based on the DHCCP survey  
36 data of the conveyance planning area, an estimated 15 elderberry shrubs would be impacted by  
37 conveyance construction in the near-term by CM1 (see Section 12.3.2.3 for a discussion on the  
38 methods used to make this estimate).

39 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by  
40 CM1 and that are identified in the biological goals and objectives for valley elderberry longhorn  
41 beetle in Chapter 3 of the BDCP would be 1:1 for restoration and 1:1 for protection for riparian  
42 habitat. Using these typical ratios would indicate that 309 acres of the riparian habitat should be  
43 restored/created and 309 acres of existing riparian should be protected to mitigate the CM1 losses

1 of valley elderberry longhorn beetle habitat. The near-term effects of other conservation actions  
2 would require 457 acres of riparian restoration and 457 acres of riparian protection using the same  
3 typical NEPA and CEQA ratios (1:1 for restoration and 1:1 for protection).

4 The BDCP has committed to near-term goals of protecting 750 acres of riparian and restoring 800  
5 acres of riparian habitat in the Plan Area. These conservation actions would occur in the same  
6 timeframe as the construction and early restoration losses, thereby avoiding adverse effects on  
7 valley elderberry longhorn beetle. In addition, BDCP Objectives VELB 1.1 and 1.2, which call for  
8 implementing the USFWS conservation guidelines for valley elderberry longhorn beetle  
9 (transplanting elderberry shrubs and planting elderberry seedlings and associated natives) and  
10 siting elderberry restoration within drainages immediately adjacent to or in the vicinity of sites  
11 confirmed to be occupied by valley elderberry longhorn beetle. These objectives would be met  
12 through the implementation of *CM7 Riparian Natural Community Restoration*. CM7 specifically calls  
13 for the planting of elderberry shrubs in large, contiguous clusters with a mosaic of associated  
14 natives as part of riparian restoration consistent with USFWS conservation guidelines (U.S. Fish and  
15 Wildlife Service 1999a). These Plan goals represent performance standards for considering the  
16 effectiveness of restoration actions. The acres of protection proposed in the near-term Plan goals are  
17 just slightly less (16 acres less) than what would be considered the typical mitigation requirements  
18 for riparian natural community impacts. However, the Plan's commitments in BDCP Objectives VELB  
19 1.1 and 1.2 would satisfy typical mitigation requirements for valley elderberry longhorn beetle and  
20 thus the Plan would sufficiently reduce the effects from CM1 and other near-term conservation  
21 measures.

22 The Plan also includes commitments to implement *AMM1 Worker Awareness training, AMM2*  
23 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*  
24 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
25 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
26 *Material, and AMM15 Valley Elderberry Longhorn Beetle*. AMM15 requires surveys for elderberry  
27 shrubs within 100 feet of any ground disturbing activities; the implementation of avoidance and  
28 minimize measures for any shrubs that are identified within this 100-foot buffer, and transplanting  
29 shrubs that can't be avoided. All of these AMMs include elements that avoid or minimize the risk of  
30 affecting habitats and species adjacent to work areas and RTM storage sites. The AMMs are  
31 described in detail in BDCP Appendix 3.C.

32 The acres of protection proposed in the near-term Plan goals are just slightly less (16 acres less)  
33 than what would be considered the typical mitigation requirements for riparian natural community  
34 impacts. However, the Plan's commitments in BDCP Objectives VELB 1.1 and 1.2 would satisfy  
35 typical mitigation requirements for valley elderberry longhorn beetle and thus the Plan would  
36 sufficiently reduce the effects from CM1 and other near-term conservation measures. These  
37 commitments, implemented together with the AMMs, are more than sufficient to support the  
38 conclusion that the near-term effects of Alternative 9 would be less than significant under CEQA.

### 39 ***Late Long-Term Timeframe***

40 Alternative 9 as a whole would result in the permanent loss of and temporary effects on 1,872 acres  
41 of modeled valley elderberry longhorn beetle habitat (1,098 acres of riparian habitat and 774 acres  
42 of nonriparian habitat) during the term of the Plan (5% of the modeled habitat in the study area).  
43 The locations of these losses are described above in the analyses of individual conservation  
44 measures. These losses would not fragment any known populations of valley elderberry longhorn

1 beetle. The Plan includes a commitment to protect 750 acres of riparian habitat and  
2 restoring/creating 5,000 acres of riparian habitat in the Plan Area. According to Objective VELB1.2,  
3 the restoration of elderberry longhorn beetle habitat would occur adjacent to occupied habitat,  
4 which would provide connectivity between occupied and restored habitats and improve the species'  
5 ability to disperse within and outside the Plan Area. The BDCP also includes a number of AMM1-  
6 AMM6, AMM10, and AMM15) directed at minimizing or avoiding potential impacts on valley  
7 elderberry longhorn beetle. The large acreages of conservation would adequately compensate for  
8 the modeled habitats lost to construction and restoration activities.

9 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*  
10 *Plant Species*) estimates that the restoration and protection actions discussed above, as well as other  
11 actions that overlap with the nonriparian portions of the species model, could result in the  
12 restoration of 4,857 acres (riparian) and the protection of 2,363 acres (729 acres of riparian and  
13 1,634 acres of nonriparian channels and grassland) of modeled habitat for valley elderberry  
14 longhorn beetle.

15 Considering these protection and restoration provisions, which would provide acreages of new or  
16 enhanced habitat in amounts greater than necessary to compensate for habitats lost to construction  
17 and restoration activities, implementation of Alternative 9 as a whole would not result in a  
18 substantial adverse effect through habitat modifications and would not substantially reduce the  
19 number or restrict the range of the species. Therefore, the alternative would have a less-than-  
20 significant impact on valley elderberry longhorn beetle.

### 21 **Impact BIO-36: Indirect Effects on Valley Elderberry Longhorn Beetle and its Habitat**

22 Construction activities associated with water conveyance facilities, conservation components and  
23 ongoing habitat enhancement, as well as operation and maintenance of above-ground water  
24 conveyance facilities, including the transmission facilities, could result in ongoing periodic  
25 postconstruction disturbances with localized impacts on valley elderberry longhorn beetle over the  
26 term of the BDCP. Construction related effects could result from ground-disturbing activities,  
27 stockpiling of soils, and maintenance and refueling of heavy equipment could result in dust and the  
28 inadvertent release of hazardous substances in areas where elderberry shrubs occur. A GIS analysis  
29 (see Section 12.3.2.3 for a discussion on the methods used to make this estimate) estimates that  
30 approximately 103 shrubs could be indirectly affected by conveyance facilities construction (CM1).  
31 Restoration activities could result in excavation or modification of channels, type conversion from  
32 riparian and grasslands to tidal habitat, levee removal and modification, and removal of riprap and  
33 other protections from channel banks that occur within 100 feet of an elderberry shrubs. These  
34 potential effects would be minimized or avoided through AMM1-AMM6, AMM10, and AMM15,  
35 which would be in effect throughout the Plan's construction phase.

36 **NEPA Effects:** The indirect effects on valley elderberry longhorn beetle as a result of implementing  
37 Alternative 9 conservation actions would not have an adverse effect on valley elderberry longhorn  
38 beetle.

39 **CEQA Conclusion:** Ground-disturbing activities, stockpiling of soils, and the potential release of dust  
40 and hazardous substances would accompany construction of the water conveyance facilities. An  
41 estimated 103 shrubs could be indirectly affected by conveyance facilities construction (CM1). In  
42 addition, ground-disturbing activities associated with the re-contouring of surface topography,  
43 excavation or modification of channels, type conversion from riparian and grasslands to tidal

1 habitat, levee removal and modification, and removal of riprap and other protections from channel  
2 banks could indirectly affected elderberry shrubs that occur within 100 feet of these restoration  
3 activities. With the implementation of AMM1–AMM6, AMM10, and AMM15 as part of Alternative 9  
4 construction, operation, and maintenance, the BDCP would avoid the potential for substantial  
5 adverse indirect effects on valley elderberry longhorn beetle in that the Plan would not result in a  
6 substantial reduction in numbers or a restriction in the range of valley elderberry longhorn beetle.  
7 Therefore, the indirect effects under this alternative would have a less-than-significant impact on  
8 valley elderberry longhorn beetle.

9 **Impact BIO-37: Periodic Effects of Inundation of Valley Elderberry Longhorn Beetle Habitat**  
10 **as a Result of Implementation of Conservation Components**

11 Flooding of the Yolo Bypass from *CM2 Yolo Bypass Fisheries Enhancement* would periodically affect  
12 161 to 325 acres of modeled valley elderberry longhorn beetle habitat (Table 12-9-14).

13 *CM5 Seasonally Inundated Floodplain Restoration* would periodically inundate 553 acres of modeled  
14 valley elderberry longhorn beetle habitat (Table 12-9-14).

15 It is unknown at this time how much of the modeled habitat that would be inundated as a result of  
16 CM2 and CM5 actually contains elderberry shrubs. Elderberry shrubs have been found to be  
17 intolerant of long periods of inundation and there is evidence that they die very quickly after even  
18 short periods of flooding (River Partners 2008). During monitoring of a restoration project at the  
19 San Joaquin River National Wildlife Refuge, River Partners found that nearly all (99% to 100%) of  
20 the 4-year-old elderberry shrubs in restoration plots died after 15–17 weeks of inundation, and  
21 River Partners noted in general that the shrubs died very quickly after even short periods of  
22 flooding (River Partners 2008). Talley et al (2006) in their report assisting the USFWS 5-year review  
23 of the species, note that elderberry shrubs respond negatively to saturated soil conditions and that  
24 they can only tolerate temporary root crown inundation. Therefore, in the areas that would be  
25 periodically inundated by the implementation of CM2 it is likely that there are few, if any, mature  
26 shrubs in these areas because under current conditions they would be inundated in about 50% of all  
27 years for approximately 7 weeks. The areas affected by CM5 are not currently inundated and thus  
28 elderberry shrubs could present in these areas.

29 The periodic effects on modeled habitat for valley elderberry longhorn beetle associated with  
30 implementing Alternative 9 could adversely affect valley elderberry longhorn beetle habitat  
31 (elderberry shrubs) and make modeled habitat there unsuitable for future elderberry  
32 establishment. Based on the information presented above, the current conditions in those areas that  
33 would be periodically inundated in Yolo Bypass (CM2) are not likely very suitable for elderberry  
34 shrubs and thus CM2 would likely have minimal effects, if any, on the species. The modeled habitat  
35 that would be periodically inundated from the implementation of CM5 could result in adverse effects  
36 on valley elderberry longhorn beetle.

37 **NEPA Effects:** Periodic effects of the inundation of valley elderberry longhorn beetle habitat as a  
38 result of implementing Alternative 9 conservation actions would not be adverse under NEPA when  
39 taking into consideration CM7 habitat protection and restoration. This habitat protection and  
40 restoration would be guided by species-specific goals and objectives, and by AMM1–AMM6, AMM10,  
41 and AMM15, which would be in place throughout the time period that periodic effects would occur.

42 **CEQA Conclusion:** Alternative 9 (CM2 and CM5) would have periodic impacts on modeled valley  
43 elderberry longhorn beetle habitat. The periodic inundation of between 161 and 325 acres (CM2)

1 and 553 acres (CM5) of modeled habitat could result in the death of elderberry shrubs that may  
2 occur there and thus potentially impact valley elderberry longhorn beetle. The Plan includes the  
3 restoration of 5,000 acres of riparian habitat (Objective VFRNC1.1) and the protection of 750 acres  
4 riparian habitat (VFRNC1.2) would include areas for elderberry restoration and protection. The  
5 BDCP also includes AMM1–AMM6, AMM10, and AMM15, which would minimize and avoid impacts  
6 on valley elderberry longhorn beetle prior to Yolo Bypass fisheries enhancement and floodplain  
7 restoration activities. AMM15, which includes measure for following the USFWS conservation  
8 guidelines for valley elderberry longhorn beetle (U.S. Fish and Wildlife Service 1999a), would be  
9 used to identify shrubs for transplanting to conservation areas that otherwise could be adversely  
10 affected by periodic inundation in Yolo Bypass and floodplain restoration areas. These conservation  
11 actions would compensate for the periodic impacts on valley elderberry longhorn beetle.

12 Considering these protection and restoration provisions and avoidance and minimization measures,  
13 implementation of Alternative 9 as a whole would not result in a substantial adverse effect through  
14 habitat modifications and would not substantially reduce the number or restrict the range of the  
15 species. Therefore, periodic effects of inundation resulting from Alternative 9 would have a less-  
16 than-significant impact on valley elderberry longhorn beetle.

#### 17 **Nonlisted Vernal Pool Invertebrates**

18 This section describes the effects of Alternative 9, including water conveyance facilities construction  
19 and implementation of other conservation components, on other, noncovered vernal pool  
20 invertebrates that are not covered by the plan (Blennosperma vernal pool andrenid bee, hairy water  
21 flea, Ricksecker’s water scavenger beetle, curved-foot hygrotus beetle, molestan blister beetle).  
22 Little is known about the range of these species so it is assumed that they have potential to occur in  
23 the same areas described by the vernal pool crustacean modeled habitat. That habitat model  
24 consists of: vernal pool complex, which consists of vernal pools and uplands that display  
25 characteristic vernal pool and swale visual signatures that have not been significantly affected by  
26 agricultural or development practices; alkali seasonal wetlands in CZ 8; and degraded vernal pool  
27 complex, which consists of low-value ephemeral habitat ranging from areas with vernal pool and  
28 swale visual signatures that display clear evidence of significant disturbance due to plowing, discing,  
29 or leveling to areas with clearly artificial basins such as shallow agricultural ditches, depressions in  
30 fallow fields, and areas of compacted soils in pastures. For the purpose of the effects analysis, vernal  
31 pool complex is categorized as high-value and degraded vernal pool complex is categorized as low-  
32 value for these species. Alkali seasonal wetlands in CZ 8 were also included as high-value habitat for  
33 vernal pool crustaceans in the model. Also included as low-value for vernal pool habitat are areas  
34 along the eastern boundary of CZ 11 that are mapped as vernal pool complex because they flood  
35 seasonally and support typical vernal pool plants, but do not include topographic depressions that  
36 are characteristic of vernal pools.

37 Construction and restoration associated with Alternative 9 conservation measures would result in  
38 permanent losses of habitat for nonlisted vernal pool invertebrates as indicated in Table 12-9-15  
39 and indirect conversions of vernal pool habitat. The majority of the losses would take place over an  
40 extended period of time as tidal marsh is restored in the Plan Area. Full implementation of  
41 Alternative 9 would also include the following conservation actions over the term of the BDCP that  
42 would benefit nonlisted vernal pool invertebrates (BDCP Chapter 3, *Conservation Strategy*).

- 43 ● Protect 600 acres of vernal pool complex in CZ 1, CZ 8, or CZ 11, primarily in core vernal pool  
44 recovery areas (ObjectiveVPNC1.1, associated with CM3).

- 1 • Restore vernal pool complex in CZ 1, CZ 8, and CZ 11 to achieve no net loss of vernal pool  
2 acreage (up to 67 acres of vernal pool complex restoration [10 wetted acres])(Objective  
3 VPNC1.2, associated with CM9).
- 4 • Increase size and connectivity of protected vernal pool complexes in plan area and increase  
5 connectivity with complexes outside the Plan Area (ObjectiveVPNC1.3)
- 6 • Protect the range of inundation characteristics of vernal pools in the Plan Area (Objective  
7 VPNC1.4)
- 8 • Maintain and enhance vernal pool complexes to provide appropriate inundation (ponding) for  
9 supporting and sustaining vernal pool species (Objective VPNC2.1)

10 As explained below, with the restoration or protection of these amounts of habitat, impacts on  
11 nonlisted vernal pool invertebrates would be adverse for NEPA purposes and would be significant  
12 for CEQA purposes.

13 **Table 12-9-15. Changes in Nonlisted Vernal Pool Invertebrate Habitat Associated with**  
14 **Alternative 9 (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	High-value	0	0	0	0	NA	NA
	Low-value	0	0	0	0	NA	NA
<b>Total Impacts CM1</b>		<b>0</b>	<b>0</b>	<b>0</b>		<b>NA</b>	<b>NA</b>
CM2–CM18 <sup>e</sup>	High-value	0	0	0	0	0-4	0
	Low-value	201	372	0	0	0	0
<b>Total Impacts CM2–CM18</b>		<b>201</b>	<b>372</b>	<b>0</b>	<b>0</b>	<b>0-4</b>	<b>0</b>
<b>TOTAL IMPACTS</b>		<b>201</b>	<b>372</b>	<b>0</b>	<b>0</b>	<b>0-4</b>	<b>0</b>

<sup>a</sup> See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

<sup>e</sup> Includes indirect conversion impacts

NT = near-term

LLT = late long-term

NA = not applicable

15

16 **Impact BIO-38: Loss or Conversion of Habitat for and Direct Mortality of Nonlisted Vernal**  
17 **Pool Invertebrates**

18 Alternative 9 conservation measures would result in the direct, permanent loss of up to 372 acres of  
19 low-value vernal pool habitat from tidal habitat restoration (CM4). In addition, the conservation  
20 measures could result in the indirect conversion due to hydrologic changes of an additional 135

1 acres of vernal pool habitat (89 acres of high-value habitat and 45 acres of low-value habitat) from  
2 tidal restoration (CM4). Tidal restoration activities may result in the modification of hardpan and  
3 changes to the perched water table, which could lead to alterations in the rate, extent, and duration  
4 of inundation of nearby vernal pool habitat. USFWS typically considers construction within 250 feet  
5 of vernal pools to constitute an a possible conversion of the habitat unless more detailed  
6 information is provided to further refine the limits of any such effects. For the purposes of this  
7 analysis, the 250-foot buffer was applied to the water conveyance facilities work areas where  
8 surface and subsurface disturbance activities would take place and to restoration hypothetical  
9 footprints. Habitat enhancement and management activities (CM11), which include disturbance or  
10 removal of nonnative vegetation, could result in local adverse habitat effects.

11 Because the estimates of habitat loss resulting from tidal inundation are based on projections of  
12 where restoration may occur, actual effects are expected to be lower because sites would be selected  
13 and restoration projects designed to minimize or avoid effects on vernal pools and alkali seasonal  
14 wetlands. As specified in the BDCP, the BDCP Implementation Office would ensure that tidal  
15 restoration projects and other covered activities would be designed such that no more than a total of  
16 10 wetted acres of vernal pool habitat are directly affected and that no more than 20 wetted acres of  
17 vernal pool habitat are indirectly affected by BDCP covered activities (AMM12). The term *wetted*  
18 *acres* refers to an area that would be defined by the three parameter wetland delineation method  
19 used by USACE to determine the limits of a wetland, which includes an evaluation of wetland soil,  
20 vegetation, and hydrology characteristics. This acreage differs from vernal pool complex acreages in  
21 that a vernal pool complex is composed of individual wetlands (vernal pools) and those upland  
22 areas that are in between and surrounding them, which provide the supporting hydrology (surface  
23 runoff and groundwater input), organic and nutrient inputs, and refuge for the terrestrial phase of  
24 some vernal pool species.

25 A summary statement of the combined impacts and NEPA and CEQA conclusions follows the  
26 individual conservation measure discussions.

- 27 • *CM4 Tidal Natural Communities Restoration*: Tidal natural communities restoration would result  
28 in the permanent loss of approximately 372 acres of low-value vernal pool habitat, which  
29 consists of degraded vernal pool complex. The BDCP describes degraded vernal pool complex as  
30 areas of low-value ephemeral habitat ranging from areas with vernal pool and swale visual  
31 signatures that display clear evidence of significant disturbance due to plowing, discing, or  
32 leveling to areas with clearly artificial basins such as shallow agricultural ditches, depressions in  
33 fallow fields, and areas of compacted soils in pastures. The actual density of vernal pools or  
34 other aquatic features in these areas is unknown, but a 2012 review of Google Earth imagery  
35 found that these habitats appear to generally have low densities. However, areas mapped as  
36 degraded vernal pool complex may still provide habitat for vernal pool species as evidenced by  
37 records of vernal pool fairy shrimp, vernal pool tadpole shrimp, and California linderiella  
38 occurring in degraded vernal pool complex in CZ 4 (California Department of Fish and Wildlife  
39 2013). So though degraded vernal pool complexes may not represent botanically diverse vernal  
40 pools they still can provide habitat for vernal pool invertebrates and thus the loss of 372 acres of  
41 degraded vernal pool complex may result in the loss of occupied vernal pool invertebrate  
42 habitat. In addition, tidal restoration could result in the indirect conversion of 135 acres of  
43 vernal pool habitat, which consist of 89 acres of high-value and 45 acres of low-value habitat. No  
44 records of nonlisted vernal pool invertebrates would be directly impacted by conservation  
45 actions.

- 1 • *CM11 Natural Communities Enhancement and Management*: As described in the BDCP,  
2 restoration/creation of vernal pools to achieve no net loss and the protection of 600 acres of  
3 vernal pool complex would benefit vernal pool invertebrates (Table 12-9-15). A variety of  
4 habitat management actions included in CM11 that are designed to enhance wildlife values in  
5 BDCP-protected habitats may result in localized ground disturbances that could temporarily  
6 affect vernal pool invertebrate habitat. Ground-disturbing activities, such as removal of  
7 nonnative vegetation and road and other infrastructure maintenance, are expected to have  
8 minor effects on vernal pool invertebrate habitat and are expected to result in overall  
9 improvements to and maintenance of vernal pool habitat values over the term of the BDCP.  
10 These effects cannot be quantified, but are expected to be minimal and would be avoided and  
11 minimized by the AMMs listed below.

12 The following paragraphs summarize the combined effects discussed above and describe other  
13 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA impact conclusions are  
14 also included. Table 12-9-16 was prepared to further analyze BDCP effects on nonlisted vernal pool  
15 invertebrates using wetted acres of nonlisted vernal pool invertebrate habitat in order to compare  
16 to the effects of this alternative with the effect limits established in BDCP Chapter 3, Section 3.3,  
17 *Biological Goals and Objectives*, and AMM12, which are measured in wetted acres of vernal pool  
18 species habitat. Based on an informal evaluation of aerial photographs of the Plan Area it is likely  
19 that the actual densities within the Plan Area are approximately 10%, but the 15% density value  
20 was chosen as a conservative estimate for determining effects.

21 **Table 12-9-16. Estimated Effects on Wetted Nonlisted Vernal Pool Invertebrate Habitat under**  
22 **Alternative 9 (acres)**

		Direct Loss		Indirect Conversion	
		Near-Term	Late Long-Term	Near-Term	Late Long-Term
BDCP Impact Limit <sup>a</sup>		5	10	10	20
Alternative 9	CM1 <sup>c</sup>	0	0	0	0
Impact <sup>b</sup>	CM4 <sup>d</sup>	30.2	55.8	11.0	20.3
<b>Total</b>		<b>30.2</b>	<b>55.8</b>	<b>11.0</b>	<b>20.3</b>

<sup>a</sup> Because roughly half of the impacts would occur in the near-term, it is assumed that the impact limit in the near-term would be 5 wetted acres for direct loss and 10 acres for indirect.

<sup>b</sup> These acreages were generated by assuming that the modeled habitat identified in Table 12-9-15 has densities of wetted vernal pool species habitat at 15%. The direct effects numbers include permanent and temporary impacts.

<sup>c</sup> The temporary impacts from transmission line construction associated with CM1 would be zero because the commitment in AMM30, which calls for temporary transmission lines to avoid removal of alkali seasonal wetland and vernal pool wetted acres. This would lower CM1 impacts to 2.3 acres.

<sup>d</sup> These impacts are based on the hypothetical restoration footprints and would likely be lower based on the BDCP's commitment to minimize and avoid effects on nonlisted vernal pool invertebrate habitat as much as practicable. The values for near-term indirect effects were assumed to be slightly more than half of what the late long-term value would be.

23

24 ***Near-Term Timeframe***

25 Because the water conveyance facilities construction is being evaluated at the project level, the near-  
26 term BDCP conservation strategy has been evaluated to determine whether it would provide

1 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the effects of  
2 construction would not be adverse under NEPA and would be less than significant under CEQA.  
3 Table 12-9-16 above lists the impacts on nonlisted vernal pool invertebrate habitat that is based on  
4 the natural community mapping done within the study area. The impacts from tidal natural  
5 communities restoration (CM4) are based on hypothetical footprints and do not reflect actual  
6 impacts on vernal pool habitat considering the BDCP's commitment to design restoration projects to  
7 minimize or avoid effects on vernal pools (see AMM12). As seen in Table 12-9-16, Alternative 9  
8 would not meet the Plan's near-term biological goals and objectives for direct and indirect effects  
9 unless near-term tidal restoration projects are designed to ensure that they do not exceed these  
10 impact limits.

11 Typical NEPA and CEQA project-level mitigation ratios for vernal pools affected by CM1 would be  
12 1:1 for restoration and 2:1 for protection. Typically, indirect impacts are mitigated by protecting  
13 vernal pool species habitat at a 2:1 ratio. If impacts on wetted vernal pools from tidal restoration  
14 stay within the near-term effect limit presented in Table 12-9-16, the near-term effects of tidal  
15 restoration would require up to 5 acres of vernal pool restoration and up to 30 wetted acres of  
16 vernal pool protection (or 200 acres of vernal pool complex protection using the 15% density  
17 assumption).

18 The BDCP has committed to near-term goal of protecting 400 acres of vernal pool complex (see  
19 Table 3-4 in Chapter 3, *Description of Alternatives*) by protecting at least 2 wetted acres of vernal  
20 pools for each wetted acre directly or indirectly affected. The BDCP has also committed to  
21 restoring/creating vernal pools such that there is no net loss of vernal pool acreage. The amount of  
22 restoration would be determined during implementation based on the following criteria.

- 23 • If restoration is completed (i.e., restored natural community meets all success criteria) prior to  
24 impacts, then 1.0 wetted acre of vernal pools would be restored for each wetted acre directly  
25 affected (1:1 ratio).
- 26 • If restoration takes place concurrent with impacts (i.e., restoration construction is completed,  
27 but restored habitat has not met all success criteria, prior to impacts occurring), then 1.5 wetted  
28 acres of vernal pools would be restored for each wetted acre directly affected (1.5:1 ratio).

29 The species-specific biological goals and objectives would also inform the near-term protection and  
30 restoration efforts. These Plan goals represent performance standards for considering the  
31 effectiveness of restoration actions. The acres of protection and restoration contained in the near-  
32 term Plan goals would keep pace with the loss of habitat and effects on nonlisted vernal pool  
33 invertebrate habitat.

34 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
35 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
36 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
37 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
38 *Material*, *AMM10 Restoration of Temporarily Affected Natural Communities*, *AMM30 Transmission*  
39 *Line Design and Alignment Guidelines*, and *AMM37 Recreation*. *AMM12 Vernal Pool Crustaceans*,  
40 though developed for vernal pool crustaceans, includes measures to avoid and minimize direct and  
41 indirect effects on vernal pools and would thus be applicable to nonlisted vernal pool invertebrates  
42 as well. All of these AMMs include elements that avoid or minimize the risk of affecting habitats and  
43 species adjacent to work areas. The AMMs are described in detail in BDCP Appendix 3.C.

1 **Late Long-Term Timeframe**

2 The BDCP states that covered activities would not result in more than 10 wetted acres of direct loss  
3 and no more than 20 wetted acres of indirect conversion effects on vernal pools by the late long-  
4 term (see Objective VPNC1.2 and AMM12). As seen in Table 12-9-16, Alternative 9 would not meet  
5 the Plan's late long-term biological goals and objectives for direct and indirect effects unless tidal  
6 restoration projects are designed to ensure that they do not exceed these impact limits.

7 The Plan has committed to late long-term goal of protecting 600 acres of vernal pool complex in  
8 either Conservation Zones 1, 8, or 11, primarily in core vernal pool recovery areas (Objective  
9 VPNC1.1) by protecting at least 2 wetted acres of vernal pools protected for each wetted acre  
10 directly or indirectly affected. The Plan also includes a commitment to restore or create vernal pools  
11 such that the Plan results in no net loss of vernal pool acreage (Objective VPNC1.2). The protection  
12 and restoration would be achieved using the criteria presented above as well as by the following  
13 other specific biological goals and objectives.

- 14 ● Increasing the size and connectivity of protected vernal pool complexes (Objective VPNC1.3).  
15 Protecting the range of inundation characteristics that are currently represented by vernal pool  
16 throughout the Plan Area (Objective VPNC1.4).

17 **NEPA Effects:** The near-term loss of vernal pool habitat under Alternative 9 would not be adverse  
18 under NEPA because the BDCP has committed to avoiding and minimizing effects from tidal  
19 restoration and to restoring and protecting an acreage that meets or exceeds the typical mitigation  
20 ratios described above. In the absence of other conservation actions, the potential modification of  
21 vernal pool habitat and potential mortality of special-status species resulting from Alternative 9 in  
22 the late long-term would represent an adverse effect. However, the BDCP has committed to impact  
23 limits for vernal pool habitat and to habitat protection, restoration, management and enhancement  
24 associated with CM3, CM9, and CM11. This habitat protection, restoration, management, and  
25 enhancement would be guided by species-specific goals and objectives, and by AMM1-AMM6,  
26 AMM10, AMM12, AMM30, and AMM37, which would be in place throughout the time period of  
27 construction. Considering these commitments, losses and conversions of nonlisted vernal pool  
28 invertebrates habitat under Alternative 9 would not be adverse.

29 **CEQA Conclusion:**

30 **Near-Term Timeframe**

31 Because the water conveyance facilities construction is being evaluated at the project level, the near-  
32 term BDCP conservation strategy has been evaluated to determine whether it would provide  
33 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the impacts of  
34 construction would be less than significant. Table 12-9-15 above lists the impacts on nonlisted  
35 vernal pool invertebrate habitat that is based on the natural community mapping done within the  
36 study area. The impacts from tidal natural communities restoration (CM4) are based on hypothetical  
37 footprints and do not reflect actual impacts on vernal pool habitat considering the BDCP's  
38 commitment to design restoration projects to minimize or avoid effects on vernal pools (see  
39 AMM12). As seen in Table 12-9-16, Alternative 9 would not meet the Plan's near-term biological  
40 goals and objectives for direct and indirect effects unless near-term tidal restoration projects are  
41 designed to ensure that they do not exceed these impact limits.

1 Typical NEPA and CEQA project-level mitigation ratios for vernal pools affected by CM1 would be  
2 1:1 for restoration and 2:1 for protection. Typically, indirect impacts are mitigated by protecting  
3 vernal pools at a 2:1 ratio. If impacts on wetted vernal pools from tidal restoration stay within the  
4 near-term effect limit presented in Table 12-9-16, the near-term effects of tidal restoration would  
5 require up to 5 acres of vernal pool restoration and up to 30 wetted acres of vernal pool protection  
6 (or 200 acres of vernal pool complex protection using the 15% density assumption).

7 The BDCP has committed to near-term goal of protecting 400 acres of vernal pool complex (see  
8 Table 3-4 in Chapter 3, *Description of Alternatives*) by protecting at least 2 wetted acres of vernal  
9 pools for each wetted acre directly or indirectly affected. The BDCP has also committed to  
10 restoring/creating vernal pools such that there is no net loss of vernal pool acreage. The amount of  
11 restoration would be determined during implementation based on the following criteria.

- 12 • If restoration is completed (i.e., restored natural community meets all success criteria) prior to  
13 impacts, then 1.0 wetted acre of vernal pools would be restored for each wetted acre directly  
14 affected (1:1 ratio).
- 15 • If restoration takes place concurrent with impacts (i.e., restoration construction is completed,  
16 but restored habitat has not met all success criteria, prior to impacts occurring), then 1.5 wetted  
17 acres of vernal pools would be restored for each wetted acre directly affected (1.5:1 ratio).

18 The species-specific biological goals and objectives would also inform the near-term protection and  
19 restoration efforts. These Plan goals represent performance standards for considering the  
20 effectiveness of restoration actions. The acres of protection and restoration contained in the near-  
21 term Plan goals would keep pace with the loss of habitat and effects on nonlisted vernal pool  
22 invertebrates.

23 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
24 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
25 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
26 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
27 *Material*, and *AMM10 Restoration of Temporarily Affected Natural Communities*, and *Alignment*  
28 *Guidelines*, and *AMM37 Recreation*. *AMM12 Vernal Pool Crustaceans*, though developed for vernal  
29 pool crustaceans, includes measures to avoid and minimize direct and indirect effects on vernal  
30 pools and would thus be applicable to nonlisted vernal pool invertebrates as well. All of these AMMs  
31 include elements that avoid or minimize the risk of affecting habitats and species adjacent to work  
32 areas. The AMMs are described in detail in BDCP Appendix 3.C.

33 The natural community restoration and protection activities are expected to be concluded in the  
34 first 10 years of Plan implementation, which is close enough in time to the occurrence of impacts on  
35 constitute adequate mitigation for CEQA purposes. These commitments, implemented together with  
36 the AMMs and biological goals and objectives, are more than sufficient to support the conclusion  
37 that the near-term effects of Alternative 9 would be less than significant under CEQA.

### 38 **Late Long-Term Timeframe**

39 The BDCP states that covered activities would not result in more than 10 wetted acres of direct loss  
40 and no more than 20 wetted acres of indirect effects on vernal pools by the long-term term (see  
41 Objective VPNC1.2 and AMM12). As seen in Table 12-9-16, Alternative 9 would not meet the Plan's

1 late long-term biological goals and objectives for direct and indirect effects unless near-term tidal  
2 restoration projects are designed to ensure that that they do not exceed these impact limits.

3 The Plan has committed to late long-term goal of protecting 600 acres of vernal pool complex in  
4 either Conservation Zones 1, 8, or 11, primarily in core vernal pool recovery areas (Objective  
5 VPNC1.1) by protecting at least 2 wetted acres of vernal pools protected for each wetted acre  
6 directly or indirectly affected. The Plan also includes a commitment to restore or create vernal pools  
7 such that the Plan results in no net loss of vernal pool acreage. The protection and restoration would  
8 be achieved using the criteria presented above as well as by following the other specific biological  
9 goals and objectives, which include:

- 10 • Increasing the size and connectivity of protected vernal pool complexes (Objective VPNC1.3)
- 11 • Protecting the range of inundation characteristics that are currently represented by vernal pool  
12 throughout the Plan Area (Objective VPNC1.4)

13 The effects on nonlisted pool invertebrate species habitat from Alternative 9 would represent an  
14 adverse effect as a result of habitat modification of a special-status species and potential for direct  
15 mortality in the absence of other conservation actions. However, the BDCP has committed to impact  
16 limits for vernal pools and alkali seasonal wetlands and to habitat protection, restoration, and  
17 management and enhancement associated with CM3, CM9, and CM11. These conservation activities  
18 would be guided by species-specific goals and objectives, and AMM1–AMM6, AMM10, AMM12, and  
19 AMM37, which would be in place throughout the time period any construction activity would be  
20 occurring. Considering these commitments, Alternative 9 over the term of the BDCP would not  
21 result in a substantial adverse effect through habitat modifications and would not substantially  
22 reduce the number or restrict the range of nonlisted vernal pool invertebrates. Therefore,  
23 Alternative 9 would have a less-than-significant impact on nonlisted vernal pool invertebrates.

#### 24 **Impact BIO-39: Indirect Effects of Plan Implementation on Nonlisted Vernal Pool** 25 **Invertebrates**

26 Construction and maintenance activities associated with water conveyance facilities, and restoration  
27 actions could indirectly affect nonlisted vernal pool invertebrates and their habitat in the vicinity of  
28 construction and restoration areas, and maintenance activities. These potential effects would be  
29 minimized or avoided through AMM1–AMM6, and AMM10, which would be in effect throughout the  
30 Plan’s construction phase.

31 **NEPA Effects:** Water conveyance facilities construction and restoration activities could indirectly  
32 affect nonlisted vernal pool invertebrates and their habitat in the vicinity of construction areas.  
33 Ground-disturbing activities, stockpiling of soils, and maintenance and refueling of heavy equipment  
34 could result in the inadvertent release of sediment and hazardous substances into this habitat.  
35 These potential effects would be avoided and minimized through AMM1–AMM6, which would be in  
36 effect throughout the Plan’s construction phase. Nonlisted vernal pool invertebrates and their  
37 habitat could be periodically indirectly affected by maintenance activities at water conveyance  
38 facilities. Embankment maintenance activities around Clifton Court Forebays could result in the  
39 inadvertent discharge of sediments and hazardous materials into nonlisted vernal pool invertebrate  
40 habitat that occurs along the southern and western boundaries of the forebays. These potential  
41 effects would be avoided and minimized through AMM1–AMM6, which would be in effect  
42 throughout the term of the Plan. The indirect effects of plan implementation under Alternative 9  
43 would not be adverse.

1 **CEQA Conclusion:** Construction and maintenance activities associated with water conveyance  
2 facilities, and restoration actions could indirectly impact nonlisted vernal pool invertebrates and  
3 their habitat in the vicinity of construction and restoration areas, and maintenance activities. These  
4 potential impacts would be minimized or avoided through AMM1–AMM6, and AMM10, which would  
5 be in effect throughout the Plan’s construction phase. The indirect impacts of Alternative 9 would be  
6 less than significant.

7 **Impact BIO-40: Periodic Effects of Inundation of Nonlisted Vernal Pool Invertebrates’ Habitat**  
8 **as a Result of Implementation of Conservation Components**

9 Flooding of the Yolo Bypass from *CM2 Yolo Bypass Fisheries Enhancement* would periodically affect 0  
10 to 4 acres of modeled habitat for nonlisted vernal pool invertebrates (Table 12-9-15). There would  
11 be no periodic effects resulting from *CM5 Seasonally Inundated Floodplain Restoration*

12 **NEPA Effects:** BDCP Appendix 5.J, *Effects on Natural Communities, Wildlife, and Plants*, describes the  
13 methods used to estimate periodic inundation effects in the Yolo Bypass. Based on this method,  
14 periodic inundation could affect nonlisted vernal pool invertebrates occupying areas ranging from 0  
15 acres of habitat during most notch flows, to an estimated 4 acres during a notch flow of 6,000 cfs.  
16 BDCP-associated inundation of areas that would not otherwise have been inundated is expected to  
17 occur in no more than 30% of all years, because Fremont Weir is expected to overtop the remaining  
18 70% of all years, and during those years notch operations would not typically affect the maximum  
19 extent of inundation. In more than half of all years under Existing Conditions, an area greater than  
20 the BDCP-related inundation area already inundates in the bypass. Yolo Bypass flooding is expected  
21 to have a minimal effect on nonlisted vernal pool invertebrates and would thus not be adverse under  
22 NEPA.

23 **CEQA Conclusion:** Alternative 9 would periodically inundate at most 4 acres of nonlisted vernal pool  
24 invertebrates’ habitat during the maximum flows over the Fremont Weir. The periodic inundation is  
25 not anticipated to result in a conversion of nonlisted vernal pool invertebrates’ habitat into different  
26 wetland habitat. BDCP-associated inundation of areas that would not otherwise have been  
27 inundated is expected to occur in no more than 30% of all years, because Fremont Weir is expected  
28 to overtop the remaining 70% of all years, and during those years notch operations would not  
29 typically affect the maximum extent of inundation. In more than half of all years under Existing  
30 Conditions, an area greater than the BDCP-related inundation area already inundates in the bypass.  
31 Yolo Bypass flooding is expected to have a minimal effect on nonlisted vernal pool invertebrates and  
32 would thus result in less-than-significant impacts on the species.

33 **Sacramento and Antioch Dunes Anthicid Beetles**

34 This section describes the effects of Alternative 9, including water conveyance facilities construction  
35 and implementation of other conservation components, on Sacramento and Antioch Dunes anthicid  
36 beetles. Potential habitat in the study area includes the inland dune scrub at Antioch Dunes NWR,  
37 sand bars along the Sacramento and San Joaquin Rivers, and sandy dredge spoil piles (California  
38 Department of Fish and Game 2006c and 2006d).

39 The construction, and operations and maintenance of the water conveyance facilities under  
40 Alternative 9 would not likely affect Sacramento and Antioch Dunes anthicid beetles. The channel  
41 work and associated infrastructure would generally avoid affects to channel margins where sand  
42 bars are likely to form. Conveyance construction would not affect inland dune scrub at Antioch

1 Dunes NWR. No dredge spoil areas that could be occupied by Sacramento anthicid beetle were  
2 identified within conveyance facilities footprints during a review of Google Earth imagery. Also, a  
3 review of the locations of the Alternative 9 operable barriers and areas of channel modifications on  
4 Google Earth imagery did not reveal any sandbars in the channels or along the channel margins.  
5 These portions of the Delta have steep, riprap lined channel banks that are likely not conducive to  
6 the formation of sandbars and flows there are slow enough that sand deposits are unlikely.

7 Implementation of BDCP restoration based conservation measures could affect habitat for  
8 Sacramento and Antioch Dunes anthicid beetles. Both species are known to utilize interior sand  
9 dunes and sandbar habitat. The only interior sand dune habitat within the Plan Area is at Antioch  
10 Dunes, which would not be impacted by the Alternative 9 conservation measures. Both species are  
11 known to occur along the Sacramento River and San Joaquin Rivers. The implementation of BDCP  
12 restoration actions, and other covered activities could affect habitat for Sacramento and Antioch  
13 Dunes anthicid beetles along channels throughout the Plan Area; however the extent of these  
14 habitats in the Plan Area is unknown because these areas were not identified at the scale of mapping  
15 done within the study area. Because of current and historic channel modifications (channel  
16 straightening and dredging) and levee construction throughout the Delta, sandbar habitat is likely  
17 very limited and restricted to channel margins. The implementation of *CM4 Tidal Natural*  
18 *Communities Restoration*, *CM5 Seasonally Inundated Floodplain Restoration*, and *CM6 Channel Margin*  
19 *Enhancement* could impact sandbar habitat along the river channels and possibly sandy, dredge  
20 piles on Delta islands.

21 Over the term of the BDCP, Alternative 9 would likely result in beneficial effects on Sacramento and  
22 Antioch Dunes anthicid beetles. The following Alternative 9 objectives would generally increase  
23 opportunities for the formation of sandbars in the Plan Area.

- 24 ● Restore 10,000 acres of seasonally inundated floodplain (Objective L2.11, associated with CM5),.
- 25 ● Enhance 20 miles of channel margin habitat (Objective L2.12, associated with CM6),.
- 26 ● Restore 5,000 acres of riparian habitat, with at least 3,000 acres occurring on restored  
27 seasonally inundated floodplain. (VFRNC1.1, associated with CM7).

28 These measures would improve shoreline conditions by creating benches along levees, shallow  
29 habitat along margins and in floodplains, and increasing shoreline vegetation, all of which would  
30 likely contribute to the formation of sandbars along Delta river channels where these measures  
31 would be implemented. Increasing the structural diversity of Delta river channel margins and  
32 floodplains would create opportunities for sand to be deposited and for sandbars to subsequently  
33 form. As explained below, potential impacts on Sacramento and Antioch Dunes anthicid beetles  
34 would not be adverse for NEPA purposes and would be less than significant for CEQA purposes.

1 **Table 12-9-17. Changes in Sacramento and Antioch Dunes Anthicid Beetles’ Habitat Associated**  
2 **with Alternative 9 (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1		0	0	0	0	NA	NA
		0	0	0	0	NA	NA
<b>Total Impacts CM1</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>NA</b>	<b>NA</b>
CM2–CM18		0	0	0	0	0	0
		0	0	0	0	0	0
<b>Total Impacts CM2–CM18</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>TOTAL IMPACTS</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

<sup>a</sup> See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only.

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-41: Loss or Conversion of Habitat for and Direct Mortality of Sacramento and**  
5 **Antioch Dunes Anthicid Beetles**

6 Implementation of Alternative 9 conservation measures could affect Sacramento and Antioch Dunes  
7 anthicid beetles and their habitat. As mentioned above, the extent of this habitat in the study area is  
8 unknown but it is assumed that sand bars likely occur along to some degree along the Sacramento  
9 and San Joaquin Rivers and that some islands in the Delta may contain sandy dredge spoil piles. A  
10 review of Google Earth imagery of the north Delta did identify three general areas that appear to  
11 have accumulations of sandy soils (with some vegetation), possibly from dredge disposal, are  
12 Decker Island, the western portion of Bradford Island, and the southwestern tip of Grand Island. A  
13 review of Google Earth imagery of the south Delta did identify sandbar habitat along the San Joaquin  
14 River from the southern end of the Plan Area downstream to an area just west of Lathrop. An  
15 additional area along Paradise Cut was identified just north of I-5. Conservation measures that could  
16 result in impacts on Sacramento and Antioch Dunes anthicid beetles are tidal habitat restoration  
17 (CM4), floodplain restoration (CM5), and channel margin enhancement (CM6). In addition,  
18 maintenance activities associated with the long-term operation of the water conveyance facilities  
19 and other BDCP physical facilities could degrade or eliminate habitat for Sacramento and Antioch  
20 Dunes anthicid beetles. Each of these individual activities is described below. A summary statement  
21 of the combined impacts and NEPA and CEQA conclusions follows the individual conservation  
22 measure discussions.

- 23 • *CM4 Tidal Natural Communities Restoration*: Tidal natural communities restoration could impact  
24 the areas of sandy soils identified from aerial photographs on Decker Island, the western

1 portion of Bradford Island, and on the southwestern tip of Grand Island because these areas fall  
2 within the West Delta Restoration Opportunity Area (ROA). The West Delta ROA has been  
3 identified in the BDCP (BDCP Chapter 3, *Conservation Strategy*, Section 3.4.4) as providing  
4 opportunities for creating subtidal aquatic and tidal marsh habitats. The methods and  
5 techniques identified in the BDCP that may be used for tidal restoration include the  
6 recontouring of lands so that they have elevations suitable for the establishment of marsh plains  
7 and the eventual breaching of levees. There are three CNDDDB records of Sacramento anthicid  
8 beetle (just north of Rio Vista, one just south of Rio Vista along the west shore of the Sacramento  
9 River, and one on Grand Island) and one CNDDDB record of Antioch Dunes anthicid beetle (just  
10 north of Rio Vista) that fall within the West Delta ROA (California Department of Fish and  
11 Wildlife 2013). Tidal restoration actions in the West Delta ROA may eliminate potential habitat  
12 and impact occupied habitat of both Sacramento and Antioch Dunes anthicid beetles.

- 13 ● *CM5 Seasonally Inundated Floodplain Restoration*: Seasonally inundated floodplain restoration  
14 could impact areas with sandbars that were identified in a review of aerial photographs. The  
15 sandbars identified along the San Joaquin River and Paradise Cut are within the conceptual  
16 corridors (Corridors 1a, 1b, 2a, and 4) identified in Figure 3.4-20 of the BDCP. There are four  
17 CNDDDB records for Sacramento anthicid beetle in the conceptual corridor along the San Joaquin  
18 River (California Department of Fish and Wildlife 2013). Floodplain restoration actions in these  
19 conceptual corridors could impact potential habitat for both these species and occupied habitat  
20 of Sacramento anthicid beetle.
- 21 ● *CM6 Channel Margin Enhancement*: Channel margin enhancement could result in impacts on 20  
22 miles of channel margin that could contain sandbars.

23 The following paragraphs summarize the combined effects discussed above and describe other  
24 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA impact conclusions are  
25 also included.

26 The BDCP could result in substantial affects to Sacramento and Antioch Dunes anthicid beetles  
27 because all of the habitat identifiable from aerial photo review falls within either the West Delta  
28 ROA, which is being considered for tidal restoration (CM4), or within three of the conceptual  
29 corridors being considered for floodplain restoration (CM5). Furthermore, all seven of the records  
30 for Sacramento anthicid beetle within the study area fall within areas being considered for  
31 restoration (CM4 and CM5), which represent over half of the extant records for this species range  
32 wide (7 of 13), and the only extant record for Antioch Dunes anthicid beetle, which represent one of  
33 five extant records range wide, falls within the West Delta ROA that is just north of Rio Vista. These  
34 occurrences could be affected by restoration if these areas are chosen as restoration projects.  
35 However, over the term of the BDCP, implementation of conservation components would likely  
36 benefit Sacramento and Antioch Dunes anthicid beetles. CM5, CM6, and CM7 would generally  
37 contribute to the formation of sandbar habitat in the Plan Area. These measures would improve  
38 shoreline conditions by creating benches along levees (CM6), creating shallow margin and  
39 floodplain habitat (CM5), and increasing shoreline vegetation (CM7), all of which would likely  
40 contribute to the formation of sandbars along Delta river channels where these measures would be  
41 implemented. Increasing the structural diversity of Delta river channel margins would create areas  
42 of slow water that would allow for sand to be deposited and for sandbars to subsequently form.  
43 Other factors relevant to effects on Sacramento and Antioch Dunes anthicid beetle include:

- 44 ● The actual extent of suitable and occupied habitat for these species in the plan is unknown.

- 1     • The sandbar habitat occupied by Sacramento anthicid beetle along the San Joaquin River would  
2     likely not be directly impacted where floodplain restoration occurs because the physical  
3     disturbance would be to adjacent levees and agricultural areas. Though these actions would  
4     change hydrologic conditions that could overtime remove the existing sandbars, the expanded  
5     floodplain would create conditions suitable for the formation of new and possibly larger  
6     sandbars.
- 7     • Floodplain restoration would be phased over a period of 30 years so that not all sandbar habitat  
8     within these areas would be affected at once. Furthermore, as floodplain restoration is being  
9     implemented new sandbar habitat would likely be forming prior and/or concurrent with future  
10    floodplain restoration projects that may affect sandbar habitat on the San Joaquin River and/or  
11    Paradise Cut.

12    **NEPA Effects:** The potential impacts on Sacramento and Antioch Dunes anthicid beetles associated  
13    with Alternative 9 as a whole would represent an adverse effect as a result of habitat modification of  
14    a special-status species and potential for direct mortality in the absence of other conservation  
15    actions. However, with implementation of restoration associated with CM5, CM6, and CM7, which  
16    would be phased throughout the time period when the impacts would be occurring, the effects of  
17    Alternative 9 as a whole on Sacramento and Antioch Dunes anthicid beetles would not be adverse  
18    under NEPA.

19    **CEQA Conclusion:** Alternative 9 would impact Sacramento and Antioch Dunes anthicid beetles'  
20    habitat and could impact seven occurrences of Sacramento anthicid beetle and one occurrence of  
21    Antioch Dunes anthicid beetle. However, over the term of the BDCP, implementation of conservation  
22    components would likely benefit Sacramento and Antioch Dunes anthicid beetles. BDCP  
23    conservation components, particularly conservation measures CM5, CM6, and CM7, would generally  
24    contribute to the formation of sandbar habitat in the Plan Area. Floodplain restoration (CM5) would  
25    be phased over a period of 30 years so that not all sandbar habitat within these areas would be  
26    affected at once. Furthermore, as floodplain restoration is being implemented new sandbar habitat  
27    would likely be forming prior and/or concurrent with future floodplain restoration projects that  
28    may affect sandbar habitat on the San Joaquin River and/or Paradise Cut.

29    Considering that floodplain (CM5), channel margin enhancement (CM6), and riparian restoration  
30    (CM7) would contribute to the replacement of and possible expansion of sandbar habitat in the  
31    Delta and be phased throughout the time period when the impacts would be occurring, the  
32    implementation of Alternative 9 as a whole would not result in a substantial adverse effect though  
33    habitat modification and would not substantially reduce the number or restrict the range of these  
34    species. Therefore, the alternative would have a less-than-significant impact on Sacramento and  
35    Antioch Dunes anthicid beetles.

### 36    **Delta Green Ground Beetle**

37    This section describes the effects of Alternative 9 on delta green ground beetle. Suitable habitat in  
38    the study area would be vernal pool complexes and annual grasslands in the general Jepson Prairie  
39    area. The construction, and operations and maintenance of the water conveyance facilities under  
40    Alternative 9 would not affect delta green ground beetle because the facilities and construction area  
41    are outside the known range of the species. Implementation of Alternative 9 could affect delta green  
42    ground beetle through the protection of grasslands and vernal pool complex (CM3) in the vicinity of  
43    Jepson Prairie and the subsequent implementation of habitat enhancement and management actions

and recreational trail construction (CM11) in these areas. In addition, tidal natural communities restoration (CM4) could result in potential impacts on delta green ground beetle and its habitat. Full implementation of Alternative 9 would likely result in beneficial effects on delta green ground beetle through the following conservation actions.

- Protect 2,000 acres of grassland in CZ 1 (Objective GNC1.1, associated with CM3).
- Protect 600 acres of vernal pool complex in CZs 1, 8, and 11 (Objective VPNC1.1, associated with CM3).
- Restore up to 67 acres of vernal pool complex in CZs 1, 8, and/or 11 (Objective VPNC1.2, associated with CM9).

These areas could contain currently occupied habitat for delta green ground beetle and/or create conditions suitable for eventual range expansion. As explained below, potential impacts on delta green ground beetle would be adverse for NEPA purposes and would be significant for CEQA purposes. Mitigation Measure BIO-42, *Avoid Impacts on Delta Green Ground Beetle and its Habitat*, would reduce the effects under NEPA and reduce the impacts to a less-than-significant level under CEQA.

**Table 12-9-18. Changes in Delta Green Ground Beetle Habitat Associated with Alternative 9 (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1		0	0	0	0	NA	NA
		0	0	0	0	NA	NA
<b>Total Impacts CM1</b>		0	0	0	0	<b>NA</b>	<b>NA</b>
CM2–CM18		0	0	0	0	0	0
		0	0	0	0	0	0
<b>Total Impacts CM2–CM18</b>		0	0	0	0	0	0
<b>TOTAL IMPACTS</b>		0	0	0	0	0	0

<sup>a</sup> See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only.

NT = near-term

LLT = late long-term

NA = not applicable

**Impact BIO-42: Loss or Conversion of Habitat for and Direct Mortality of Delta Green Ground Beetle**

Alternative 9 conservation measures could result in the conversion of habitat and/or direct mortality to delta green ground beetle. Conservation measure that could affect delta green ground

1 beetle are tidal natural communities habitat restoration (CM4) and habitat enhancement and  
2 management activities (CM11) in CZ 1. CZ 1 is the only portion of the Plan Area that contains  
3 occupied and potential habitat for delta green ground beetle. The range of the delta green ground  
4 beetle is currently believed to be generally bound by Travis Air Force Base to the west, Highway 113  
5 to the east, Hay Road to the north, and Creed Road to the south (Arnold and Kavanaugh 2007; U.S.  
6 Fish and Wildlife Service 2009a). Further discussion of this potential effect is provided below, and  
7 NEPA and CEQA conclusions follow.

- 8 • *CM4 Tidal Natural Communities Restoration:* Tidal restoration in the Cache Slough ROA could  
9 result in the loss of delta green ground beetle habitat if restoration is planned in areas known to  
10 be or potentially occupied by the species. CM4 identifies 5,000 acres of freshwater tidal natural  
11 communities restoration in the Cache Slough ROA and Lindsey Slough and Calhoun Cut have  
12 been identified as areas suitable for restoration. Lindsey Slough is just east of Jepson Prairie and  
13 Calhoun Cut, which is off of Lindsey Slough (see Figure 12-1), goes into the general Jepson  
14 Prairie area and is adjacent to areas of potential habitat for delta green ground beetle. The tidal  
15 restoration methods and techniques identified in CM4 (see BDCP Chapter 3, Section 3.4.4.3.3)  
16 includes excavating channels; modifying ditches, cuts, and levees to encourage tidal circulation;  
17 and scalping higher elevation areas to create marsh plains. These disturbances could affect delta  
18 green ground beetle through habitat modification, either directly or indirectly through  
19 hydrologic modifications, and/or result in direct mortality to the species. No CNDDDB records for  
20 delta green ground beetle are intersected by the hypothetical tidal restoration footprints being  
21 used by the BDCP.
- 22 • *CM11 Natural Communities Enhancement and Management:* As described in *CM3 Natural*  
23 *Communities Protection and Restoration*, up to 2,000 acres of grasslands would be protected in  
24 CZ 1 and a portion of the 600 acres of protection and possibly some of the up to 10 wetted acres  
25 of vernal pool restoration could also occur in CZ 1. Potential effects from CM11 could include  
26 direct mortality to larvae and adults from the implementation of grassland management  
27 techniques, which may include livestock grazing, prescribed burning, and mowing. In addition to  
28 these grassland and vernal pool complex management actions, CM11 also includes guidelines  
29 and techniques for invasive plant control, which may include manual control (hand-pulling and  
30 digging), mechanical control (large equipment), and chemical control, though some of these  
31 methods would be restricted in areas where rare plants occur or in critical habitat for vernal  
32 pool species. The creation of new recreation trails as part of CM11 would result in impacts on  
33 15.5 acres of grasslands within CZ 1, which could affect delta green ground beetle if present.

34 **NEPA Effects:** The protection of 2,000 acres of grassland in CZ 1 (CM3) and the protection of 600  
35 acres of vernal pool complex and up 10 wetted acres of vernal pool complex restoration, some of  
36 which could occur in CZ 1 (CM3 and CM9) could benefit delta green ground beetle if these areas  
37 occur within the range of the species. The management of these grasslands and vernal pool  
38 complexes according to *CM11 Natural Communities Enhancement and Management* and the  
39 construction of recreational trails in CZ 1 has a potential to affect this species. AMM37 would ensure  
40 that new trails in vernal pool complexes be sited at least 250 feet from wetland features, or closer if  
41 site-specific information indicates that local watershed surrounding a vernal pools is not adversely  
42 affected. Direct mortality and/or the affects to delta green ground beetle habitat would be an  
43 adverse effect under NEPA. Implementation of Mitigation Measure BIO-42, *Avoid Impacts on Delta*  
44 *Green Ground Beetle and its Habitat*, would reduce this effect.

1       **CEQA Conclusion:** The implementation of grassland and vernal pool complex protection (CM3), tidal  
2 natural communities restoration (CM4), vernal pool restoration (CM9), and recreational trail  
3 construction and subsequent enhancement and management actions (CM11) could impact delta  
4 green ground beetle. Tidal restoration projects around Calhoun Cut and possible Lindsey Slough  
5 could affect habitat and result in direct mortality to the species from excavating channels; modifying  
6 ditches, cuts, and levees to encourage tidal circulation; and scalping higher elevation areas to create  
7 marsh plains. Potential impacts from CM11 could include direct mortality to larvae and adults  
8 resulting from the implementation of recreation trail construction in 15.5 acres of grassland in CZ 1  
9 and from grassland management techniques, which may include livestock grazing, prescribed  
10 burning, and mowing. AMM37 would ensure that new trails in vernal pool complexes be sited at  
11 least 250 feet from wetland features, or closer if site-specific information indicates that local  
12 watershed surrounding a vernal pools is not adversely affected. CM11 also includes guidelines and  
13 techniques for invasive plant control, which may include manual control (hand-pulling and digging),  
14 mechanical control (large equipment), and chemical control, though some of these methods would  
15 be restricted in areas where rare plants occur and in critical habitat for vernal pool species. These  
16 actions could result in adverse effects through habitat modification and a possible reduction in the  
17 number of the species or restrict its range, and therefore result in significant impacts on delta green  
18 ground beetle. Implementation of Mitigation Measure BIO-42 would reduce these potential impacts  
19 on a less-than-significant level.

20       **Mitigation Measure BIO-42: Avoid Impacts on Delta Green Ground Beetle and its Habitat**

21       As part of the design of recreational trails in CZ 1, the development of tidal restoration plans and  
22 site-specific management plans on protected grasslands and vernal pool complexes, and the  
23 possible implementation of vernal pool restoration in the area of Jepson Prairie, BDCP  
24 proponents will implement the following measures to avoid effects on delta green ground  
25 beetle.

- 26       ● If recreational trail construction, habitat restoration, or protection is planned for the lands  
27 adjacent to Calhoun Cut and non-cultivated lands on the western side of Lindsey Slough,  
28 these area will be evaluated by a USFWS approved biologist for potential delta green ground  
29 beetle habitat (large playa pools, or other similar aquatic features, with low growing  
30 vegetation or bare soils around the perimeter). The biologist will have previous experience  
31 with identifying suitable habitat requirements for delta green ground beetle.
- 32       ● Any suitable habitat identified by the biologist (with previous experience with delta green  
33 ground beetle) within the species current range will be considered potentially occupied and  
34 all ground disturbing covered activities in these areas will be avoided, which for the Plan  
35 Area is generally the area west of State Route 113.
- 36       ● Any other areas identified as suitable habitat outside of the current range of the species will  
37 be surveyed by a biologist with previous experience in surveying for and identifying delta  
38 green ground beetle. No ground disturbing covered activities will occur in areas identified as  
39 occupied by delta green ground beetle.
- 40       ● Based on the results of the habitat evaluations and surveys, recreational trail construction  
41 plans, and site-specific restoration and management plans will be developed so that they  
42 don't conflict with the recovery goals for delta green ground beetle in the USFWS's 2005  
43 Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon (U.S. Fish and  
44 Wildlife Service 2005). Plans will include measures to protect and manage for delta green

1 ground beetle so that they continue to support existing populations or allow for future  
2 colonization.

### 3 **Callippe Silverspot Butterfly**

4 This section describes the effects of Alternative 9 on callippe silverspot butterfly. Suitable habitats  
5 are typically in areas influenced by coastal fog with hilltops that support the specie's host-plant,  
6 Johnny jump-ups. Preferred nectar flowers used by adults include thistles, blessed milk thistle, and  
7 coyote wild mint. Other native nectar sources include hairy false goldeneaster, coast buckwheat,  
8 mourning bride, and California buckeye. The construction, and operations and maintenance of the  
9 water conveyance facilities under Alternative 9 would not result in impacts on callippe silverspot  
10 butterfly or its habitat. If Cordelia Hills and Potrero Hills are identified for grassland protection  
11 opportunities as part of *CM3 Natural Communities Protection and Restoration* and the subsequent  
12 implementation of *CM11 Natural Communities Enhancement and Management*, could affect callippe  
13 silverspot butterfly. Callippe silverspot butterfly has been documented in the western most portion  
14 of the Plan Area (CZ 11) in the Cordelia Hills (Solano County Water Agency 2009). Potential habitat  
15 for the species (grassy hills with *Viola pedunculata*) is present in the Potrero Hills, but it has not  
16 been observed there (EDAW 2005, California Department of Fish and Wildlife 2013). Though CZ 11  
17 has been identified as potential area for grassland restoration in *CM8 Grassland Natural Community*  
18 *Restoration*, the primary goal there is to restore small patches of grassland to connect to Jepson  
19 Prairie and/or the restoration of upland grasses adjacent to tidal brackish emergent wetland in  
20 Suisun Marsh, both of which would not be areas suitable for Callippe silverspot butterfly. The full  
21 implementation of Alternative 9 would protect up to 2,000 acres of grassland in CZ 11 (Objective  
22 GNC1.1, associated with CM3), some of which may contain habitat for Callippe silverspot butterfly.  
23 Any potential effects on callippe silverspot would be avoided and minimized through the  
24 implementation of Mitigation Measure BIO-43, *Avoid and Minimize Loss of Callippe Silverspot*  
25 *Butterfly Habitat*. As explained below, potential impacts on callippe silverspot would be adverse for  
26 NEPA purposes and would be significant for CEQA purposes. Mitigation Measure BIO-43 would  
27 reduce the effects under NEPA and reduce the impacts on less-than significant under CEQA.

1 **Table 12-9-19. Changes in Callippe Silverspot Butterfly Habitat Associated with Alternative 9**  
2 **(acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1		0	0	0	0	NA	NA
		0	0	0	0	NA	NA
<b>Total Impacts CM1</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>NA</b>	<b>NA</b>
CM2–CM18		0	0	0	0	0	0
		0	0	0	0	0	0
<b>Total Impacts CM2–CM18</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>TOTAL IMPACTS</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

- <sup>a</sup> See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.
- <sup>b</sup> See discussion below for a description of applicable CMs.
- <sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.
- <sup>d</sup> Periodic effects were estimated for the late long-term only.
- NT = near-term  
LLT = late long-term  
NA = not applicable

3

4 **Impact BIO-43: Loss or Conversion of Habitat for and Direct Mortality of Callippe Silverspot**  
5 **Butterfly**

6 Alternative 9 conservation measures could result in the conversion of habitat for and direct  
7 mortality of callippe silverspot butterfly. Only one conservation measure was identified as  
8 potentially affecting callippe silverspot butterfly, *CM11 Natural Communities Enhancement and*  
9 *Management*, which could result in the disturbance of callippe silverspot butterfly habitat if such  
10 areas are acquired as part of grassland protection under *CM3 Natural Communities Protection and*  
11 *Restoration*. Further discussion of this potential effect is provided below and NEPA and CEQA  
12 conclusions follow.

13 *CM11 Natural Communities Enhancement and Management*: As described in *CM3 Natural*  
14 *Communities Protection and Restoration*, up to 2,000 acres of grasslands would be protected in CZ  
15 11. If areas chosen for protection include Cordelia Hills or Potrero Hills, where there is known and  
16 potential habitat, respectively, then grassland enhancement and management actions could affect  
17 the callippe silverspot butterfly. Potential effects from CM11 could include the loss of larval host and  
18 nectar sources and direct mortality to larvae and adults from the installation of artificial nesting  
19 burrows and structures and the implementation of grassland management techniques, which may  
20 include livestock grazing, prescribed burning, and mowing. In addition to these grassland  
21 management actions, CM11 also includes guidelines and techniques for invasive plant control, which  
22 may include manual control (hand-pulling and digging), mechanical control (large equipment), and  
23 chemical control. Several of the preferred nectar sources are thistles, some of which have been

1 identified by the California Invasive Plant Council as having limited to moderate ecological impacts  
2 (California Invasive Plant Council 2006).

3 **NEPA Effects:** The protection of 2,000 acres of grassland within CZ 11 could benefit callippe  
4 silverspot butterfly if these protected areas include occupied and potential habitat on the hill tops in  
5 Cordelia Hills and Potrero Hills. The management of these grasslands according to CM11 Natural  
6 Communities Enhancement and Management has potential to adversely affect this species. Direct  
7 mortality and/or the removal of larval host plants and nectar sources for adults would be an adverse  
8 effect under NEPA. Implementation of Mitigation Measure BIO-43, *Avoid and Minimize Loss of*  
9 *Callippe Silverspot Butterfly Habitat*, would ensure the effect is not adverse.

10 **CEQA Conclusion:** If grasslands within the Cordelia Hills and Potrero Hills are protected as part of  
11 *CM3 Natural Communities Protection and Restoration* then the subsequent management of these  
12 grasslands according to *CM11 Natural Communities Enhancement and Management* has affect this  
13 species. Potential impacts from CM11 could include the loss of larval host and nectar sources and  
14 direct mortality to larvae and adults resulting from the installation of artificial nesting burrows and  
15 structures and the implementation of grassland management techniques, which may include  
16 livestock grazing, prescribed burning, and mowing. In addition to these grassland management  
17 actions, CM11 also includes guidelines and techniques for invasive plant control, which may include  
18 manual control (hand-pulling and digging), mechanical control (large equipment), and chemical  
19 control, which could result in direct and indirect effects on larval host plants and nectar plants.  
20 These actions could result in adverse effects through habitat modification and a possible reduction  
21 in the number of the species or restrict its range and would therefore result in significant impact on  
22 the species under CEQA. However, over the term of BDCP callippe silverspot butterfly could benefit  
23 from the protection of occupied and potential habitat for the species with the implementation of  
24 Mitigation Measure BIO-43, which would avoid and minimize effects from management actions and  
25 thus reduce the potential impact to a less-than-significant level.

26 **Mitigation Measure BIO-43: Avoid and Minimize Loss of Callippe Silverspot Butterfly**  
27 **Habitat**

28 As part of the development of site-specific management plans on protected grasslands in the  
29 Cordelia Hills and/or Potrero Hills, BDCP proponents will implement the following measures to  
30 avoid and minimize the loss of callippe silverspot habitat.

- 31 ● Hilltops in Cordelia Hills and Potrero Hills will be surveyed for callippe silverspot larval host  
32 plants (Johnny jump-ups) by a biologist familiar with identifying this plant species. These  
33 surveys should occur during the plant's blooming period (typically early January through  
34 April)
- 35 ● If larval host plants are present, then presence/absence surveys for callippe silverspot  
36 butterfly larvae will be conducted according to the most recent USFWS approved survey  
37 methods by a biologist with previous experience in surveying for and identifying callippe  
38 larvae and/or signs of larval presence. These surveys should be conducted prior to the adult  
39 flight season, which usually starts in mid-May.
- 40 ● If larvae are detected then no further surveys are necessary. If larvae are not detected then  
41 surveys for adults will be conducted by a biologist familiar with surveying for and  
42 identifying callippe silverspot. Surveys typically start in mid-May and continue weekly for 8  
43 to 10 weeks.

- 1           ● If callippe silverspot butterflies are detected, then the site-specific management plans will  
2           be written to include measures to protect and manage for larval host plants and nectar  
3           sources so that they continue to support existing populations and/or allow for future  
4           colonization. Mapping of both larval host plants and nectar sources will be incorporated into  
5           the management plans.

6           **California Red-Legged Frog**

7           Modeled California red-legged frog habitat in the study area is restricted to freshwater aquatic and  
8           grassland habitat, and immediately adjacent cultivated lands along the study area's southwestern  
9           edge in CZ 7, CZ 8, CZ 9, and CZ 11. Pools in perennial and seasonal streams and stock ponds provide  
10          potential aquatic habitat for this species. While stock ponds are underrepresented as a modeled  
11          habitat, none is expected to be affected by BDCP actions. Construction and restoration associated  
12          with Alternative 9 conservation measures would result in permanent losses of California red-legged  
13          frog modeled habitat as indicated in Table 12-9-20. Factors considered in assessing the value of  
14          affected habitat for the California red-legged frog, to the extent that information is available, are  
15          presence of limiting habitat (aquatic breeding habitat), known occurrences and clusters of  
16          occurrences, proximity of the affected habitat to existing protected lands, and the overall degraded  
17          or fragmented nature of the habitat. The study area represents the extreme eastern edge of the  
18          species' coastal range, and species' occurrences are reported only from CZ 8 and CZ 11. Full  
19          implementation of Alternative 9 would also include the following biological objectives over the term  
20          of the BDCP to benefit the California red-legged frog (BDCP Chapter 3, *Conservation Strategy*).

- 21          ● Increase native species diversity and relative cover of native plant species, and reduce the  
22          introduction and proliferation of nonnative species (Objective L2.6, associated with CM11,  
23          CM13, and CM20).
- 24          ● Protect 8,000 acres of grassland (Objective GNC1.1, associated with CM3).
- 25          ● Protect stock ponds and other aquatic features within protected grasslands to provide aquatic  
26          breeding habitat for native amphibians and aquatic reptiles (Objective GNC1.3, associated with  
27          CM3)
- 28          ● Increase burrow availability for burrow-dependent species (Objective GNC2.3, associated with  
29          CM11).
- 30          ● Maintain and enhance aquatic features in grasslands to provide suitable inundation depth and  
31          duration and suitable composition of vegetative cover to support breeding for covered  
32          amphibian and aquatic reptile species (Objective GNC2.5, associated with CM11).

33          As explained below, with the restoration and protection of these amounts of habitat, in addition to  
34          implementation of AMMs, impacts on California red-legged frog would not be adverse for NEPA  
35          purposes and would be less than significant for CEQA purposes.

1  
2

**Table 12-9-20. Changes in California Red-Legged Frog Modeled Habitat Associated with Alternative 9 (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	Aquatic	0	0	0	0	NA	NA
	Upland	0	0	0	0	NA	NA
<b>Total Impacts CM1</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>NA</b>	<b>NA</b>
CM2–CM18	Aquatic	0	0	0	0	0	0
	Upland	8	24	0	0	0	0
<b>Total Impacts CM2–CM18</b>		<b>8</b>	<b>24</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>TOTAL IMPACTS</b>		<b>8</b>	<b>24</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

<sup>a</sup> See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only.

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-44: Loss or Conversion of Habitat for and Direct Mortality of California Red-**  
5 **Legged Frog**

6 Alternative 9 conservation measure CM11 would result in the permanent loss of 24 acres of  
7 modeled upland habitat for t California red-legged frog. There are no California red-legged frog  
8 occurrences that overlap with the Plan footprint. Construction activities associated recreational  
9 facilities, including operation of construction equipment, could result in temporary effects on, as  
10 well as injury and mortality of, California red-legged frogs. In addition, natural enhancement and  
11 management activities (CM11), which include ground disturbance or removal of nonnative  
12 vegetation, could result in local adverse habitat effects. In addition, maintenance activities  
13 associated with the long-term operation of the water conveyance facilities and other BDCP physical  
14 facilities could degrade or eliminate California red-legged frog habitat including injury and mortality  
15 of California red-legged frogs. Each of these individual activities is described below. A summary  
16 statement of the combined impacts and NEPA effects and a CEQA conclusion follow the individual  
17 conservation measure discussions.

- 18 • *CM11 Natural Communities Enhancement and Management*: Based on the recreation  
19 assumptions described in BDCP Chapter 3, Section 3.4.11, an estimated 24 acres of upland cover  
20 and dispersal habitat for the California red-legged frog would be removed as a result of  
21 constructing trails and associated recreational facilities. Passive recreation in the reserve  
22 system could result in trampling and disturbance of egg masses in water bodies, degradation of  
23 water quality through erosion and sedimentation, and trampling of sites adjacent to upland  
24 habitat used for cover and movement. However, *AMM37 Recreation* requires protection of water

1 bodies from recreational activities and requires trail setbacks from wetlands. With these  
2 restrictions, recreation-related effects on California red-legged frog are expected to be minimal.

3 Activities associated with natural communities enhancement and management in protected  
4 California red-legged frog habitat, such as ground disturbance or herbicide use to control  
5 nonnative vegetation, could result in local adverse habitat effects on, and injury or mortality of,  
6 California red-legged frogs. These effects would be avoided and minimized with implementation  
7 of the AMMs discussed below. Herbicides would only be used in California red-legged frog  
8 habitat in accordance with the written recommendation of a licensed, registered pest control  
9 advisor and in conformance with label precautions and federal, state, and local regulations in a  
10 manner that avoids or minimizes harm to the California red-legged frog.

- 11 ● Critical habitat: Several conservation measures would be implemented in California red-legged  
12 frog habitat and designated critical habitat in CZ 8 and CZ 11. Approximately 2,460 acres of  
13 designated critical habitat for the California red-legged frog overlaps with the study area along  
14 the western edge of CZ 11 in critical habitat unit SOL-1. An additional 862 acres of designated  
15 critical habitat is also present along the western edge of CZ 8 in critical habitat unit ALA-2.  
16 Conservation actions to protect and enhance grassland habitat for covered species, including  
17 California red-legged frog, in CZ 8 could include acquisition and enhancement of designated  
18 critical habitat for the California red-legged frog and California tiger salamander. Any habitat  
19 enhancement actions for these species in designated critical habitat are expected to enhance the  
20 value of any affected designated critical habitat for conservation of California red-legged frog.  
21 These actions would result in an overall benefit to California red-legged frog within the study  
22 area through protection and management of grasslands with associated intermittent stream  
23 habitat and through restoration of vernal pool complex habitat and its associated grassland  
24 habitat.
- 25 ● Operations and maintenance: Ongoing water conveyance facilities operation and maintenance is  
26 expected to have little if any adverse effect on the California red-legged frog. Postconstruction  
27 operation and maintenance of the above-ground water conveyance facilities could result in  
28 ongoing but periodic postconstruction disturbances that could affect California red-legged frog  
29 use of the surrounding habitat. Operation of maintenance equipment, including vehicle use  
30 along transmission corridors in CZ 8, could also result in injury or mortality of California red-  
31 legged frogs if present in work sites. Implementation conservation actions and implementation  
32 of AMM1–AMM6, AMM10, AMM14, and AMM37 would reduce these effects.
- 33 ● Injury and direct mortality: Construction activities associated with t vernal pool complex  
34 restoration, and habitat and management enhancement-related activities, including operation of  
35 construction equipment, could result in injury or mortality of California red-legged frogs.  
36 Breeding, foraging, dispersal, and overwintering behavior may be altered during construction  
37 activities, resulting in injury or mortality of California red-legged frog. Frogs occupying burrows  
38 could be trapped and crushed during ground-disturbing activities. Degradation and loss of  
39 estivation habitat is also anticipated to result from the removal of vegetative cover and  
40 collapsing of burrows. Injury or mortality would be avoided and minimized through  
41 implementation of seasonal constraints and preconstruction surveys in suitable habitat,  
42 collapsing unoccupied burrows, and relocating frogs outside of the construction area as  
43 described in AMM1–AMM6, AMM10, AMM14, and AMM37.

1 The following paragraphs summarize the combined effects discussed above and describe other  
2 BDCP conservation actions that offset or avoid these effects. NEPA effects and a CEQA conclusion are  
3 also included.

4 ***Near-Term Timeframe***

5 Because the water conveyance facilities construction is being evaluated at the project level, the near-  
6 term BDCP conservation strategy has been evaluated to determine whether it would provide  
7 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the effects of  
8 construction would not be adverse under NEPA.

9 Alternative 9 would permanently remove 8 acres of upland terrestrial cover habitat for California  
10 red-legged frog. The effects would result from construction of recreational facilities (CM11).

11 Typical NEPA project-level mitigation ratios for those natural communities that would be affected  
12 and that are identified in the biological goals and objectives for California's red-legged frog in  
13 Chapter 3 of the BDCP would be 2:1 for protection of grassland habitats. Using these ratios would  
14 indicate that 16 acres of grassland should be protected for California red-legged frog to mitigate the  
15 near-term losses.

16 The BDCP has committed to near-term protection of up to 2,000 acres grassland in the Plan Area  
17 (Table 3-4 in Chapter 3, *Description of Alternatives*). Protection of at least 1,000 acres of grassland in  
18 CZ 8, west of Byron Highway, would benefit California red-legged frog by providing habitat in the  
19 portion of the Plan Area with the highest long-term conservation value for the species based on  
20 known species occurrences and large, contiguous habitat areas (Objective GNC1.1). Consistent with  
21 Objective GNC1.3, ponds and other aquatic features within the grasslands would be protected to  
22 provide aquatic habitat for this species, and surrounding grassland would provide dispersal and  
23 aestivation habitat which would compensate for the loss of 1 acre of aquatic habitat. In addition,  
24 aquatic features in grasslands would be maintained and enhanced to provide suitable inundation  
25 depth and duration to support breeding habitat for covered amphibians (Objective GNC2.5).

26 These conservation actions would occur in the same timeframe as the construction losses, thereby  
27 avoiding adverse effects of habitat loss on California red-legged frog. These Plan objectives  
28 represent performance standards for considering the effectiveness of CM3 protection and  
29 restoration actions. The acres of restoration and protection contained in the near-term Plan goals  
30 and the additional detail in the biological objectives for California red-legged frog satisfy the typical  
31 mitigation that would be applied to the project-level effects of CM1, as well as mitigate the near-  
32 term effects of the other conservation measures.

33 The plan also contains commitments to implement *AMM1 Worker Awareness Training, AMM2*  
34 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*  
35 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
36 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
37 *Material, AMM10 Restoration of Temporarily Affected Natural Communities, AMM14 California Red-*  
38 *Legged Frog, and AMM37 Recreation. These AMMs include elements that avoid or minimize the risk*  
39 *of affecting individuals and species habitats adjacent to work areas and storage sites. The AMMs are*  
40 *described in detail in BDCP Appendix 3.C, Avoidance and Minimization Measures.*

1       **Late Long-Term Timeframe**

2       The habitat model indicates that the study area supports approximately 159 acres of aquatic 7,766  
3       acres of upland habitat for California red-legged frog.

4       Alternative 9 as a whole would result in the permanent loss of 24 acres of upland habitat for  
5       California red-legged frog for the term of the plan (less than 1% of the total upland habitat in the  
6       study area). Most of the California red-legged frog upland habitat that would be removed consists of  
7       naturalized grassland or cultivated land in a highly disturbed or modified setting on lands  
8       immediately adjacent to Clifton Court Forebay. The removed upland cover and dispersal habitat is  
9       within 0.5 mile of a cluster of known California red-legged frog occurrences to the west. However,  
10      this habitat consists mostly of cultivated lands and small patches of grasslands, and past and current  
11      surveys in this area have not found any evidence that this habitat is being used (Appendix 12C, *2009*  
12      *to 2011 Bay Delta Conservation Plan EIR/EIS Environmental Data Report*).

13      The BDCP has committed to long-term protection of 8,000 acres grassland in the Plan Area (Table 3-  
14      4 in Chapter 3, *Description of Alternatives*). Protection of at least 1,000 acres of grassland in CZ 8  
15      west of Byron Highway would benefit the California red-legged frog by providing habitat in the  
16      portion of the study area with the highest long-term conservation value for the species based on  
17      known species occurrences and large, contiguous habitat areas (Objective GNC1.1). Consistent with  
18      Objective GNC1.3, ponds and other aquatic features in the grasslands would also be protected to  
19      provide aquatic habitat for this species, and the surrounding grassland would provide dispersal and  
20      aestivation habitat. Aquatic features in the protected grasslands in CZ 8 would be maintained and  
21      enhanced to provide suitable inundation depth and duration and suitable composition of vegetative  
22      cover to support breeding California red-legged frogs (Objective GNC2.5). Additionally, livestock  
23      exclusion from streams and ponds and other measures would be implemented as described in CM11  
24      to promote growth of aquatic vegetation with appropriate cover characteristics favorable to  
25      California red-legged frogs. Lands protected in CZ 8 would connect with lands protected under the  
26      *East Contra Costa County HCP/NCCP* and the extensive Los Vaqueros Watershed lands, including  
27      grassland areas supporting this species. This objective would ensure that California red-legged frog  
28      upland and associated aquatic habitats would be protected and enhanced in the largest possible  
29      patch sizes adjacent to occupied habitat within and adjacent to the Plan Area.

30      The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*  
31      *Plant Species*) estimates that the restoration and protection actions discussed above, as well as the  
32      restoration of tidal freshwater emergent wetland, grassland, valley/foothill riparian, and vernal pool  
33      complex that could overlap with the species model, would result in the restoration of 16 acres of  
34      aquatic and 351 acres of upland modeled habitat for California red-legged frog. In addition,  
35      protection of managed wetland, grassland, valley/foothill riparian, and vernal pool complex could  
36      overlap with the species model and would result in the protection of 3 acres of aquatic and 1,047  
37      acres of upland California red-legged frog modeled habitat.

38      **NEPA Effects:** In the near-term, the loss of California red-legged frog habitat under Alternative 9  
39      would be not be adverse because the BDCP has committed to protecting and restoring the acreage  
40      required to meet the typical mitigation ratios described above. In the late long-term, the losses of  
41      California red-legged frog aquatic and upland habitat associated with Alternative 9, in the absence of  
42      other conservation actions, would represent an adverse effect as a result of habitat modification of a  
43      special-status species and potential for direct mortality. However, with habitat protection and  
44      restoration associated with the conservation components, guided by landscape-scale goals and

1 objectives and by AMM1–AMM6, AMM10, AMM14, and AMM37, the effects of Alternative 9 as a  
2 whole on California red-legged frog would not be adverse.

3 ***CEQA Conclusion:***

4 ***Near-Term Timeframe***

5 Because the water conveyance facilities construction is being evaluated at the project level, the near-  
6 term BDCP conservation strategy has been evaluated to determine whether it would provide  
7 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the impacts of  
8 construction would be less than significant under CEQA.

9 Alternative 9 would permanently remove 8 acres of upland terrestrial cover habitat for California  
10 red-legged frog. The effects would result from construction of recreational facilities (CM11).

11 Typical CEQA project-level mitigation ratios for those natural communities that would be affected  
12 and that are identified in the biological goals and objectives for California’s red-legged frog in  
13 Chapter 3 of the BDCP would be 2:1 for protection of grassland habitats. Using these ratios would  
14 indicate that 16 acres of grassland should be protected for California red-legged frog to mitigate the  
15 near-term losses.

16 The BDCP has committed to near-term protection of up to 2,000 acres grassland in the Plan Area  
17 (Table 3-4 in Chapter 3, *Description of Alternatives*). Protection of at least 1,000 acres of grassland in  
18 CZ 8, west of Byron Highway, would benefit California red-legged frog by providing habitat in the  
19 portion of the Plan Area with the highest long-term conservation value for the species based on  
20 known species occurrences and large, contiguous habitat areas (Objective GNC1.1). Consistent with  
21 Objective GNC1.3, ponds and other aquatic features within the grasslands would be protected to  
22 provide aquatic habitat for this species, and surrounding grassland would provide dispersal and  
23 aestivation habitat which would compensate for the loss of 1 acre of aquatic habitat. In addition,  
24 aquatic features in grasslands would be maintained and enhanced to provide suitable inundation  
25 depth and duration to support breeding habitat for covered amphibians (Objective GNC2.5).

26 These conservation actions would occur in the same timeframe as the construction losses, thereby  
27 avoiding adverse effects of habitat loss on California red-legged frog. These Plan objectives  
28 represent performance standards for considering the effectiveness of CM3 protection and  
29 restoration actions. The acres of restoration and protection contained in the near-term Plan goals  
30 and the additional detail in the biological objectives for California red-legged frog satisfy the typical  
31 mitigation that would be applied to the project-level effects of CM1, as well as mitigate the near-  
32 term effects of the other conservation measures.

33 The BDCP also contains commitments to implement AMM1–AMM6, AMM10, AMM14, and AMM37.  
34 These AMMs include elements that avoid or minimize the risk of affecting individuals and species  
35 habitats adjacent to work areas and storage sites. The AMMs are described in detail in BDCP  
36 Appendix 3.C, *Avoidance and Minimization Measures*

37 These commitments are more than sufficient to support the conclusion that the near-term effects of  
38 Alternative 9 on California red-legged frog would be less than significant under CEQA, because the  
39 number of acres required to meet the typical ratios described above would be only 16 acres of  
40 upland communities protected.

1 **Late Long-Term Timeframe**

2 The habitat model indicates that the study area supports approximately 159 acres of aquatic 7,766  
3 acres of upland habitat for California red-legged frog. Alternative 9 as a whole would result in the  
4 permanent loss of 24 acres of upland habitat for California red-legged frog for the term of the plan  
5 (less than 1% of the total upland habitat in the study area). Most of the California red-legged frog  
6 upland habitat that would be removed consists of naturalized grassland or cultivated land in a  
7 highly disturbed or modified setting on lands immediately adjacent to Clifton Court Forebay. The  
8 removed upland cover and dispersal habitat is within 0.5 mile of a cluster of known California red-  
9 legged frog occurrences to the west. However, this habitat consists mostly of cultivated lands and  
10 small patches of grasslands, and past and current surveys in this area have not found any evidence  
11 that this habitat is being used (Appendix 12C, *2009 to 2011 Bay Delta Conservation Plan EIR/EIS*  
12 *Environmental Data Report*).

13 The BDCP has committed to long-term protection of 8,000 acres grassland in the Plan Area (Table 3-  
14 4 in Chapter 3, *Description of Alternatives*). Protection of at least 1,000 acres of grassland in CZ 8  
15 west of Byron Highway would benefit the California red-legged frog by providing habitat in the  
16 portion of the study area with the highest long-term conservation value for the species based on  
17 known species occurrences and large, contiguous habitat areas (Objective GNC1.1). Consistent with  
18 Objective GNC1.3, ponds and other aquatic features in the grasslands would also be protected to  
19 provide aquatic habitat for this species, and the surrounding grassland would provide dispersal and  
20 aestivation habitat. Aquatic features in the protected grasslands in CZ 8 would be maintained and  
21 enhanced to provide suitable inundation depth and duration and suitable composition of vegetative  
22 cover to support breeding California red-legged frogs (Objective GNC2.5). Additionally, livestock  
23 exclusion from streams and ponds and other measures would be implemented as described in CM11  
24 to promote growth of aquatic vegetation with appropriate cover characteristics favorable to  
25 California red-legged frogs. Lands protected in CZ 8 would connect with lands protected under the  
26 *East Contra Costa County HCP/NCCP* and the extensive Los Vaqueros Watershed lands, including  
27 grassland areas supporting this species. This objective would ensure that California red-legged frog  
28 upland and associated aquatic habitats would be protected and enhanced in the largest possible  
29 patch sizes adjacent to occupied habitat within and adjacent to the Plan Area.

30 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*  
31 *Plant Species*) estimates that the restoration and protection actions discussed above, as well as the  
32 restoration of tidal freshwater emergent wetland, grassland, valley/foothill riparian, and vernal pool  
33 complex that could overlap with the species model, would result in the restoration of 16 acres of  
34 aquatic and 351 acres of upland modeled habitat for California red-legged frog. In addition,  
35 protection of managed wetland, grassland, valley/foothill riparian, and vernal pool complex could  
36 overlap with the species model and would result in the protection of 3 acres of aquatic and 1,047  
37 acres of upland California red-legged frog modeled habitat.

38 In the absence of other conservation actions, the losses of California red-legged frog aquatic and  
39 upland habitat associated with Alternative 9 would represent an adverse effect as a result of habitat  
40 modification of a special-status species and potential for direct mortality. However, with habitat  
41 protection and restoration associated with the conservation components, guided by landscape-scale  
42 goals and objectives and by AMM1-AMM6, AMM10, AMM14, and AMM37, the effects of Alternative 9  
43 would have a less-than-significant impact on California red-legged frog.

1 **Impact BIO-45: Indirect Effects of Plan Implementation on California Red-Legged Frog**

2 Noise and visual disturbance outside the project footprint but within 500 feet of construction  
3 activities are indirect effects that could temporarily affect the use of California red-legged frog  
4 habitat, all of which is upland cover and dispersal habitat. The areas to be affected are near Clifton  
5 Court Forebay, and no California red-legged frogs were detected during recent surveys conducted in  
6 this area (Appendix 12C, 2009 to 2011 Bay Delta Conservation Plan EIR/EIS Environmental Data  
7 Report).

8 Maintenance and refueling of heavy equipment could result in the inadvertent release of sediment  
9 and hazardous substances into species habitat. Increased sedimentation could reduce the suitability  
10 of California red-legged frog habitat downstream of the construction area by filling in pools and  
11 smothering eggs. Accidental spills of toxic fluids also could result in the subsequent loss of California  
12 red-legged frog if these materials enter the aquatic system. Hydrocarbon and heavy metal pollutants  
13 associated with roadside runoff also have the potential to enter the aquatic system, affecting water  
14 quality and California red-legged frog.

15 **NEPA Effects:** Implementation of AMM1-AMM6, AMM10, AMM14, and AMM37 as part of  
16 implementing Alternative 9 would avoid the potential for substantial adverse effects on California  
17 red-legged frogs, either indirectly or through habitat modifications. These AMMs would also avoid  
18 and minimize effects that could substantially reduce the number of California red-legged frogs, or  
19 restrict the species' range. Therefore, the indirect effects of Alternative 9 would not have an adverse  
20 effect on California red-legged frog.

21 **CEQA Conclusion:** Indirect effects from conservation measure operations and maintenance, as well  
22 as construction-related noise and visual disturbances, could impact California red-legged frog in  
23 aquatic and upland habitats. The use of mechanical equipment during construction could cause the  
24 accidental release of petroleum or other contaminants that could impact California red-legged frog  
25 or its prey. The inadvertent discharge of sediment or excessive dust adjacent to California red-  
26 legged frog habitat could also have a negative impact on the species or its prey. With  
27 implementation of AMM1-AMM6, AMM10, AMM14, and AMM37, construction, operation, and  
28 maintenance under Alternative 9 would avoid the potential for substantial adverse effects on  
29 California red-legged frog, either indirectly or through habitat modifications, and would not result in  
30 a substantial reduction in numbers or a restriction in the range of California red-legged frogs. The  
31 indirect effects of BDCP Alternative 9 would have a less-than-significant impact on California red-  
32 legged frogs.

33 **California Tiger Salamander**

34 Modeled California tiger salamander habitat in the study area contains two habitat types: terrestrial  
35 cover and aestivation habitat, and aquatic breeding habitat and is restricted to CZ 1, CZ 2, CZ 4, CZ 5,  
36 CZ 7, CZ 8, and CZ 11 (Figure 12-14). Modeled terrestrial cover and aestivation habitat contains all  
37 grassland types and alkali seasonal wetland with a minimum patch size of 100 acres and within a  
38 geographic area defined by species records and areas most likely to support the species. Patches of  
39 grassland that were below the 100-acre minimum patch size but were contiguous with grasslands  
40 outside of the study area boundary were included. Modeled aquatic breeding habitat for the  
41 California tiger salamander includes vernal pools and seasonal and perennial ponds.

1 Factors considered in assessing the value of affected habitat for California tiger salamander, to the  
2 extent that information is available, include presence of limiting habitat (aquatic breeding habitat),  
3 known occurrences and clusters of occurrences, proximity of the affected habitat to existing  
4 protected lands, and the overall degraded or fragmented nature of the habitat. While conservation  
5 measures implemented in other CZs could have potential effects on California tiger salamander,  
6 those activities in CZ 8 and CZ 11 are considered to have a proportionately larger effect due to their  
7 closer proximity to known occurrences of the species.

8 Alternative 9 is expected to result in the temporary, permanent, and periodic removal of upland  
9 habitat that California tiger salamander uses for cover and dispersal (Table 12-9-21). Potential  
10 aquatic habitat for this species would not be affected. While stock ponds are underrepresented as a  
11 modeled habitat, none is expected to be affected by BDCP actions. Full implementation of Alternative  
12 9 would also include the following biological objectives over the term of the BDCP to benefit the  
13 California tiger salamander (BDCP Chapter 3, *Conservation Strategy*).

- 14 ● Increase the size and connectivity of the reserve system by acquiring lands adjacent to and  
15 between existing conservation lands (Objective L1.6, associated with CM3).
- 16 ● Increase native species diversity and relative cover of native plant species, and reduce the  
17 introduction and proliferation of nonnative species (Objective L2.6, associated with CM11).
- 18 ● Protect and improve habitat linkages that allow terrestrial covered and other native species to  
19 move between protected habitats within and adjacent to the Plan Area (Objective L3.1,  
20 associated with CM3, CM8, and CM11).
- 21 ● Protect 150 acres of alkali seasonal wetland in CZ 1, CZ 8, and/or CZ 11 among a mosaic of  
22 protected grasslands and vernal pool complex (Objective ASWNC1.1, associated with CM3).
- 23 ● Provide appropriate seasonal flooding characteristics for supporting and sustaining alkali  
24 seasonal wetland species (Objective ASWNC2.1, associated with CM3 and CM11).
- 25 ● Increase burrow availability for burrow-dependent species in grasslands surrounding alkali  
26 seasonal wetlands within restored and protected alkali seasonal wetland complex (Objective  
27 ASWNC2.3, associated with CM11).
- 28 ● Protect 600 acres of existing vernal pool complex in CZ 1, CZ 8, and/or CZ 11, primarily in core  
29 vernal pool recovery areas identified in the *Recovery Plan for Vernal Pool Ecosystems of  
30 California and Southern Oregon* (U.S. Fish and Wildlife Service 2005) (Objective VPNC1.1,  
31 associated with CM3).
- 32 ● Restore vernal pool complex in CZ 1, CZ 8, and/or CZ 11 to achieve no net loss of vernal pool  
33 acreage (up to 67 acres of vernal pool complex restoration, assuming that all anticipated  
34 impacts [10 wetted acres] occur and that the restored vernal pool complex has 15% density of  
35 vernal pools) (Objective VPNC1.2, associated with CM3 and CM9).
- 36 ● Increase the size and connectivity of protected vernal pool complex within the Plan Area and  
37 increase connectivity with protected vernal pool complex adjacent to the Plan Area (Objective  
38 VPNC1.3, associated with CM3).
- 39 ● Protect the range of inundation characteristics that are currently represented by vernal pools  
40 throughout the Plan Area (Objective VPNC1.4, associated with CM3).
- 41 ● Protect 8,000 acres of grassland (Objective GNC1.1, associated with CM3).

- 1 • Restore 2,000 acres of grasslands to connect fragmented patches of protected (Objective  
2 GNC1.2, associated with CM3 and CM8).
- 3 • Protect stock ponds and other aquatic features within protected grasslands to provide aquatic  
4 breeding habitat for native amphibians and aquatic reptiles (Objective GNC1.3, associated with  
5 CM3).
- 6 • Increase burrow availability for burrow-dependent species (Objective GNC2.3, associated with  
7 CM11).
- 8 • Maintain and enhance aquatic features in grasslands to provide suitable inundation depth and  
9 duration and suitable composition of vegetative cover to support breeding for covered  
10 amphibian and aquatic reptile species (Objective GNC2.5, associated with CM11).

11 As explained below, with the restoration or protection of these amounts of habitat, in addition to the  
12 implementation of AMMs, impacts on California tiger salamander would not be adverse for NEPA  
13 purposes and would be less than significant for CEQA purposes.

14 **Table 12-9-21. Changes in California Tiger Salamander Modeled Habitat Associated with**  
15 **Alternative 9 (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	Aquatic	0	0	0	0	NA	NA
	Upland	0	0	0	0	NA	NA
<b>Total Impacts CM1</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>NA</b>	<b>NA</b>
CM2-CM18	Aquatic	0	0	0	0	0	0
	Upland	292	634	0	0	191-639	0
<b>Total Impacts CM2-CM18</b>		<b>292</b>	<b>634</b>	<b>0</b>	<b>0</b>	<b>191-639</b>	<b>0</b>
<b>TOTAL IMPACTS</b>		<b>292</b>	<b>634</b>	<b>0</b>	<b>0</b>	<b>191-639</b>	<b>0</b>

<sup>a</sup> See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

16

17 **Impact BIO-46: Loss or Conversion of Habitat for and Direct Mortality of California Tiger**  
18 **Salamander**

19 Alternative 9 conservation measures would result in the permanent loss of up to 634 acres of  
20 modeled upland habitat for California tiger salamander (Table 12-9-21). There are no California  
21 tiger salamander occurrences that overlap with the Plan footprint. Conservation measures that

1 would result in these losses are Fremont Weir/Yolo Bypass improvements (CM2), tidal habitat  
2 restoration (CM4), construction of recreational facilities, and construction of a conservation fish  
3 hatchery (CM18). Habitat enhancement and management activities (CM11), which include ground  
4 disturbance or removal of nonnative vegetation, could result in local adverse habitat effects. In  
5 addition, maintenance activities associated with the long-term operation of the water conveyance  
6 facilities and other BDCP physical facilities could degrade or eliminate California tiger salamander  
7 habitat. Each of these individual activities is described below. A summary statement of the combined  
8 impacts and NEPA effects and a CEQA conclusion follow the individual conservation measure  
9 discussions.

- 10 • *CM2 Yolo Bypass Fisheries Enhancement*: Improvements in the Yolo Bypass would result in the  
11 permanent removal of approximately 42 acres of terrestrial cover and aestivation habitat for the  
12 California tiger salamander in the late long-term. The modeled habitat in the Yolo Bypass is of  
13 low potential for California tiger salamander: There have been no observations of California  
14 tiger salamander in this area based on the results of a number of surveys for vernal pool  
15 invertebrates and plants, and the bypass lacks vernal pool complexes with large, deep pools or  
16 large grassland areas with stock ponds and similar aquatic features that hold water long enough  
17 to provide potential breeding habitat for this species.
- 18 • *CM4 Tidal Natural Communities Restoration*: This activity would result in the permanent  
19 removal of approximately 517 acres of terrestrial cover and aestivation habitat in the study area  
20 in the late long-term. Tidal restoration in the Cache Slough area would result in habitat loss  
21 along the edges of Lindsey Slough and Duck Slough, and adjacent to cultivated land along the  
22 eastern edge of a block of modeled habitat. The modeled aquatic breeding habitat nearby the  
23 hypothetical tidal restoration footprint is of relatively high value, consisting of vernal pool  
24 complex along Lindsey Slough within the Jepson Prairie area in and near open space. The Jepson  
25 Prairie area includes numerous California tiger salamander CNDDDB recorded occurrences and  
26 overlaps with Critical Habitat Unit 2, Jepson Prairie Unit, for this species. However, the  
27 hypothetical tidal restoration footprint does not overlap with critical habitat or recorded  
28 occurrences in this area. The tidal restoration at Lindsey Slough would occur along the  
29 northeastern edge of the Jepson Prairie block of habitat and would not contribute to  
30 fragmentation. Because the estimates of habitat loss resulting from tidal inundation are based  
31 on projections of where restoration may occur, actual effects are expected to be lower because  
32 of the ability to select sites that minimize effects on California tiger salamander.
- 33 • *CM11 Natural Communities Enhancement and Management*: Based on the recreation  
34 assumptions described in BDCP Chapter 3, Section 3.4.11, an estimated 40 acres of terrestrial  
35 cover and aestivation habitat for the California tiger salamander would be removed as a result of  
36 constructing trails and associated recreational facilities. Passive recreation in the reserve  
37 system could result in trampling and disturbance of eggs and larvae in water bodies,  
38 degradation of water quality through erosion and sedimentation, and trampling of sites adjacent  
39 to upland habitat used for cover and movement. However, *AMM37 Recreation* requires  
40 protection of water bodies from recreational activities and requires trail setbacks from  
41 wetlands. With these restrictions, recreation related effects on California tiger salamander are  
42 expected to be minimal.

43 Habitat enhancement- and management-related activities in protected California tiger  
44 salamander habitats would result in overall improvements to and maintenance of California  
45 tiger salamander habitat values over the term of the BDCP. At least 1,000 acres of grassland

1 habitat and some unknown acres of vernal pool complex habitat in CZ 8 are expected to benefit  
2 the California tiger salamander through protection of existing upland cover and dispersal  
3 habitat from potential loss or degradation that otherwise could happen with future changes in  
4 existing land use. Activities associated with natural communities enhancement and management  
5 over the term of the BDCP in protected California tiger salamander habitat, such as ground  
6 disturbance or herbicide use to control nonnative vegetation, could result in local adverse  
7 habitat effects and injury or mortality of California tiger salamander and disturbance effects if  
8 individuals are present in work sites. Implementation of AMM1–AMM6, AMM10, AMM13, and  
9 AMM37 would reduce these effects. Herbicides would only be used in California tiger  
10 salamander habitat in accordance with the written recommendation of a licensed, registered  
11 Pest Control Advisor and in conformance with label precautions and federal, state, and local  
12 regulations in a manner that avoids or minimizes harm to the California tiger salamander.

- 13 ● *CM18 Conservation Hatcheries*: This activity could result in the permanent removal of  
14 approximately 35 acres of terrestrial cover and aestivation habitat for California tiger  
15 salamander in the Yolo Bypass area (CZ 2). The specifications and operations of this facility have  
16 not been developed, although the facility is expected to be constructed near Rio Vista on  
17 cultivated lands in low-value habitat for the species.
- 18 ● *Critical habitat*: Approximately 1,781 acres of designated Critical Habitat Unit 2, Jepson Prairie  
19 Unit, for California tiger salamander overlap the study area in CZ 1. While this area is located  
20 within the Cache Slough Complex, it is not expected to be affected by BDCP tidal habitat  
21 restoration actions. Tidal habitat would be restored approximately 2 miles east of SR 113, with  
22 some restoration taking place along the Barker and Lindsey Slough channels west to  
23 approximately SR 113 and a small amount (0.4 acre) taking place along the Lindsey Slough  
24 Channel west of SR 113 into Critical Habitat Unit 2.
- 25 ● *Operations and maintenance*: Ongoing facilities operation and maintenance is expected to have  
26 little if any adverse effect on the California tiger salamander. Postconstruction operation and  
27 maintenance of the above-ground water conveyance facilities could result in ongoing but  
28 periodic disturbances that could affect California tiger salamander use of the surrounding  
29 habitat. Operation of maintenance equipment, including vehicle use along transmission  
30 corridors in CZ 8, could also result in injury or mortality of California tiger salamanders if  
31 present in work sites. These effects, however, would be minimized with implementation of the  
32 California tiger salamander measures described in AMM1–AMM6, AMM10, AMM13, and  
33 AMM37.
- 34 ● *Injury and direct mortality*: Construction activities associated with the water conveyance  
35 facilities, vernal pool complex restoration, and habitat and management enhancement-related  
36 activities, including operation of construction equipment, could result in injury or mortality of  
37 California tiger salamanders. Foraging, dispersal, and overwintering behavior may be altered  
38 during construction activities, resulting in injury or mortality of California tiger salamander if  
39 the species is present. Salamanders occupying burrows could be trapped and crushed during  
40 ground-disturbing activities. Degradation and loss of estivation habitat is also anticipated to  
41 result from the removal of vegetative cover and collapsing of burrows. Injury or mortality would  
42 be avoided and minimized through implementation of seasonal constraints and preconstruction  
43 surveys in suitable habitat, collapsing unoccupied burrows, and relocating salamanders outside  
44 of the construction area as described in AMM1–AMM6, AMM10, AMM13, and AMM37.

1 The following paragraphs summarize the combined effects discussed above and describe other  
2 BDCP conservation actions that offset or avoid these effects. NEPA effects and CEQA conclusions are  
3 also included.

#### 4 ***Near-Term Timeframe***

5 Because the water conveyance facilities construction is being evaluated at the project level, the near-  
6 term BDCP conservation strategy has been evaluated to determine whether it would provide  
7 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
8 construction effects would not be adverse under NEPA.

9 Alternative 9 would permanently remove approximately 292 acres of upland terrestrial cover  
10 habitat for California tiger salamander. There would be no effect on aquatic habitat. The effects  
11 would result from Yolo Bypass improvements (CM2, 42 acres), tidal habitat restoration (CM4, 203  
12 acres), construction of recreational facilities (CM11, 12 acres), and construction of conservation  
13 hatcheries (CM18, 35 acres).

14 The typical NEPA project-level mitigation ratio of 2:1 for protected grassland habitats would  
15 indicate that 584 acres of grassland should be protected in the near-term for California tiger  
16 salamander to mitigate the near-term losses.

17 The BDCP has committed to near-term restoration of up to 1,140 acres of upland habitat (Objective  
18 GNC1.2) and 40 acres of aquatic habitat and to protection of at least 520 acres of aquatic habitat  
19 (Objective ASWNC1.1 and Objective VPNC1.1) and 2,000 acres of upland habitat (Objective GNC1.1).  
20 The landscape-scale goals and objectives would inform the near-term protection and restoration  
21 efforts. The natural community restoration and protection activities are expected to be concluded  
22 during the first 10 years of plan implementation, which is close enough in time to the occurrence of  
23 impacts to constitute adequate mitigation for NEPA purposes.

24 In addition, the plan contains commitments to implement *AMM1 Worker Awareness Training, AMM2*  
25 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*  
26 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
27 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
28 *Material, AMM10 Restoration of Temporarily Affected Natural Communities, AMM13 California Tiger*  
29 *Salamander, and AMM37 Recreation. These AMMs include elements that avoid or minimize the risk*  
30 *of affecting habitats and species adjacent to work areas and storage sites. The AMMs are described*  
31 *in detail in BDCP Appendix 3.C, Avoidance and Minimization Measures.*

#### 32 ***Late Long-Term Timeframe***

33 Based on the habitat model, the study area supports approximately 8,273 acres of aquatic and  
34 29,459 acres of upland modeled habitat for California tiger salamander. Alternative 9 as a whole  
35 would result in the permanent loss of, and temporary effects on 634 acres of upland habitat for  
36 California tiger salamander for the term of the plan (less than 2% of the total upland habitat in the  
37 study area). The location of these losses is described above in the discussions of CM2, CM4, CM11,  
38 and CM18.

39 The BDCP has committed to long-term protection of 8,000 acres grassland in the Plan Area (Table 3-  
40 4 in Chapter 3, *Description of Alternatives*). Protection of at least 1,000 acres of grassland in CZ 8  
41 west of Byron Highway would benefit the California tiger salamander by providing habitat in the

1 portion of the study area with the highest long-term conservation value for the species based on  
2 known species occurrences and large, contiguous habitat areas (Objective GNC1.1). Consistent with  
3 Objective GNC1.3, ponds and other aquatic features in the grasslands would also be protected to  
4 provide aquatic habitat for this species, and the surrounding grassland would provide dispersal and  
5 aestivation habitat. Aquatic features in the protected grasslands in CZ 8 would be maintained and  
6 enhanced to provide suitable inundation depth and duration and suitable composition of vegetative  
7 cover to support breeding California tiger salamanders (Objective GNC2.5). Additionally, livestock  
8 exclusion from streams and ponds and other measures would be implemented as described in CM11  
9 to promote growth of aquatic vegetation with appropriate cover characteristics favorable to  
10 California tiger salamanders. Lands protected in CZ 8 would connect with lands protected under the  
11 *East Contra Costa County HCP/NCCP* and the extensive Los Vaqueros Watershed lands, including  
12 grassland areas supporting this species. This objective would ensure that California tiger  
13 salamander upland and associated aquatic habitats would be protected and enhanced in the largest  
14 possible patch sizes adjacent to occupied habitat within and adjacent to the Plan Area.

15 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*  
16 *Plant Species*) estimates that the restoration and protection actions discussed above, as well as the  
17 restoration of alkali seasonal wetland complex, vernal pool complex, and grassland that could  
18 overlap with the species model, would result in the restoration of 88 acres of aquatic and 598 acres  
19 of upland modeled habitat for California tiger salamander. In addition, protection of alkali seasonal  
20 wetland complex, vernal pool complex, and grassland that could overlap with the species model,  
21 would result in the protection of 750 acres of aquatic and 5,000 acres of upland California tiger  
22 salamander modeled habitat.

23 **NEPA Effects:** In the near-term, the loss of California tiger salamander habitat under Alternative 9  
24 would be not be adverse because the BDCP has committed to protecting the acreage required to  
25 meet the typical mitigation ratios described above. In the late long-term, the losses of California tiger  
26 salamander upland habitat associated with Alternative 9, in the absence of other conservation  
27 actions, would represent an adverse effect as a result of habitat modification of a special-status  
28 species and potential for direct mortality. However, with habitat protection and restoration  
29 associated with the conservation components, guided by landscape-scale goals and objectives and  
30 by AMM1-AMM6, AMM10, AMM13, and AMM37, the effects of Alternative 9 as a whole on California  
31 tiger salamander would not be adverse.

32 **CEQA Conclusion:**

33 **Near-Term Timeframe**

34 Because the water conveyance facilities construction is being evaluated at the project level, the near-  
35 term BDCP conservation strategy has been evaluated to determine whether it would provide  
36 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the impacts of  
37 construction would be less than significant.

38 Alternative 9 would permanently remove approximately 292 acres of upland terrestrial cover  
39 habitat for California tiger salamander. There would be no effect on aquatic habitat. The effects  
40 would result from Yolo Bypass improvements (CM2, 42 acres), tidal habitat restoration (CM4, 203  
41 acres), construction of recreational facilities (CM11, 12 acres), and construction of conservation  
42 hatcheries (CM18, 35 acres).

1 The typical CEQA project-level mitigation ratio of 2:1 for protected grassland habitats would  
2 indicate that 584 acres of grassland should be protected in the near-term for California tiger  
3 salamander to mitigate the near-term losses.

4 The BDCP has committed to near-term restoration of up to 1,140 acres of upland habitat (Objective  
5 GNC1.2) and 40 acres of aquatic habitat and to protection of at least 520 acres of aquatic habitat  
6 (Objective ASWNC1.1 and Objective VPNC1.1) and 2,000 acres of upland habitat (Objective GNC1.1).  
7 The landscape-scale goals and objectives would inform the near-term protection and restoration  
8 efforts. The natural community restoration and protection activities are expected to be concluded  
9 during the first 10 years of plan implementation, which is close enough in time to the occurrence of  
10 impacts to constitute adequate mitigation for CEQA purposes.

11 In addition, the plan contains commitments to implement AMM1–AMM6, AMM10, AMM13, and  
12 AMM37, which include elements that avoid or minimize the risk of affecting habitats and species  
13 adjacent to work areas and storage sites. BDCP Appendix 3.C describes the AMMs in detail. These  
14 commitments are more than sufficient to support the conclusion that the near-term impacts of  
15 Alternative 9 on California tiger salamander would be less than significant under CEQA, because the  
16 number of acres required to meet the typical ratios described above would be only 584 acres of  
17 upland communities protected.

#### 18 **Late Long-Term Timeframe**

19 Based on the habitat model, the study area supports approximately 8,273 acres of aquatic and  
20 29,459 acres of upland modeled habitat for California tiger salamander. Alternative 9 as a whole  
21 would result in the permanent loss of, and temporary effects on 634 acres of upland habitat for  
22 California tiger salamander for the term of the plan (less than 2% of the total upland habitat in the  
23 study area). The location of these losses is described above in the discussions of CM2, CM4, CM11,  
24 and CM18.

25 The BDCP has committed to long-term protection of 8,000 acres grassland in the Plan Area (Table 3-  
26 4 in Chapter 3, *Description of Alternatives*). Protection of at least 1,000 acres of grassland in CZ 8  
27 west of Byron Highway would benefit the California tiger salamander by providing habitat in the  
28 portion of the study area with the highest long-term conservation value for the species based on  
29 known species occurrences and large, contiguous habitat areas (Objective GNC1.1). Consistent with  
30 Objective GNC1.3, ponds and other aquatic features in the grasslands would also be protected to  
31 provide aquatic habitat for this species, and the surrounding grassland would provide dispersal and  
32 aestivation habitat. Aquatic features in the protected grasslands in CZ 8 would be maintained and  
33 enhanced to provide suitable inundation depth and duration and suitable composition of vegetative  
34 cover to support breeding California tiger salamanders (Objective GNC2.5). Additionally, livestock  
35 exclusion from streams and ponds and other measures would be implemented as described in CM11  
36 to promote growth of aquatic vegetation with appropriate cover characteristics favorable to  
37 California tiger salamanders. Lands protected in CZ 8 would connect with lands protected under the  
38 *East Contra Costa County HCP/NCCP* and the extensive Los Vaqueros Watershed lands, including  
39 grassland areas supporting this species. This objective would ensure that California tiger  
40 salamander upland and associated aquatic habitats would be protected and enhanced in the largest  
41 possible patch sizes adjacent to occupied habitat within and adjacent to the Plan Area.

42 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*  
43 *Plant Species*) estimates that the restoration and protection actions discussed above, as well as the

1 restoration of alkali seasonal wetland complex, vernal pool complex, and grassland that could  
2 overlap with the species model, would result in the restoration of 88 acres of aquatic and 598 acres  
3 of upland modeled habitat for California tiger salamander. In addition, protection of alkali seasonal  
4 wetland complex, vernal pool complex, and grassland that could overlap with the species model,  
5 would result in the protection of 750 acres of aquatic and 5,000 acres of upland California tiger  
6 salamander modeled habitat.

7 In the absence of other conservation actions, the losses of California tiger salamander upland habitat  
8 associated with Alternative 9 would represent an adverse effect as a result of habitat modification of  
9 a special-status species and potential for direct mortality. However, with habitat protection and  
10 restoration associated with the conservation components, guided by landscape-scale goals and  
11 objectives and by AMM1–AMM6, AMM10, AMM13, and AMM37, which would be in place throughout  
12 the construction phase, the impacts of Alternative 9 as a whole on California tiger salamander would  
13 not be significant under CEQA.

#### 14 **Impact BIO-47: Indirect Effects of Plan Implementation on California Tiger Salamander**

15 Indirect effects could occur outside of the construction footprint but within 500 feet of California  
16 tiger salamander habitat. Activities associated with conservation component construction and  
17 ongoing habitat enhancement, as well as operation and maintenance of above-ground water  
18 conveyance facilities, including the transmission facilities, could result in ongoing but periodic  
19 postconstruction disturbances with localized effects on California tiger salamander and its habitat,  
20 and temporary noise and visual disturbances over the term of the BDCP. Most of the areas indirectly  
21 affected are associated with the construction of Byron Forebay and its borrow and spoil areas in  
22 CZ 8.

23 Maintenance and refueling of heavy equipment could result in the inadvertent release of sediment  
24 and hazardous substances into species habitat. Increased sedimentation could reduce the suitability  
25 of California tiger salamander habitat downstream of the construction area by filling in pools and  
26 smothering eggs. Accidental spills of toxic fluids into the aquatic system could result in the  
27 subsequent loss of California tiger salamander habitat. Hydrocarbon and heavy metal pollutants  
28 associated with roadside runoff also have the potential to enter the aquatic system, affecting water  
29 quality and California tiger salamander.

30 **NEPA Effects:** Implementation of AMM1–AMM6, AMM10, AMM13, and AMM37 under Alternative 9  
31 would avoid or minimize the potential for substantial adverse effects on California tiger  
32 salamanders, either indirectly or through habitat modifications. These AMMs would also avoid and  
33 minimize effects that could substantially reduce the number of California tiger salamanders or  
34 restrict the species' range. Therefore, the indirect effects of Alternative 9 would not have an adverse  
35 effect on California tiger salamander.

36 **CEQA Conclusion:** Indirect effects from conservation measure operations and maintenance as well  
37 as construction-related noise and visual disturbances could impact California tiger salamander in  
38 aquatic and upland habitats. The use of mechanical equipment during construction could cause the  
39 accidental release of petroleum or other contaminants that could impact California tiger salamander  
40 or its prey. The inadvertent discharge of sediment or excessive dust adjacent to California tiger  
41 salamander habitat could also have a negative impact on the species or its prey. With  
42 implementation of AMM1–AMM6, AMM10, AMM13, and AMM37 as part of Alternative 9, the BDCP  
43 would avoid the potential for substantial adverse effects on California tiger salamander, either

1 indirectly or through habitat modifications, and would not result in a substantial reduction in  
2 numbers or a restriction in the range of California tiger salamanders. The indirect effects of  
3 Alternative 9 would have a less-than-significant impact on California tiger salamander.

4 **Impact BIO-48: Periodic Effects of Inundation of California Tiger Salamander Habitat as a**  
5 **Result of Implementation of Conservation Components**

6 *CM2 Yolo Bypass Fisheries Enhancement* is the only conservation measure expected to result in  
7 periodic inundation of California tiger salamander habitat. Periodic inundation of Yolo Bypass could  
8 affect from an estimated 191 acres of terrestrial habitat during a notch flow of 1,000 cfs, to an  
9 estimated 639 acres of terrestrial habitat during a notch flow of 4,000 cfs in CZ 1 (Table 12-9-21).  
10 This effect would only occur during an estimated maximum of 30% of years and in areas that are  
11 already inundated in more than half of all years; therefore, these areas are expected to provide only  
12 marginal terrestrial habitat for the California tiger salamander under existing conditions. No aquatic  
13 breeding habitat would be affected (Table 12-9-21). The modeled habitat in the Yolo Bypass in the  
14 vicinity of terrestrial habitat is of low value in that there are no California tiger salamander records  
15 in this area and the bypass lacks vernal pool complexes with large, deep pools, or large grassland  
16 areas with stock ponds and similar aquatic features that provide the habitat of highest value for this  
17 species. Therefore, the terrestrial habitat to be affected has a small likelihood of supporting  
18 California tiger salamanders, and Yolo Bypass operations are expected to have a minimal effect on  
19 the species, if any.

20 **NEPA Effects:** The effects of periodic inundation from Alternative 9 would not have an adverse effect  
21 on California tiger salamander.

22 **CEQA Conclusion:** Flooding of the Yolo Bypass from Fremont Weir operations would periodically  
23 increase the frequency and duration of inundation of 191–639 acres of terrestrial habitat for  
24 California tiger salamander. Because this area is considered low-value habitat and there are no  
25 California tiger salamander records in the area, and because of the lack of suitable breeding habitat  
26 in this area, the effects of periodic inundation of California tiger salamander habitat from  
27 Alternative 9 would have a less-than-significant impact.

28 **Giant Garter Snake**

29 This section describes the effects of Alternative 9, including water conveyance facilities construction  
30 and implementation of other conservation components, on the giant garter snake. The habitat model  
31 used to assess effects for the giant garter snake is based on aquatic habitat and upland habitat.  
32 Modeled aquatic habitat is composed of tidal perennial aquatic (except in Suisun Marsh), tidal  
33 freshwater perennial emergent wetland, nontidal freshwater emergent wetland, and nontidal  
34 perennial aquatic natural communities; rice fields; and artificial canals and ditches. Modeled upland  
35 habitat is composed of all nonwetland and nonaquatic natural communities within 200 feet of  
36 modeled aquatic habitat features (primarily grassland and cropland). The modeled upland habitat is  
37 ranked as high-, moderate-, or low-value based on giant garter snake associations between  
38 vegetation and cover types (U.S. Fish and Wildlife Service 2012) and historical and recent  
39 occurrence records (Hansen pers. comm. in Appendix 12C, *2009 to 2011 Bay Delta Conservation Plan*  
40 *EIR/EIS Environmental Data Report*), and presence of features necessary to fulfill the species' life  
41 cycle requirements. Modeled habitat is expressed in acres for aquatic and upland habitats, and in  
42 miles for linear movement corridors in aquatic habitat. Other factors considered in assessing the  
43 value of affected habitat for the giant garter snake, to the extent that information is available, are

1 proximity to conserved lands and recorded occurrences of the species, proximity to giant garter  
2 snake subpopulations (Yolo Basin/Willow Slough and Coldani Marsh-White Slough) in the study  
3 area that are identified in the draft recovery plan for this species (U.S. Fish and Wildlife Service  
4 1999b), and contribution to connectivity between giant garter snake subpopulations.

5 Construction and restoration associated with Alternative 9 conservation measures would result in  
6 both temporary and permanent losses of giant garter snake modeled habitat as indicated in Table  
7 12-9-22. The majority of the losses would take place over an extended period of time as tidal marsh  
8 is restored in the study area. Full implementation of Alternative 9 would also include the following  
9 biological objectives over the term of the BDCP to benefit the giant garter snake (BDCP Chapter 3,  
10 *Conservation Strategy*).

- 11 • Increase native species diversity and relative cover of native plant species, and reduce the  
12 introduction and proliferation of nonnative species (Objective L2.6, associated with CM11).
- 13 • Within the 65,000 acres of tidal natural communities (L1.3), restore or create 24,000 acres of  
14 tidal freshwater emergent wetland in CZ 1, CZ 2, CZ 4, CZ 5, CZ 6, and/or CZ 7 (Objective  
15 TFEWNC1.1, associated with CM3 and CM4).
- 16 • Create at least 1,200 acres of nontidal marsh consisting of a mosaic of nontidal perennial aquatic  
17 and nontidal freshwater emergent wetland natural communities, with suitable habitat  
18 characteristics for giant garter snake and western pond turtle (Objective NFEW/NPANC1.1,  
19 associated with CM3 and CM10).
- 20 • Protect 48,625 acres of cultivated lands that provide suitable habitat for covered and other  
21 native wildlife species (Objective CLNC1.1, associated with CM3 and CM11).
- 22 • Target cultivated land conservation to provide connectivity between other conservation lands  
23 (Objective CLNC1.2, associated with CM3).
- 24 • Maintain and protect the small patches of important wildlife habitats associated with cultivated  
25 lands that occur in cultivated lands within the reserve system, including isolated valley oak  
26 trees, trees and shrubs along field borders and roadsides, remnant groves, riparian corridors,  
27 water conveyance channels, grasslands, ponds, and wetlands (Objective CLNC1.3, associated  
28 with CM3 and CM11).
- 29 • Of the at least 1,200 acres of nontidal marsh created under (Objective NFEW/NPANC1.1), create  
30 600 acres of aquatic habitat giant garter snake aquatic habitat that is connected to the 1,500  
31 acres of rice land or equivalent-value habitat described below in Objective GGS1.4 (Objective  
32 GGS1.1, associated with CM3, CM4, and CM10).
- 33 • Of the 8,000 acres of grassland protected under Objective GNC1.1 and 2,000 acres restored  
34 under Objective GNC1.2, create or protect 200 acres of high-value upland giant garter snake  
35 habitat adjacent to the at least 600 acres of nontidal perennial habitat being restored and/or  
36 created in CZ 4 and/or CZ 5 (Objective GGS1.2, associated with CM3 and CM8).
- 37 • Protect giant garter snakes on restored and protected nontidal marsh and adjacent uplands  
38 (Objectives GGS1.1 and GGS1.2) from incidental injury or mortality by establishing 200-foot  
39 buffers between protected giant garter snake habitat and roads (other than those roads  
40 primarily used to support adjacent cultivated lands and levees). Establish giant garter snake  
41 reserves at least 2,500 feet from urban areas or areas zoned for urban development (Objective  
42 GGS1.3, associated with CM3).

- 1       • Create connections from the White Slough population to other areas in the giant garter snake’s  
2       historical range in the Stone Lakes vicinity by protecting, restoring, and/or creating at least  
3       1,500 acres of rice land or equivalent-value habitat (e.g., perennial wetland) for the giant garter  
4       snake in CZ 4 and/or CZ 5. Any portion of the 1,500 acres may consist of tidal freshwater  
5       emergent wetland and may overlap with the 24,000 acres of tidally restored freshwater  
6       emergent wetland if it meets specific giant garter snake habitat criteria described in CM4. Up to  
7       500 (33%) of the 1,500 acres may consist of suitable uplands adjacent to protected or restored  
8       aquatic habitat (Objective GGS1.4, associated with CM3 and CM4).
- 9       • Of the at least 1,200 acres of nontidal marsh created under Objective NFEW/NPANC1.1, create  
10       600 acres of connected aquatic giant garter snake habitat outside the Yolo Bypass in CZ 2  
11       (Objective GGS2.1, associated with CM3 and CM10).
- 12       • Of the 8,000 acres of grasslands protected under Objective GNC1.1 and the 2,000 acres restored  
13       under Objective GNC1.2, create or protect 200 acres of high-value upland habitat adjacent to the  
14       600 acres of nontidal marsh created in CZ 2 outside of Yolo Bypass (GGS2.1) (Objective GGS2.2,  
15       associated with CM3 and CM8).
- 16       • To expand upon and buffer the newly restored/created nontidal perennial habitat in CZ 2,  
17       protect 700 acres of cultivated lands, with 500 acres consisting of rice land and the remainder  
18       consisting of compatible cultivated land that can support giant garter snakes. The cultivated  
19       lands may be a subset of lands protected for the cultivated lands natural community and other  
20       covered species (Objective GGS2.3, associated with CM3).
- 21       • Protect giant garter snakes on created nontidal marsh (Objective GGS2.1) and created or  
22       protected adjacent uplands (Objective GGS2.2) from incidental injury or mortality by  
23       establishing 200-foot buffers between protected giant garter snake habitat and roads, and  
24       establishing giant garter snake reserves at least 2,500 feet from urban areas or areas zoned for  
25       urban development (Objective GGS2.4, associated with CM3).
- 26       • Protect, restore, and/or create 2,740 acres of rice land or equivalent-value habitat (e.g.,  
27       perennial wetland) for the giant garter snake in CZ 1, CZ 2, CZ 4, or CZ 5. Up to 500 acres may  
28       consist of tidal freshwater emergent wetland and may overlap with the at least 5,000 acres of  
29       tidally restored freshwater emergent wetland in the Cache Slough ROA if this portion meets  
30       giant garter snake habitat criteria specified in CM4. Up to 1,700 acres may consist of rice fields  
31       in the Yolo Bypass if this portion meets the criteria specified in CM3, *Reserve Design*  
32       *Requirements by Species*. Any remaining acreage would consist of rice land or equivalent-value  
33       habitat outside the Yolo Bypass. Up to 915 (33%) of the 2,740 acres may consist of suitable  
34       uplands adjacent to protected or restored aquatic habitat (Objective GGS3.1, associated with  
35       CM3, CM4, and CM10).

36       As explained below, with the restoration or protection of these amounts of habitat, in addition to the  
37       implementation of AMMs, impacts on giant garter snake would not be adverse for NEPA purposes  
38       and would be less than significant for CEQA purposes.

39

1 **Table 12-9-22. Changes in Giant Garter Snake Modeled Habitat Associated with Alternative 9<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type <sup>c</sup>	Permanent		Temporary		Periodic <sup>e</sup>	
		NT	LLT <sup>d</sup>	NT	LLT <sup>d</sup>	CM2	CM5
CM1	Aquatic (acres)	210	210	266	266	NA	NA
	Upland (acres)	154	154	627	627	NA	NA
	Aquatic (miles)	20	20	20	20	NA	NA
<b>Total Impacts CM1 (acres)</b>		<b>364</b>	<b>364</b>	<b>893</b>	<b>893</b>	<b>NA</b>	<b>NA</b>
CM2–CM18	Aquatic (acres)	179	498	15	38	NA	NA
	Upland (acres)	1,467	2,443	219	261	582–1,402	331
	Aquatic (miles)	49	189	9	10	NA	NA
<b>Total Impacts CM2–CM18 (acres)</b>		<b>1,646</b>	<b>2,941</b>	<b>234</b>	<b>299</b>	<b>582–1,402</b>	<b>331</b>
<b>TOTAL IMPACTS CM1–CM18 (acres)</b>		<b>2,010</b>	<b>3,305</b>	<b>1,127</b>	<b>1,192</b>	<b>582–1,402</b>	<b>331</b>

- <sup>a</sup> See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.
- <sup>b</sup> See discussion below for a description of applicable CMs.
- <sup>c</sup> Aquatic acres represent tidal and nontidal habitat combined, and upland acres represent low-, moderate-, and high-value acreages combined.
- <sup>d</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.
- <sup>e</sup> Periodic effects were estimated for the late long-term only. CM2 periodic impacts on upland habitats only are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.
- NT = near-term  
LLT = late long-term  
NA = not applicable

2

3 **Impact BIO-49: Loss or Conversion of Habitat for and Direct Mortality of Giant Garter Snake**

4 Alternative 9 conservation measures would result in the permanent and temporary loss combined  
 5 of up to 1,012 acres of modeled aquatic habitat (tidal and nontidal combined), up to 3,485 acres of  
 6 modeled upland habitat, and up to 239 miles of channels providing aquatic movement habitat for  
 7 the giant garter snake (Table 12-9-22). There is one giant garter snake occurrence that overlaps  
 8 with the Plan footprint. Conservation measures that would result in these losses are conveyance  
 9 facilities and transmission line construction, and establishment and use of borrow and spoil areas  
 10 (CM1), Fremont Weir/Yolo Bypass improvements (CM2), tidal habitat restoration (CM4), floodplain  
 11 restoration (CM5), and construction of a conservation fish hatchery (CM18). Habitat enhancement  
 12 and management activities (CM11), which include ground disturbance or removal of nonnative  
 13 vegetation, could result in local adverse habitat effects. In addition, maintenance activities  
 14 associated with the long-term operation of the water conveyance facilities and other BDCP physical  
 15 facilities could degrade or eliminate giant garter snake habitat. Each of these individual activities is  
 16 described below. A summary statement of the combined impacts and NEPA effects and a CEQA  
 17 conclusion follow the individual conservation measure discussions.

- 1       ● *CM1 Water Facilities and Operation*: Construction of Alternative 9 conveyance facilities would  
2 result in the permanent loss of approximately 364 acres of modeled giant garter snake habitat,  
3 composed of 210 acres of aquatic habitat and 154 acres of upland habitat (Table 12-9-22). The  
4 364 acres of upland habitat that would be removed for the construction of the conveyance  
5 facilities consists of 23 acres of high-, 96 acres of moderate-, and 35 acres of low-value habitat.  
6 In addition, approximately 20 miles of channels providing giant garter snake movement habitat  
7 would be removed as a result of conveyance facilities construction. Development of the water  
8 conveyance facilities would also result in the temporary removal of up to 266 acres of giant  
9 garter snake aquatic habitat and up to 627 acres of adjacent upland habitat in areas near  
10 construction in CZ 5 and CZ 6 (see Table 12-9-22 and Terrestrial Biology Map Book). In addition,  
11 approximately 20 miles of channels providing giant garter snake movement habitat would be  
12 temporarily removed as a result of conveyance facilities construction.

13 Most of the habitat that would be lost is located in the central Delta, in CZ 6, and CZ 8 south of  
14 Bacon Island. Refer to the Terrestrial Biology Map Book for a detailed view of Alternative 9  
15 construction locations. Water facilities construction and operation is expected to have low to  
16 moderate potential for adverse effects on giant garter snake aquatic habitat on Mandeville  
17 Island because it is not located near or between subpopulations identified in the draft recovery  
18 plan. However, giant garter snake occurrences were reported in 1992 in the vicinity of Snodgrass  
19 Slough just northeast of Locke in CZ 5 and in 1996 on the north side of Columbia Cut on the  
20 south side of Medford Island in CZ 6. There would be no effect from construction of CM1 near  
21 the CZ 6 occurrence. However, there would be both permanent (channel enlargement and  
22 connections) and temporary impacts on modeled giant garter snake habitat in Meadow Slough  
23 which is hydrologically connected to Snodgrass Slough and is less than 0.4 miles away from the  
24 giant garter snake occurrence.

- 25       ● *CM2 Yolo Bypass Fisheries Enhancement*: Construction activity associated with fisheries  
26 improvements in the Yolo Bypass would result in the permanent and temporary removal of  
27 approximately 83 acres of aquatic habitat and 458 acres of upland habitat for the giant garter  
28 snake in the late long-term. The upland habitat that would be removed is composed of 336 acres  
29 of high-value, 121 acres of moderate-value, and 1 acre of low-value habitat. Approximately 14  
30 miles (less than 1% of total miles in Plan Area) of channels providing giant garter snake habitat  
31 for movements would be removed as a result of Fremont Weir/Yolo Bypass Improvements.  
32 Most of this habitat removal would occur at the north end of the Yolo Bypass, near Fremont  
33 Weir. Construction is expected to have adverse effects on giant garter snake aquatic habitat in  
34 the Yolo Bypass area because it is near the Yolo Basin/Willow Slough subpopulation.

35 In addition to habitat loss from construction related activities in Yolo Bypass, late season  
36 flooding in the bypass may result in loss of rice habitat (considered aquatic habitat for giant  
37 garter snake) by precluding the preparation and planting of rice fields. The methods for  
38 estimating loss of rice in the bypass and results are provided in BDCP Appendix 5.J, Attachment  
39 5J.E, *Estimation of BDCP Impact on Giant Garter Snake Summer Foraging Habitat in the Yolo*  
40 *Bypass*. This analysis concludes that the estimated loss of rice is 1,662 acres which was  
41 considered to occur late long-term.

- 42       ● *CM4 Tidal Natural Communities Restoration*: Tidal natural communities restoration would result  
43 in the permanent loss of approximately 395 acres of aquatic habitat and 2,123 acres of upland  
44 habitat for the giant garter snake to tidal marsh in the late long-term. The upland habitat  
45 affected by tidal inundation includes 594 acres of high-value, 1,375 acres of moderate-value, and

1 154 acres of low-value habitat. In addition, approximately 138 miles of channels providing giant  
2 garter snake movement habitat would be removed as a result of tidal natural communities  
3 restoration. Most of the effects of tidal natural communities restoration would occur in the  
4 Cache Slough and Yolo Bypass areas (CZ 1 and CZ 2). This aquatic habitat is of low to moderate  
5 value: it is in and near Category 1 open space but is not near any giant garter snake occurrences  
6 and is not near or between giant garter snake subpopulations identified in the draft recovery  
7 plan. Tidal natural communities restoration is expected to have little to no adverse effects on  
8 giant garter snake aquatic or upland habitat in the Cache Slough ROA. There are no giant garter  
9 snake occurrences in this area, which is already tidally influenced so it has limited value for the  
10 giant garter snake (giant garter snakes may occur in tidally muted areas but are not likely to use  
11 aquatic areas with a strong tidal influence).

- 12 ● *CM5 Seasonally Inundated Floodplain Restoration*: Levee construction associated with floodplain  
13 restoration in the south Delta (CZ 7) would result in the permanent and temporary removal of  
14 approximately 60 acres of aquatic habitat and 89 acres of upland habitat for giant garter snake.  
15 The upland habitat to be removed is composed of 51 acres of moderate-value and 38 acres of  
16 low-value upland habitat. Approximately 2 miles of channels providing giant garter snake  
17 movement habitat would be removed as a result of floodplain restoration. Seasonally inundated  
18 floodplain restoration is expected to have little to no adverse effects on giant garter snake  
19 aquatic habitat because the site is not located near or between giant garter snake  
20 subpopulations identified in the draft recovery plan. As with CM4, the estimates of the effect of  
21 seasonal floodplain levee construction and inundation are based on projections of where  
22 restoration may occur. Actual effects are expected to be lower because sites would be selected to  
23 minimize effects on giant garter snake habitat.
- 24 ● *CM11 Natural Communities Enhancement and Management*: Passive recreation in the reserve  
25 system could result in human disturbance of giant garter snakes basking in upland areas and  
26 compaction of upland burrow sites used for brumation. However, *AMM37 Recreation* requires  
27 setbacks for trails in giant garter snake habitat. With this measure in place, recreation-related  
28 effects on giant garter snake are expected to be minimal.

29 A variety of habitat management actions included in CM11 that are designed to enhance wildlife  
30 values in BDCP-protected habitats may result in localized ground disturbances that could  
31 temporarily remove small amounts of giant garter snake habitat. Ground-disturbing activities,  
32 such as removal of nonnative vegetation and road and other infrastructure maintenance, are  
33 expected to have minor effects on available giant garter snake habitat and are expected to result  
34 in overall improvements to and maintenance of giant garter snake habitat values over the term  
35 of the BDCP. These effects cannot be quantified, but are expected to be minimal and would be  
36 avoided and minimized by the AMMs listed below.

- 37 ● *CM18 Conservation Hatcheries*: Construction for conservation hatcheries could result in the  
38 permanent removal of 35 acres of moderate-value upland habitat for the giant garter snake in  
39 the Yolo Bypass area (CZ 2).
- 40 ● *Operations and maintenance*: Postconstruction operation and maintenance of the above-ground  
41 water conveyance facilities and restoration infrastructure could result in ongoing but periodic  
42 disturbances that could affect giant garter snake use of the surrounding habitat in the Yolo  
43 Bypass, the Cache Slough area, and the north and south Delta (CZ 1, CZ 2, CZ 4, CZ 5, CZ 6, CZ 7,  
44 and CZ 8). Maintenance activities would include vegetation management, levee and structure

1 repair, and regrading of roads and permanent work areas. These effects, however, would be  
2 reduced by AMMs and conservation actions as described below.

- 3 • Injury and direct mortality: Construction vehicle activity may cause injury or mortality of the  
4 giant garter snake. If snakes reside where activities take place (most likely in the vicinity of the  
5 two subpopulations: Yolo Basin/Willow Slough [CZ 2] and the Coldani Marsh-White Slough [CZ  
6 4 and CZ 5]), the operation of equipment for land clearing, construction, conveyance facilities  
7 operation and maintenance, and habitat restoration, enhancement, and management could  
8 result in injury or mortality of giant garter snakes. This risk is highest from late fall through  
9 early spring, when the snakes are dormant. Increased vehicular traffic associated with BDCP  
10 actions could contribute to a higher incidence of road kill. However, preconstruction surveys  
11 would be implemented after the project planning phase and prior to any ground-disturbing  
12 activity. Any disturbance to suitable aquatic and upland sites in or near the project footprint  
13 would be avoided to the extent feasible, and the loss of aquatic habitat and grassland vegetation  
14 would be minimized through adjustments to project design, as practicable. Construction  
15 monitoring, and other measures would be implemented to avoid and minimize injury or  
16 mortality of this species during construction, as described in *AMM16 Giant Garter Snake*.

17 The following paragraphs summarize the combined effects discussed above and describe other  
18 BDCP conservation actions that offset or avoid these effects. NEPA effects and a CEQA conclusion are  
19 also included.

#### 20 ***Near-Term Timeframe***

21 Because the water conveyance facilities construction is being evaluated at the project level, the near-  
22 term BDCP conservation strategy has been evaluated to determine whether it would provide  
23 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the effects of  
24 construction would not be adverse under NEPA.

25 Alternative 9 would permanently and temporarily remove 670 acres of aquatic habitat and 2,467  
26 acres of upland habitat for giant garter snake in the study area during the near-term. These effects  
27 would result from the construction of the water conveyance facilities (CM1, 476 acres of aquatic and  
28 781 acres of upland habitat), Yolo Bypass fisheries improvements (CM2, 83 acres of aquatic and 458  
29 acres of upland habitat), from tidal restoration (CM4, 111 acres of aquatic and 1,193 acres of upland  
30 habitat), and conservation hatcheries (CM18, 35 acres of upland habitat). The aquatic habitat losses  
31 would occur in tidal and nontidal wetland natural communities and rice fields. The upland habitat  
32 losses would occur in cropland and grassland communities. In addition, approximately 98 miles of  
33 irrigation and drainage channels providing giant garter snake movement habitat would be removed.  
34 The habitat model likely overestimates the relative value of irrigation and drainage canals in the  
35 vicinity of White Slough and south due to its proximity to records that likely represent single  
36 displaced snakes, not viable populations.

37 Typical NEPA project-level mitigation ratios for those natural communities that would be affected  
38 and that are identified in the biological goals and objectives for giant garter snake in Chapter 3 of the  
39 BDCP would be 1:1 for restoration and 1:1 for protection of aquatic habitats and 2:1 for protection  
40 of upland habitats. Using these ratios would indicate that 670 acres of aquatic habitat should be  
41 restored, 670 acres of aquatic habitat should be protected, and 4,934 acres of upland habitat should  
42 be protected for giant garter snake to mitigate the near-term losses.

1 The BDCP has committed to near-term restoration of up to 8,100 acres of aquatic habitat and up to  
2 1,140 acres of upland habitat, and to protection of at least 16,900 acres of upland habitat. Lands to  
3 be protected and restored in the near-term specifically for the giant garter snake total 3,900 acres  
4 (400 acres nontidal marsh, 400 acres of grassland, 700 acres of cultivated lands including at least  
5 500 acres of rice in CZ 2, and acres of rice or habitat of equivalent value in CZ 2, CZ 4, and CZ 5.  
6 Additionally, 2,400 acres of rice or habitat equivalent (1,500 acres under Objective GGS1.4 and 900  
7 acres under Objective GGS3.1) would be restored or protected to create connections from the  
8 Coldani Marsh/White Slough population to other areas in the giant garter snake historical range.  
9 Additionally, 900 of the 2,400 acres of rice land or habitat of equivalent value would be protected  
10 and restored for the giant garter snake to achieve a 1:1 ratio of habitat conserved to habitat affected  
11 (habitat affected includes uplands periodically flooded and rice lost due to late season flooding in  
12 Yolo Bypass as a result of CM2) (Objective GGS3.1). An unknown number of irrigation and drainage  
13 ditches located in cultivated lands and suitable for giant garter snake movement would be  
14 maintained and protected within the reserve system, which would include isolated valley oak trees,  
15 trees and shrubs along field borders and roadsides, remnant groves, riparian corridors, water  
16 conveyance channels, grasslands, ponds, and wetlands (Objective CLNC1.3).

17 These habitat protection and restoration measures would benefit the giant garter snake and the  
18 plan's species-specific biological goals and objectives would inform the near-term protection and  
19 restoration efforts. Protecting and expanding existing giant garter snake subpopulations, and  
20 providing connectivity between protected areas, is considered the most effective approach to giant  
21 garter snake conservation in the Plan Area. The Coldani Marsh/White Slough and Yolo Basin/Willow  
22 Slough subpopulations are the only known populations of giant garter snakes in the Plan Area and  
23 are identified as important for the recovery of the species in the draft recovery plan for the species  
24 (U.S. Fish and Wildlife Service 1999b). Implementation actions that target giant garter snake habitat  
25 would focus on these two important subpopulations.

26 The species-specific biological goals and objectives would inform the near-term protection and  
27 restoration efforts. The natural community restoration and protection activities are expected to be  
28 concluded during the first 10 years of Plan implementation, which is close enough in time to the  
29 occurrence of impacts to constitute adequate mitigation for NEPA purposes. These commitments are  
30 more than sufficient to support the conclusion that the near-term effects of Alternative 9 would be  
31 not be adverse under NEPA, because the number of acres required to meet the typical ratios  
32 described above would be only 670 acres of aquatic communities restored, 670 acres of aquatic  
33 communities protected, and 4,934 acres of upland communities protected.

34 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
35 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
36 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
37 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
38 *Material*, *AMM7 Barge Operations Plan*, *AMM10 Restoration of Temporarily Affected Natural*  
39 *Communities*, *AMM16 Giant Garter Snake*, and *AMM37 Recreation*. All of these AMMs include  
40 elements that avoid or minimize the risk of BDCP activities affecting habitats and species adjacent to  
41 work areas and storage sites. The AMMs are described in detail in BDCP Appendix 3.C, *Avoidance*  
42 *and Minimization Measures*.

1 **Late Long-Term Timeframe**

2 Based on modeled habitat, the study area supports approximately 31,281 acres of aquatic and  
3 53,285 acres of upland habitat for giant garter snake. Alternative 9 as a whole would result in the  
4 permanent loss of and temporary effects on 1,012 acres of aquatic habitat and 3,485 acres of upland  
5 habitat for giant garter snake during the term of the plan (3% of the total aquatic habitat and 6% of  
6 the total upland habitat in the study area). The locations of these losses are described above in the  
7 analyses of individual conservation measures.

8 The BDCP has committed to protecting 8,000 acres of grassland and 48,625 acres of cultivated lands  
9 in the study area, and restoring 25,100 acres tidal and nontidal wetlands and 2,000 acres of  
10 grasslands in the study area. Lands to be protected and restored specifically for the giant garter  
11 snake total 6,540 acres (1,200 acres nontidal marsh, 400 acres of grassland, 700 acres of cultivated  
12 lands including at least 500 acres of rice in CZ 2, and acres of rice or habitat of equivalent value in CZ  
13 2, CZ 4, and CZ 5. Additionally, 4,240 acres of rice or habitat equivalent (1,500 acres under Objective  
14 GGS1.4 and 2,740 acres under Objective GGS3.1) would be restored or protected to create  
15 connections from the Coldani Marsh/White Slough population to other areas in the giant garter  
16 snake historical range. Additionally, the 2,740 acres of rice land or habitat of equivalent value would  
17 be protected and restored for the giant garter snake under Objective GGS3.1 to achieve a 1:1 ratio of  
18 habitat conserved to habitat affected (habitat affected includes uplands periodically flooded and rice  
19 lost due to late season flooding in Yolo Bypass as a result of CM2). In addition to the 6,540 acres of  
20 high-value habitat targeted specifically for giant garter snake, the protection and restoration of  
21 other natural communities is expected to provide additional restoration of 4,430 acres and  
22 protection of 3,733 acres of garter snake habitat.

23 Protection and management of cultivated lands (CM3 and CM11) would also benefit the giant garter  
24 snake by providing connectivity and maintaining irrigation and drainage channels that provide  
25 aquatic habitat for the snake. Assuming the length of canals and ditches providing giant garter snake  
26 movement habitat on the protected cultivated lands is proportional to the modeled habitat on  
27 cultivated lands in the Plan Area, the 48,625 acres of protected cultivated lands would support  
28 approximately 281 miles of movement habitat for the giant garter snake (2,784 miles multiplied by  
29 0.101 [48,625 acres protected of 481,909 acres in Plan Area]).

30 Giant garter snake habitat would be restored and protected specifically, to conserve and expand the  
31 Coldani Marsh/White Slough and Yolo Basin/Willow Slough subpopulations of the giant garter  
32 snake. Protecting and expanding existing giant garter snake subpopulations, and providing  
33 connectivity between protected areas, is considered the most effective approach to giant garter  
34 snake conservation in the Plan Area. The Coldani Marsh/White Slough and Yolo Basin/Willow  
35 Slough subpopulations are the only known subpopulations of giant garter snakes in the Plan Area  
36 and are identified as important for the recovery of the species in the draft recovery plan for the  
37 species (U.S. Fish and Wildlife Service 1999b). Implementation actions that target giant garter snake  
38 habitat would focus on these two important subpopulations.

39 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*  
40 *Plant Species*) estimates that the restoration and protection actions discussed above, as well as the  
41 restoration of managed wetland, nontidal freshwater perennial emergent wetland, nontidal  
42 perennial aquatic, tidal freshwater emergent wetland, alkali seasonal wetland, grassland, and vernal  
43 pool complex that could overlap with the species model, would result in the restoration of 3,450  
44 acres of aquatic and 980 acres of upland modeled habitat for giant garter snake. In addition,

1 protection of cultivated land, grassland, alkali seasonal wetland, and vernal pool complex could  
2 overlap with the species model and would result in the protection of 1,547 acres of aquatic and  
3 2,185 acres of upland giant garter snake modeled habitat.

4 **NEPA Effects:** In the near-term, the loss of giant garter snake habitat under Alternative 9 would not  
5 be adverse because the BDCP has committed to protecting and restoring the acreage required to  
6 meet the typical mitigation ratios described above. In the late long-term, the losses of giant garter  
7 snake associated with Alternative 9, in the absence of other conservation actions, would represent  
8 an adverse effect as a result of habitat modification of a special-status species and potential for  
9 direct mortality. However, with habitat protection and restoration associated with the conservation  
10 components, guided by landscape-scale goals and objectives and AMM1–AMM7, AMM10, AMM16,  
11 and AMM37, the effects of Alternative 9 as a whole on giant garter snake would not be adverse.

12 **CEQA Conclusion:**

13 **Near-Term Timeframe**

14 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
15 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
16 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
17 effects of construction would be less than significant under CEQA.

18 Alternative 9 would permanently and temporarily remove 670 acres of aquatic habitat and 2,467  
19 acres of upland habitat for giant garter snake in the study area during the near-term. These effects  
20 would result from the construction of the water conveyance facilities (CM1, 476 acres of aquatic and  
21 781 acres of upland habitat), Yolo Bypass fisheries improvements (CM2, 83 acres of aquatic and 458  
22 acres of upland habitat), from tidal restoration (CM4, 111 acres of aquatic and 1,193 acres of upland  
23 habitat), and conservation hatcheries (CM18, 35 acres of upland habitat). The aquatic habitat losses  
24 would occur in tidal and nontidal wetland natural communities and rice fields. The upland habitat  
25 losses would occur in cropland and grassland communities. In addition, approximately 98 miles of  
26 irrigation and drainage channels providing giant garter snake movement habitat would be removed.  
27 The habitat model likely overestimates the relative value of irrigation and drainage canals in the  
28 vicinity of White Slough and south due to its proximity to records that likely represent single  
29 displaced snakes, not viable populations.

30 Typical CEQA project-level mitigation ratios for those natural communities that would be affected  
31 and that are identified in the biological goals and objectives for giant garter snake in Chapter 3 of the  
32 BDCP would be 1:1 for restoration and 1:1 for protection of aquatic habitats and 2:1 for protection  
33 of upland habitats. Using these ratios would indicate that 670 acres of aquatic habitat should be  
34 restored, 670 acres of aquatic habitat should be protected, and 4,934 acres of upland habitat should  
35 be protected for giant garter snake to mitigate the near-term losses.

36 The BDCP has committed to near-term restoration of up to 8,100 acres of aquatic habitat and up to  
37 1,140 acres of upland habitat, and to protection of at least 16,900 acres of upland habitat. Lands to  
38 be protected and restored in the near-term specifically for the giant garter snake total 3,900 acres  
39 (400 acres nontidal marsh, 400 acres of grassland, 700 acres of cultivated lands including at least  
40 500 acres of rice in CZ 2, and acres of rice or habitat of equivalent value in CZ 2, CZ 4, and CZ 5.  
41 Additionally, 2,400 acres of rice or habitat equivalent (1,500 acres under Objective GGS1.4 and 900  
42 acres under Objective GGS3.1) would be restored or protected to create connections from the  
43 Coldani Marsh/White Slough population to other areas in the giant garter snake historical range.

1 Additionally, 900 of the 2,400 acres of rice land or habitat of equivalent value would be protected  
2 and restored for the giant garter snake to achieve a 1:1 ratio of habitat conserved to habitat affected  
3 (habitat affected includes uplands periodically flooded and rice lost due to late season flooding in  
4 Yolo Bypass as a result of CM2) (Objective GGS3.1). An unknown number of irrigation and drainage  
5 ditches located in cultivated lands and suitable for giant garter snake movement would be  
6 maintained and protected within the reserve system, which would include isolated valley oak trees,  
7 trees and shrubs along field borders and roadsides, remnant groves, riparian corridors, water  
8 conveyance channels, grasslands, ponds, and wetlands (Objective CLNC1.3).

9 These habitat protection and restoration measures would benefit the giant garter snake and the  
10 plan's species-specific biological goals and objectives would inform the near-term protection and  
11 restoration efforts. Protecting and expanding existing giant garter snake subpopulations, and  
12 providing connectivity between protected areas, is considered the most effective approach to giant  
13 garter snake conservation in the Plan Area. The Coldani Marsh/White Slough and Yolo Basin/Willow  
14 Slough subpopulations are the only known populations of giant garter snakes in the Plan Area and  
15 are identified as important for the recovery of the species in the draft recovery plan for the species  
16 (U.S. Fish and Wildlife Service 1999b). Implementation actions that target giant garter snake habitat  
17 would focus on these two important subpopulations.

18 The species-specific biological goals and objectives would inform the near-term protection and  
19 restoration efforts. The natural community restoration and protection activities are expected to be  
20 concluded during the first 10 years of Plan implementation, which is close enough in time to the  
21 occurrence of impacts to constitute adequate mitigation for CEQA purposes. These commitments are  
22 more than sufficient to support the conclusion that the near-term effects of Alternative 9 would be  
23 not be adverse under CEQA, because the number of acres required to meet the typical ratios  
24 described above would be only 670 acres of aquatic communities restored, 670 acres of aquatic  
25 communities protected, and 4,934 acres of upland communities protected.

26 The Plan also includes commitments to implement AMM1-AMM7, AMM10, AMM16, and AMM37. All  
27 of these AMMs include elements that avoid or minimize the risk of BDCP activities affecting habitats  
28 and species adjacent to work areas and storage sites. The AMMs are described in detail in BDCP  
29 Appendix 3.C, *Avoidance and Minimization Measures*.

### 30 ***Late Long-Term Timeframe***

31 Based on modeled habitat, the study area supports approximately 31,281 acres of aquatic and  
32 53,285 acres of upland habitat for giant garter snake. Alternative 9 as a whole would result in the  
33 permanent loss of and temporary effects on 1,012 acres of aquatic habitat and 3,485 acres of upland  
34 habitat for giant garter snake during the term of the plan (3% of the total aquatic habitat and 6% of  
35 the total upland habitat in the study area). The locations of these losses are described above in the  
36 analyses of individual conservation measures.

37 The BDCP has committed to protecting 8,000 acres of grassland and 48,625 acres of cultivated lands  
38 in the study area, and restoring 25,100 acres tidal and nontidal wetlands and 2,000 acres of  
39 grasslands in the study area. Lands to be protected and restored specifically for the giant garter  
40 snake total 6,540 acres (1,200 acres nontidal marsh, 400 acres of grassland, 700 acres of cultivated  
41 lands including at least 500 acres of rice in CZ 2, and acres of rice or habitat of equivalent value in CZ  
42 2, CZ 4, and CZ 5. Additionally, 4,240 acres of rice or habitat equivalent (1,500 acres under Objective  
43 GGS1.4 and 2,740 acres under Objective GGS3.1) would be restored or protected to create

1 connections from the Coldani Marsh/White Slough population to other areas in the giant garter  
2 snake historical range. Additionally, the 2,740 acres of rice land or habitat of equivalent value under  
3 Objective GGS3.1 would be protected and restored for the giant garter snake to achieve a 1:1 ratio of  
4 habitat conserved to habitat affected (habitat affected includes uplands periodically flooded and rice  
5 lost due to late season flooding in Yolo Bypass as a result of CM2). In addition to the 6,540 acres of  
6 high-value habitat targeted specifically for giant garter snake, the protection and restoration of  
7 other natural communities is expected to provide additional restoration of 4,430 acres and  
8 protection of 3,733 acres of garter snake habitat.

9 Protection and management of cultivated lands (CM3 and CM11) would also benefit the giant garter  
10 snake by providing connectivity and maintaining irrigation and drainage channels that provide  
11 aquatic habitat for the snake. Assuming the length of canals and ditches providing giant garter snake  
12 movement habitat on the protected cultivated lands is proportional to the modeled habitat on  
13 cultivated lands in the Plan Area, the 48,625 acres of protected cultivated lands would support  
14 approximately 281 miles of movement habitat for the giant garter snake (2,784 miles multiplied by  
15 0.101 [48,625 acres protected of 481,909 acres in Plan Area]).

16 Giant garter snake habitat would be restored and protected specifically, to conserve and expand the  
17 Coldani Marsh/White Slough and Yolo Basin/Willow Slough subpopulations of the giant garter  
18 snake. Protecting and expanding existing giant garter snake subpopulations, and providing  
19 connectivity between protected areas, is considered the most effective approach to giant garter  
20 snake conservation in the Plan Area. The Coldani Marsh/White Slough and Yolo Basin/Willow  
21 Slough subpopulations are the only known subpopulations of giant garter snakes in the Plan Area  
22 and are identified as important for the recovery of the species in the draft recovery plan for the  
23 species (U.S. Fish and Wildlife Service 1999b). Implementation actions that target giant garter snake  
24 habitat would focus on these two important subpopulations.

25 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*  
26 *Plant Species*) estimates that the restoration and protection actions discussed above, as well as the  
27 restoration of managed wetland, nontidal freshwater perennial emergent wetland, nontidal  
28 perennial aquatic, tidal freshwater emergent wetland, alkali seasonal wetland, grassland, and vernal  
29 pool complex that could overlap with the species model, would result in the restoration of 3,450  
30 acres of aquatic and 980 acres of upland modeled habitat for giant garter snake. In addition,  
31 protection of cultivated land, grassland, alkali seasonal wetland, and vernal pool complex could  
32 overlap with the species model and would result in the protection of 1,547 acres of aquatic and  
33 2,185 acres of upland giant garter snake modeled habitat.

34 The BDCP also includes a number of AMM1-AMM7, AMM10, AMM16, and AMM37 directed at  
35 minimizing or avoiding potential impacts on adjacent habitats during construction and operation of  
36 the conservation measures. Considering the protection and restoration provisions, which would  
37 provide acreages of new or enhanced habitat in amounts greater than necessary to compensate for  
38 habitats lost to construction and restoration activities, implementation of Alternative 9 as a whole  
39 would not result in a substantial adverse effect through habitat modifications and would not  
40 substantially reduce the number or restrict the range of the species. Therefore, the loss of giant  
41 garter snake habitat and potential mortality of snakes would have a less-than-significant impact on  
42 giant garter snake under CEQA.

1 **Impact BIO-50: Indirect Effects of Plan Implementation on Giant Garter Snake**

2 Construction activities outside the project footprint but within 200 feet of construction associated  
3 with water conveyance facilities, conservation components and ongoing habitat enhancement, as  
4 well as operation and maintenance of above-ground water conveyance facilities, including the  
5 transmission facilities, could result in ongoing periodic postconstruction disturbances with localized  
6 effects on giant garter snake habitat, and temporary noise and visual disturbances over the term of  
7 the BDCP. These potential effects would be minimized or avoided through AMM1–AMM7, AMM10,  
8 AMM16, and AMM37, which would be in effect throughout the plan’s construction phase.

9 The use of mechanical equipment during water conveyance facilities construction could cause the  
10 accidental release of petroleum or other contaminants that could affect giant garter snake or its  
11 aquatic prey. The inadvertent discharge of sediment or excessive dust adjacent to giant garter snake  
12 habitat could also have a negative effect on the species or its prey. AMM1–AMM6 would minimize  
13 the likelihood of such spills occurring and would ensure measures are in place to prevent runoff  
14 from the construction area and potential effects of sediment or dust on giant garter snake or its  
15 prey.

16 Covered activities have the potential to exacerbate bioaccumulation of mercury in covered species  
17 that feed on aquatic species, including giant garter snake. The operational impacts of new flows  
18 under CM1 were analyzed to assess potential effects on mercury concentration and bioavailability.  
19 Results indicated that changes in total mercury levels in water and fish tissues due to future  
20 operational conditions were insignificant (see BDCP Appendix 5.D, Tables 5D.4-3, 5D.4-4, and  
21 5D.4-5).

22 Marsh (tidal and nontidal) and floodplain restoration also have the potential to increase exposure to  
23 methylmercury. Mercury is transformed into the more bioavailable form of methylmercury in  
24 aquatic systems, especially areas subjected to regular wetting and drying such as tidal marshes and  
25 floodplains. Thus, BDCP restoration activities that create newly inundated areas could increase  
26 bioavailability of mercury. Increased methylmercury associated with natural community and  
27 floodplain restoration may indirectly affect giant garter snake, which feeds on small fishes, tadpoles,  
28 and small frogs, especially introduced species, such as small bullfrogs (*Rana catesbeiana*) and their  
29 larvae, carp (*Cyprinus carpio*), and mosquitofish (*Gambusia affinis*). In general, the highest  
30 methylation rates are associated with high tidal marshes that experience intermittent wetting and  
31 drying and associated anoxic conditions (Alpers et al. 2008). Along with avoidance and minimization  
32 measures and adaptive management and monitoring, *CM12 Methylmercury Management* is expected  
33 to reduce the amount of methylmercury resulting from the restoration of natural communities and  
34 floodplains.

35 Extant populations of giant garter snake within the study area are known only from the upper Yolo  
36 Basin and at the Coldani Marsh/White Slough area. Davis et al. (2007) found mercury  
37 concentrations in fish at White Slough (and the Central Delta in general) to be relatively low  
38 compared to other areas of the Delta. No restoration activities involving flooding (and subsequent  
39 methylation of mercury) are planned within the known range of the Coldani Marsh/White Slough  
40 giant garter snake population. Effects on giant garter snake from increased methylmercury  
41 exposures is more likely in the Yolo Basin, where some of the highest concentrations of mercury and  
42 methylmercury have been documented (Foe et al. 2008). Effects from exposure to methylmercury  
43 may include decreased predator avoidance, reduced success in prey capture, difficulty in shedding,  
44 and reduced ability to move between shelter and foraging or thermoregulation areas (Wylie et al.

2009). Planned floodplain restoration activities in the Yolo Basin are expected to seasonally increase methylmercury production, although production would be minimized by *CM12 Methylmercury Mitigation*. Further, the periods of production and increased exposure to methylmercury do not overlap with giant garter snake seasonal activity periods. This seasonal trend should help to decrease risk to the giant garter snake, although snakes could prey on individuals that have been exposed to methylmercury during the previous season.

The potential mobilization or creation of methylmercury within the study area varies with site-specific conditions and would need to be assessed at the project level. Measures described in *CM12 Methylmercury Management* include provisions for project-specific Mercury Management Plans. Along with avoidance and minimization measures and adaptive management and monitoring, *CM12* is expected to reduce the effects of methylmercury resulting from BDCP natural communities and floodplain restoration on giant garter snake.

**NEPA Effects:** Implementation of the AMMs listed above as part of implementing Alternative 9 would avoid the potential for substantial adverse effects on giant garter snakes, either indirectly or through habitat modifications. These AMMs would also avoid and minimize effects that could substantially reduce the number of giant garter snakes or restrict the species' range. Therefore, the indirect effects of Alternative 9 would not have an adverse effect on giant garter snake.

**CEQA Conclusion:** Indirect effects from conservation measure operations and maintenance as well as construction-related noise and visual disturbances could impact giant garter snake in aquatic and upland habitats. The use of mechanical equipment during construction could cause the accidental release of petroleum or other contaminants that could impact giant garter snake or its prey. The inadvertent discharge of sediment or excessive dust adjacent to giant garter snake habitat could also have a negative impact on the species or its prey. With implementation of AMM1-AMM7, AMM10, AMM16, and AMM37 as part of Alternative 9 construction, operation and maintenance, the BDCP would avoid the potential for substantial adverse effects on giant garter snakes, either indirectly or through habitat modifications. Alternative 9 would not result in a substantial reduction in numbers or a restriction in the range of giant garter snakes. Therefore, the indirect effects of BDCP Alternative 9 would have a less-than-significant impact on giant garter snakes.

Giant garter snake could experience indirect effects from increased exposure to methylmercury as a result of tidal habitat restoration (*CM4*). With implementation of *CM12*, the potential indirect effects of methylmercury would not result in a substantial reduction in numbers or a restriction in the range of giant garter snakes, and, therefore, would have a less-than-significant impact on giant garter snakes.

#### **Impact BIO-50a: Loss of Connectivity among Giant Garter Snakes in the Coldani Marsh/White Slough Subpopulation, Stone Lakes National Wildlife Refuge, and the Delta**

Implementation of Alternative 9 would not introduce a substantial barrier to the movement among giant garter snakes in the Coldani Marsh/White Slough subpopulation, Stone Lakes National Wildlife Refuge, and the Delta in the study area.

**NEPA Effects:** Alternative 9 would not adversely affect connectivity among giant garter snakes in the Coldani Marsh/White Slough subpopulation, Stone Lakes National Wildlife Refuge, and the Delta in the study area.

1 **CEQA Conclusion:** Alternative 9 would have a less-than-significant impact on connectivity between  
2 giant garter snakes in the study area.

3 **Impact BIO-51: Periodic Effects of Inundation of Giant Garter Snake Habitat as a Result of**  
4 **Implementation of Conservation Components**

5 *CM2 Yolo Bypass Fisheries Enhancement:* The proposed changes in Fremont Weir operations would  
6 occur intermittently from as early as mid-November through as late as mid-May. The core  
7 operations would occur during the winter/spring period, which corresponds mostly with the giant  
8 garter snake's inactive season. During this time, snakes are overwintering underground. Giant garter  
9 snakes that occur in the bypass during the active season could overwinter in the bypass during the  
10 inactive season: these snakes may be vulnerable to inundation of the bypass and could be drowned  
11 or displaced from overwintering sites. However, most typically, Fremont Weir "notch" operations  
12 would occur on the shoulders of time periods in which the Sacramento River rises enough for  
13 Fremont Weir to overtop passively, without the proposed project. Project-associated inundation of  
14 areas that would not otherwise have been inundated is expected to occur in no more than 30% of all  
15 years, since Fremont Weir is expected to overtop the remaining estimated 70% of all years, and  
16 during those years notch operations would not typically affect the maximum extent of inundation  
17 that would have occurred. Currently, in more than half of all years, an area greater than the area that  
18 would be inundated as a result of covered activities is already inundated during the snake's inactive  
19 season (Kirkland pers. comm.). Duration of inundation may also be an important factor determining  
20 effects on overwintering giant garter snakes. Radiotelemetry studies have revealed giant garter  
21 snakes surviving in burrows that had been inundated for 2 to 3 weeks, but it is unknown what  
22 duration of inundation the snakes can survive while overwintering in their burrows.

23 Appendix 5.J, *Effects on Natural Communities, Wildlife, and Plants*, provides the method used to  
24 estimate periodic inundation effects in the Yolo Bypass. Based on this method, periodic inundation  
25 could affect giant garter snakes overwintering in upland areas ranging from an estimated 582 acres  
26 of upland habitat during notch flow of 1,000 cfs to an estimated 1,402 acres during a 4,000-cfs notch  
27 flow. The 4,000-cfs notch flow would affect an estimated 888 acres of high-value habitat and 514  
28 acres of moderate-value habitat.

29 As noted above under the discussion of habitat loss from construction-related activities in Yolo  
30 Bypass, late season flooding in the bypass may result in loss of rice habitat (considered aquatic  
31 habitat for giant garter snake) by precluding the preparation and planting of a maximum of 1,662  
32 acres of rice fields (BDCP Appendix 5.J, Attachment 5J.E, *Estimation of BDCP Impact on Giant Garter*  
33 *Snake Summer Foraging Habitat in the Yolo Bypass*). This analysis concludes that the estimated loss  
34 of rice is 1,662 acres which was considered to occur late long-term. Restoration and protection of  
35 2,740 acres of rice land or habitat of equivalent value for the giant garter snake would achieve a 1:1  
36 ratio of habitat conserved to habitat affected (habitat affected includes uplands periodically flooded  
37 and rice lost due to late season flooding in Yolo Bypass as a result of CM2).

38 *CM5 Seasonally Inundated Floodplain Restoration* would periodically inundate 606 acres of upland  
39 habitat for the giant garter snake in the south Delta (CZ 7). The upland habitat to be inundated  
40 contains 432 acres of moderate-value and 174 acres of low-value habitat. The area between existing  
41 levees would be breached and the newly constructed setback levees would be inundated through  
42 seasonal flooding. The restored floodplain would include a range of elevations from low-lying areas  
43 that flood frequently (e.g., every 1 to 2 years) to high-elevation areas that flood infrequently (e.g.,

1 every 10 years or more). There are no records of giant garter snakes in the vicinity of where  
2 floodplain restoration is expected to occur.

3 Based on modeled habitat for the giant garter snake, the study area supports approximately 53,285  
4 acres of upland habitat for giant garter snake. Approximately 2,008 acres of giant garter snake  
5 upland habitat (4% of total upland habitat in the study area) may be adversely affected by periodic  
6 flooding as a consequence of floodplain restoration and the operation of the Fremont Weir.

7 **NEPA Effects:** Periodic effects on upland habitat for giant garter snake associated with  
8 implementing Alternative 9 are not expected to result in substantial adverse effects on giant garter  
9 snakes, either directly or through habitat modifications, as it would not result in a substantial  
10 reduction in numbers or a restriction in the range of giant garter snakes. Therefore, Alternative 9  
11 would not adversely affect the species.

12 **CEQA Conclusion:** Flooding of the Yolo Bypass from CM2 and creation of seasonally inundated  
13 floodplain in various parts of the study area (CM5) would periodically affect a total of approximately  
14 2,008 acres of upland habitat for giant garter snake. The inundation could affect overwintering  
15 snakes. Project-associated inundation of areas that would not otherwise have been inundated is  
16 expected to occur in no more than 30% of all years, since Fremont Weir is expected to overtop the  
17 remaining estimated 70% of all years, and during those years notch operations would not typically  
18 affect the maximum extent of inundation. Currently, in more than half of all years, an area greater  
19 than the area that would be inundated as a result of covered activities is already inundated during  
20 the snake's inactive season (Kirkland pers. comm.). Therefore, increased inundation in the Yolo  
21 Bypass as a result of BDCP is expected to have a minimal effect on the Yolo Basin/Willow Slough  
22 subpopulation. Therefore, implementing Alternative 9, including AMM1–AMM7, AMM10, and  
23 AMM16, would not be expected to result in substantial adverse effects on giant garter snakes, either  
24 directly or through habitat modifications, because it would not result in a substantial reduction in  
25 numbers or a restriction in the range of giant garter snakes. Periodic effects of inundation under  
26 Alternative 9 would have a less-than-significant impact on the species.

### 27 **Western Pond Turtle**

28 The habitat model used to assess effects on the western pond turtle is based on aquatic and upland  
29 nesting and overwintering habitat. Further details regarding the habitat model, including  
30 assumptions on which the model is based, are provided in BDCP Appendix 2.A, Section 2A.30  
31 *Western Pond Turtle*. The model quantified two types of upland nesting and overwintering habitat,  
32 including upland habitat in natural communities as well as upland in agricultural areas adjacent to  
33 aquatic habitats. Both of these upland habitat types are combined for this analysis. Factors  
34 considered in assessing the value of affected aquatic habitat are natural community type and  
35 availability of adjacent nesting and overwintering habitat. The highest value aquatic habitat types in  
36 the study area consist of nontidal freshwater perennial emergent wetlands and ponds adjacent to  
37 suitable nesting and overwintering habitat (Patterson pers. comm.). Less detail is provided on  
38 effects on dispersal habitat because, although dispersal habitat is important for maintaining and  
39 increasing distribution and genetic diversity, turtles have been known to travel over many different  
40 land cover types; therefore, this habitat type is not considered limiting. The value of dispersal  
41 habitat depends less on the habitat type itself than on the proximity of that habitat type to high-  
42 value aquatic and nesting and overwintering habitat.

1 Construction and restoration associated with Alternative 9 conservation measures would result in  
2 both temporary and permanent losses of western pond turtle modeled habitat, as indicated in Table  
3 12-9-23. The majority of these losses would take place over an extended period of time as tidal  
4 marsh is restored in the study area. Full implementation of Alternative 9 would also include the  
5 following biological objectives over the term of the BDCP to benefit the western pond turtle (BDCP  
6 Chapter 3, *Conservation Strategy*).

- 7 • Protect or restore 142,200 acres of high-value natural communities and covered species  
8 habitats (Objective L1.1, associated with CM3).
- 9 • Restore and protect 65,000 acres of tidal natural communities and transitional uplands to  
10 accommodate sea level rise. Minimum restoration targets for tidal natural communities in  
11 each ROA are 7,000 acres in Suisun Marsh ROA, 5,000 acres in Cache Slough ROA, 1,500 acres in  
12 Cosumnes/Mokelumne ROA, 2,100 acres in West Delta ROA, and 5,000 acres in South Delta ROA  
13 (Objective L1.3, associated with CM2, CM3, and CM4).
- 14 • Within the 65,000 acres of tidal natural communities and transitional uplands (Objective L1.3),  
15 include sufficient transitional uplands along the fringes of restored brackish and freshwater  
16 tidal emergent wetlands to accommodate up to 3 feet of sea level rise where possible and allow  
17 for the future upslope establishment of tidal emergent wetland communities (Objective L1.7,  
18 associated with CM3, CM4, and CM8).
- 19 • Allow floods to promote fluvial processes, such that bare mineral soils are available for natural  
20 recolonization of vegetation, desirable natural community vegetation is regenerated, and  
21 structural diversity is promoted, or implement management actions that mimic those natural  
22 disturbances (Objective L2.1, associated with CM3, CM5, and CM11).
- 23 • Allow lateral river channel migration (Objective L2.2, associated with CM3 and CM5).
- 24 • Within the 65,000 acres of tidal natural communities (L1.3), restore or create 24,000 acres of  
25 tidal freshwater emergent wetland in CZ 1, CZ 2, CZ 4, CZ 5, CZ 6, and/or CZ 7 (Objective  
26 TFEWNC1.1, associated with CM3 and CM4).
- 27 • Create at least 1,200 acres of nontidal marsh consisting of a mosaic of nontidal perennial aquatic  
28 and nontidal freshwater emergent wetland natural communities, with suitable habitat  
29 characteristics for giant garter snake and western pond turtle (Objective NFEW/NPANC1.1,  
30 associated with CM3 and CM10).
- 31 • Protect and enhance 8,100 acres of managed wetland, 1,500 acres of which are in the Grizzly  
32 Island Marsh Complex (Objective MWNC1.1, associated with CM3 and CM11).
- 33 • Protect 8,000 acres of grassland (Objective GNC1.1, associated with CM3).
- 34 • Protect stock ponds and other aquatic features within protected grasslands to provide aquatic  
35 breeding habitat for native amphibians and aquatic reptiles (Objective GNC1.3, associated with  
36 CM3).
- 37 • Maintain and protect the small patches of important wildlife habitats associated with cultivated  
38 lands that occur in cultivated lands within the reserve system, including isolated valley oak  
39 trees, trees and shrubs along field borders and roadsides, remnant groves, riparian corridors,  
40 water conveyance channels, grasslands, ponds, and wetlands (Objective CLNC1.3, associated  
41 with CM3 and CM11).

1 As explained below, with the restoration and protection of these amounts of habitat, in addition to  
 2 implementation of AMMs, impacts on western pond turtle would not be adverse for NEPA purposes  
 3 and would be less than significant for CEQA purposes.

4 **Table 12-9-23. Changes in Western Pond Turtle Modeled Habitat Associated with Alternative 9<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	Aquatic (acres)	685	685	468	468	NA	NA
	Upland (acres) <sup>e</sup>	59	59	174	174	NA	NA
	Aquatic (miles)	1	1	8	8	<b>NA</b>	<b>NA</b>
<b>Total Impacts CM1 (acres)</b>		<b>744</b>	<b>744</b>	<b>642</b>	<b>642</b>	<b>NA</b>	<b>NA</b>
CM2-CM18	Aquatic (acres)	82	114	23	44	NA	NA
	Upland (acres) <sup>e</sup>	414	1,028	119	136	283-798	331
	Aquatic (miles)	25	109	3	4	NA	NA
<b>Total Impacts CM2-CM18 (acres)</b>		<b>496</b>	<b>1,142</b>	<b>142</b>	<b>180</b>	<b>283-798</b>	<b>331</b>
<b>TOTAL IMPACTS CM1-CM18 (acres)</b>		<b>1,240</b>	<b>1,886</b>	<b>784</b>	<b>822</b>	<b>283-798</b>	<b>331</b>

- <sup>a</sup> See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.
- <sup>b</sup> See discussion below for a description of applicable CMs.
- <sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.
- <sup>d</sup> Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.
- <sup>e</sup> Upland acres represent upland nesting and overwintering habitat acreages combined for both natural communities and agricultural lands adjacent to aquatic habitats.
- NT = near-term  
 LLT = late long-term  
 NA = not applicable

5

6 **Impact BIO-52: Loss or Conversion of Habitat for and Direct Mortality of Western Pond Turtle**

7 Alternative 9 conservation measures would result in the permanent and temporary loss of up to  
 8 1,311 acres of aquatic habitat and 1,397 acres of upland nesting and overwintering habitat (Table  
 9 12-9-23). There are no western pond turtle occurrences that overlap with the CM1 footprint (Figure  
 10 12-16). Activities that would result in the temporary and permanent loss of western pond turtle  
 11 modeled habitat are conveyance facilities and transmission line construction, and establishment and  
 12 use of RTM, borrow, and spoils areas (CM1), Yolo Bypass improvements (CM2), tidal habitat  
 13 restoration (CM4), seasonally inundated floodplain restoration (CM5), and riparian restoration  
 14 (CM7). Habitat enhancement and management activities (CM11), such as ground disturbance or  
 15 removal of nonnative vegetation, could result in local adverse habitat effects. In addition,  
 16 maintenance activities associated with the long-term operation of the water conveyance facilities  
 17 and other BDCP physical facilities could degrade or eliminate western pond turtle habitat. The  
 18 activity accounting for most (80%) of the habitat loss or conversion would be *CM4 Tidal Natural*

1 *Communities Restoration.* Each of these individual activities is described below. A summary  
2 statement of the combined impacts and NEPA effects and a CEQA conclusion follow the individual  
3 conservation measure discussions.

- 4 • *CM1 Water Facilities and Operation:* Construction of Alternative 9 conveyance facilities would  
5 result in the permanent loss of approximately 685 acres of aquatic habitat and 59 acres of  
6 upland nesting and overwintering habitat for the western pond turtle in the study area (Table  
7 12-9-23). Development of the water conveyance facilities would also result in the temporary  
8 removal of up to 468 acres of aquatic habitat and 174 acres of nesting and overwintering habitat  
9 for the western pond turtle in the study area (see Table 12-9-23). Approximately 1 mile of  
10 channels providing western pond turtle movement habitat would be removed and 8 miles  
11 would be temporarily disturbed. There are no western pond turtle occurrences that overlap  
12 with the CM1 footprint but these are numerous occurrences scattered throughout the Delta. The  
13 majority of the permanent loss of aquatic habitat and nesting and overwintering habitat would  
14 be near Clifton Court Forebay in CZ 8. Refer to the Terrestrial Biology Map Book for a detailed  
15 view of Alternative 9 construction locations. The aquatic habitat in the Clifton Court Forebay  
16 area is considered to be of reasonably high-value because it consists of agricultural ditches in or  
17 near known species occurrences. The nesting and overwintering and dispersal habitat that  
18 would be lost consists primarily of cultivated lands with some small portion of ruderal grassland  
19 habitat. Except for remnant, uncultivated patches, the cultivated lands are not suitable for  
20 nesting and overwintering unless left fallow. Construction of the water conveyance facilities  
21 would also affect dispersal habitat, which is primarily cultivated lands. While there are western  
22 pond turtle occurrences scattered throughout CZ 3, CZ 4, CZ 5, and CZ 6, this effect is widely  
23 dispersed because of the long, linear nature of the pipeline footprint.
- 24 • *CM2 Yolo Bypass Fisheries Enhancement:* Improvements in the Yolo Bypass would result in the  
25 permanent and temporary removal of approximately 60 acres of aquatic habitat and 249 acres  
26 of upland nesting and overwintering habitat for the western pond turtle. Approximately 4 miles  
27 of channels providing western pond turtle movement habitat would be permanently or  
28 temporarily removed as a result of Yolo Bypass improvements. Although there are no CNDDDB  
29 occurrences for western pond turtle in the Yolo Bypass, the species is known to be present in  
30 the Yolo Bypass Wildlife Area (California Department of Fish and Game 2012z).
- 31 • *CM4 Tidal Natural Communities Restoration:* Tidal natural communities restoration would result  
32 in the conversion of approximately 45 acres of aquatic habitat and 872 acres of upland nesting  
33 and overwintering habitat for western pond turtle to tidal marsh. Approximately 106 miles of  
34 channels providing western pond turtle movement habitat would be removed as a result of  
35 restoration. Tidal habitat restoration is expected to change existing salinity and flow conditions  
36 rather than lead to complete loss of aquatic habitat. Restoration of tidal flow where habitat  
37 consists of the calm waters of managed freshwater ponds and wetlands could have an adverse  
38 effect on the western pond turtle. Tidal restoration outside Suisun Marsh is likely to create  
39 suitable, slow-moving freshwater slough and marsh habitat.

40 Although the aquatic habitat model includes all tidal perennial aquatic, tidal brackish emergent  
41 wetland, and managed wetland as habitat, most of the Suisun Marsh pond turtle observations  
42 have been in the interior drainage ditches or near water control structures not hydrologically  
43 connected to Suisun Marsh. While the model does not include an aquatic class type called  
44 *drainage ditches* and therefore an effect on this habitat type cannot be calculated, it is likely that  
45 this general type of habitat accounts for a very small portion of the total modeled aquatic effects;

1 almost certainly less than 5%, or less than 287 acres of the modeled aquatic habitat affected by  
2 tidal restoration. The suitable nesting and overwintering habitat that would be affected in the  
3 interior of Suisun Marsh is limited, because the levees likely function as the primary nesting and  
4 overwintering habitat. The nesting and overwintering habitat of highest value to be affected is  
5 on the fringe of the marsh where the aquatic habitat is adjacent to undeveloped grassland  
6 habitat.

7 The habitat affected in the interior Delta (West Delta and South Delta) is of low value, consisting  
8 of levees and intensively farmed cultivated lands, while the Cache Slough and Cosumnes-  
9 Mokelumne ROAs are less intensively farmed and have higher-value habitat for the turtle.  
10 Because the estimates of the effect of tidal inundation are based on projections of where  
11 restoration may occur, actual effects are expected to be lower because sites would be selected to  
12 minimize effects on western pond turtle habitat (see AMM17 in BDCP Appendix 3.C).

- 13 • *CM5 Seasonally Inundated Floodplain Restoration*: Levee construction associated with floodplain  
14 restoration in the south Delta (CZ 7) would result in the permanent and temporary removal of  
15 approximately 53 acres of aquatic habitat and 33 acres of upland habitat for western pond  
16 turtle. Approximately 3 miles of channels providing western pond turtle movement habitat  
17 would be removed as a result of floodplain restoration. Although there are no CNDDDB  
18 occurrences for pond turtles in the areas where floodplain restoration is likely to occur, the  
19 species is known to occur along the San Joaquin River to the south in the San Joaquin River  
20 National Wildlife Refuge. As with CM4, the estimates of the effect of seasonal floodplain levee  
21 construction and inundation are based on projections of where restoration may occur. Actual  
22 effects are expected to be lower because sites would be selected to minimize effects on western  
23 pond turtle habitat.
- 24 • *CM7 Riparian Natural Community Restoration*: Riparian restoration that is part of tidal natural  
25 communities restoration in CZ 1 and CZ 2, would result in the permanent removal of 10 acres of  
26 upland nesting and overwintering habitat for western pond turtle.
- 27 • *CM11 Natural Communities Enhancement and Management*: A variety of habitat management  
28 actions included in CM11 that are designed to enhance wildlife values in BDCP protected  
29 habitats may result in localized ground disturbances that could temporarily remove small  
30 amounts of western pond turtle habitat. Ground-disturbing activities, such as removal of  
31 nonnative vegetation and road and other infrastructure maintenance, are expected to have  
32 minor adverse effects on available western pond turtle habitat and are expected to result in  
33 overall improvements to and maintenance of western pond turtle habitat values over the term  
34 of the BDCP. In addition, effects would be avoided and minimized by the AMMs listed below.

35 Management of the 6,600 acres of managed wetlands to be protected for waterfowl and  
36 shorebirds is not expected to result in overall adverse effects for the western pond turtle.  
37 Management actions that would improve wetland quality and diversity on managed wetlands  
38 include control and eradication of invasive plants; maintenance of a diversity of vegetation types  
39 and elevations, including upland areas to provide flood refugia; water management and leaching  
40 to reduce salinity; and enhancement of water management infrastructure (improvements to  
41 enhance drainage capacity, levee maintenance). These management actions could benefit the  
42 western pond turtle. The 6,600 acres of protected managed wetlands would be monitored and  
43 adaptively managed to ensure that management options are implemented to avoid adverse  
44 effects on the western pond turtle.

- 1 • Operations and maintenance: Ongoing maintenance of BDCP facilities is expected to have little if  
2 any adverse effect on the western pond turtle. Postconstruction operation and maintenance of  
3 the above-ground water conveyance facilities and restoration infrastructure could result in  
4 ongoing but periodic disturbances that could affect western pond turtle use where there is  
5 suitable habitat in the study area. Maintenance activities would include vegetation management,  
6 levee and structure repair, and regrading of roads and permanent work areas. These effects,  
7 however, would be minimized by AMMs and conservation actions described below.
- 8 • Injury and direct mortality: Construction vehicle activity may cause injury to or mortality of  
9 western pond turtles. If turtles reside where conservation measures are implemented (most  
10 likely in the vicinity of aquatic habitats in the study area), the operation of equipment for land  
11 clearing, construction, conveyance facilities operation and maintenance, and habitat restoration,  
12 enhancement, and management could result in injury or mortality of western pond turtles.  
13 However, to avoid injury or mortality, preconstruction surveys would be conducted in suitable  
14 aquatic or upland habitat for the western pond turtle, and turtles found would be relocated  
15 outside the construction areas, as required by the AMMs listed below.

16 The following paragraphs summarize the combined effects discussed above and describe other  
17 BDCP conservation actions that offset or avoid these effects. NEPA effects and a CEQA conclusion are  
18 also included.

### 19 ***Near-Term Timeframe***

20 Because the water conveyance facilities construction is being evaluated at the project level, the near-  
21 term BDCP conservation strategy has been evaluated to determine whether it would provide  
22 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the effects of  
23 construction would not be adverse under NEPA.

24 Alternative 9 would temporarily and permanently remove 1,258 acres of aquatic habitat and 766  
25 acres of upland nesting and overwintering habitat for western pond turtle in the near-term. These  
26 effects would result from water conveyance facilities construction (CM1, 1,153 acres of aquatic and  
27 233 acres of upland habitats), Yolo Bypass improvements (CM2, 60 acres of aquatic and 249 acres of  
28 upland habitats), tidal habitat restoration (CM4, 45 acres of aquatic and 280 acres of upland  
29 habitats), and riparian restoration (CM7, 4 acres of upland habitat).

30 Typical project-level mitigation ratios for those natural communities that would be affected and that  
31 are identified in the biological goals and objectives for western pond turtle in Chapter 3 of the BDCP  
32 would be 1:1 for restoration and 1:1 for protection of aquatic habitats and 2:1 for protection of  
33 upland habitats. Using these ratios would indicate that 1,258 acres of aquatic habitat should be  
34 restored, 1,258 acres of aquatic habitat should be protected, and 1,532 acres of upland habitat  
35 should be protected for western pond turtle to mitigate the near-term losses.

36 The conservation strategy for western pond turtle involves restoration and protection of aquatic  
37 and adjacent upland habitat, and establishment of an interconnected reserve system that provides  
38 for western pond turtle dispersal. The habitat protection and restoration needs for this species are  
39 addressed at the landscape and natural community levels. The BDCP has committed to near-term  
40 restoration and creation of up to 24,350 acres of aquatic habitat (Objective L1.1, Objective L1.3,  
41 Objective NFEW/NPANC1.1, and Objective MWNC1.1) and up to 2,000 acres of upland habitat  
42 (Objective GNC1.1). In addition, the protection and management of existing managed wetland  
43 habitat in Suisun Marsh may increase the value of aquatic habitat. The most beneficial restoration

1 would occur in freshwater emergent wetland consisting of slow-moving slough and marsh adjacent  
2 to protected, undisturbed grassland. Additionally, basking platforms would be installed as needed in  
3 restored freshwater marsh to benefit the western pond turtle.

4 The natural community restoration and protection activities would be concluded in the first 10  
5 years of Plan implementation, which is close enough in time to the impacts of construction to  
6 constitute adequate mitigation. Because the number of acres required to meet the typical ratios  
7 described above would be only 1,258 acres of aquatic communities protected, 1,258 acres restored,  
8 and 1,532 acres of upland communities protected, the 24,350 acres of aquatic and 2,000 acres of  
9 upland habitats restored or created in the near-term Plan goals, and the additional detail in the  
10 biological goals for western pond turtle, are more than sufficient to support the conclusion that the  
11 near-term impacts of habitat loss and direct mortality under Alternative 9 on western pond turtles  
12 would not be adverse.

13 The plan also contains commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
14 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
15 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
16 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
17 *Material*, *AMM10 Restoration of Temporarily Affected Natural Communities*, and *AMM17 Western*  
18 *Pond Turtle*. These AMMs include elements that would avoid or minimize the risk of affecting  
19 habitats and species adjacent to work areas and storage sites. The AMMs are described in detail in  
20 BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

### 21 ***Late Long-Term Timeframe***

22 Based on modeled habitat, the study area supports approximately 81,666 acres of aquatic and  
23 28,864 acres of upland habitat for western pond turtle. Alternative 9 would remove 1,311 acres of  
24 aquatic habitat and 1,397 acres of upland habitat for western pond turtle in the late long-term  
25 timeframe.

26 Implementation of Alternative 9 as a whole would increase the extent and distribution of high-value  
27 aquatic and upland nesting and overwintering habitat for western pond turtle in the study area.  
28 While the extent of dispersal habitat is expected to be reduced by approximately 9%, this habitat is  
29 abundant in the study area (composed primarily of cultivated lands), is not believed to be a factor  
30 limiting the turtle, and would be replaced with higher-value habitats for western pond turtle.

31 The conservation strategy for western pond turtle involves restoration and protection of aquatic  
32 and adjacent upland habitat, and establishment of an interconnected reserve system that provides  
33 for western pond turtle dispersal. The habitat protection and restoration needs for this species are  
34 addressed at the landscape and natural community levels. The BDCP has committed to late long-  
35 term restoration and creation of up to 74,300 acres of aquatic habitat (Objective L1.1, Objective  
36 L1.3, Objective NFEW/NPANC1.1, MWNC1.1) and up to 8,000 acres of upland habitat (Objective  
37 GNC1.1). In addition, the protection and management of existing managed wetland habitat in Suisun  
38 Marsh may increase the value of aquatic habitat. The most beneficial restoration would occur in  
39 freshwater emergent wetland consisting of slow-moving slough and marsh adjacent to protected,  
40 undisturbed grassland. Aquatic features (e.g., ditches and ponds) and adjacent uplands that are  
41 preserved and managed as part of the 45,405 acres of protected cultivated lands described above for  
42 giant garter snake are also expected to benefit the species. Additionally, basking platforms would be  
43 installed as needed in restored freshwater marsh to benefit the western pond turtle.

1 Riparian and floodplain restoration would potentially increase the quantity and value of aquatic and  
2 nesting and overwintering habitat. Where the floodplain is widened and restored, this would allow  
3 oxbows and slow-moving side channels to form, providing suitable aquatic habitat for this species  
4 (Bury and Germano 2008; Ernst and Lovich 2009). Where riparian vegetation is restored adjacent to  
5 slower-moving channels, sloughs, and ponds, downed trees can provide important basking habitat  
6 and cover habitat for turtles. Riparian restoration in those more interior portions of Old and Middle  
7 Rivers that would be managed for riparian brush rabbit habitat have potential to benefit resident  
8 western pond turtles as riparian-adjacent grassland is an important habitat characteristic for the  
9 rabbit.

10 The study area represents only a small portion of the range of the western pond turtle in California  
11 (which includes most all the Pacific drainages) and southern Oregon. Effects from permanent and  
12 temporary loss or conversion of habitat for the western pond turtle, and other effects described  
13 above, are not expected to result in an adverse effect on the long-term survival and recovery of  
14 western pond turtle because for the following reasons.

- 15 • The study area represents a small portion of the species' entire range.
- 16 • Only 1% of the habitat in the study area would be removed or converted.

17 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*  
18 *Plant Species*) estimates that the restoration and protection actions discussed above, as well as the  
19 restoration of managed wetland, nontidal freshwater perennial emergent wetland, nontidal  
20 perennial aquatic, tidal brackish emergent wetland, tidal freshwater emergent wetland, grassland,  
21 valley foothill riparian, that could overlap with the species model, would result in the restoration of  
22 29,738 acres of aquatic and 1,421 acres of upland modeled habitat for western pond turtle. In  
23 addition, protection of cultivated land, managed wetland, grassland, and valley/foothill riparian  
24 could overlap with the species model and would result in the protection of 1,281 acres of aquatic  
25 and 4,993 acres of upland western pond turtle modeled habitat.

26 **NEPA Effects:** In the near-term, the loss of western pond turtle habitat under Alternative 9 would  
27 not be adverse because the BDCP has committed to protecting and restoring the acreage required to  
28 meet the typical mitigation ratios described above. In the late long-term, the losses of western pond  
29 turtle habitat associated with Alternative 9, in the absence of other conservation actions, would  
30 represent an adverse effect as a result of habitat modification of a special-status species and  
31 potential for direct mortality. However, with habitat protection and restoration associated with the  
32 conservation components, guided by landscape-scale goals and objectives and by AMM1–AMM6,  
33 AMM10, and AMM17, the effects of Alternative 9 as a whole on western pond turtle would not be  
34 adverse.

### 35 **CEQA Conclusion:**

#### 36 **Near-Term Timeframe**

37 Because *CM1 Water Facilities and Operation* construction is being evaluated at the project level, the  
38 near-term BDCP conservation strategy has been evaluated to determine whether it would provide  
39 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the impacts of  
40 construction would be less than significant under CEQA.

41 Alternative 9 would temporarily and permanently remove 1,258 acres of aquatic habitat and 766  
42 acres of upland nesting and overwintering habitat for western pond turtle in the near-term. These

1 effects would result from water conveyance facilities construction (CM1, 1,153 acres of aquatic and  
2 233 acres of upland habitats), Yolo Bypass improvements (CM2, 60 acres of aquatic and 249 acres of  
3 upland habitats), tidal habitat restoration (CM4, 45 acres of aquatic and 280 acres of upland  
4 habitats), and riparian restoration (CM7, 4 acres of upland habitat).

5 Typical CEQA project-level mitigation ratios for those natural communities that would be affected  
6 and that are identified in the biological goals and objectives for western pond turtle in Chapter 3 of  
7 the BDCP would be 1:1 for restoration and 1:1 for protection of aquatic habitats and 2:1 for  
8 protection of upland habitats. Using these ratios would indicate that 1,258 acres of aquatic habitat  
9 should be restored, 1,258 acres of aquatic habitat should be protected, and 1,532 acres of upland  
10 habitat should be protected for western pond turtle to mitigate the near-term losses.

11 The conservation strategy for western pond turtle involves restoration and protection of aquatic  
12 and adjacent upland habitat, and establishment of an interconnected reserve system that provides  
13 for western pond turtle dispersal. The habitat protection and restoration needs for this species are  
14 addressed at the landscape and natural community levels. The BDCP has committed to near-term  
15 restoration and creation of up to 24,350 acres of aquatic habitat (Objective L1.1, Objective L1.3,  
16 Objective NFEW/NPANC1.1, and Objective MWNC1.1) and up to 2,000 acres of upland habitat  
17 (Objective GNC1.1). In addition, the protection and management of existing managed wetland  
18 habitat in Suisun Marsh may increase the value of aquatic habitat. The most beneficial restoration  
19 would occur in freshwater emergent wetland consisting of slow-moving slough and marsh adjacent  
20 to protected, undisturbed grassland. Additionally, basking platforms would be installed as needed in  
21 restored freshwater marsh to benefit the western pond turtle.

22 The natural community restoration and protection activities would be concluded in the first 10  
23 years of Plan implementation, which is close enough in time to the impacts of construction to  
24 constitute adequate mitigation for CEQA purposes. Because the number of acres required to meet  
25 the typical ratios described above would be only 1,258 acres of aquatic communities protected,  
26 1,258 acres of aquatic communities restored and 1,532 acres of upland communities protected, the  
27 24,350 acres of aquatic and 2,000 acres of upland habitats restored or created in the near-term Plan  
28 goals, and the additional detail in the biological goals for western pond turtle, are more than  
29 sufficient to support the conclusion that the near-term impacts of habitat loss and direct mortality  
30 under Alternative 9 on western pond turtles would be less than significant.

31 In addition, the plan also contains commitments to implement AMM1-6, AMM10, and AMM17,  
32 which include elements that would avoid or minimize the risk of directly and indirectly affecting  
33 habitats and species habitats adjacent to work areas and storage sites. The AMMs are described in  
34 detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

### 35 ***Late Long-Term Timeframe***

36 Based on modeled habitat, the study area supports approximately 81,666 acres of aquatic and  
37 28,864 acres of upland habitat for western pond turtle. Alternative 9 would remove 1,311 acres of  
38 aquatic habitat and 1,397 acres of upland habitat for western pond turtle in the late long-term  
39 timeframe.

40 Implementation of Alternative 9 as a whole would increase the extent and distribution of high-value  
41 aquatic and upland nesting and overwintering habitat for western pond turtle in the study area.  
42 While the extent of dispersal habitat is expected to be reduced by approximately 1%, this habitat is

1 abundant in the study area (composed primarily of cultivated lands), is not believed to be a factor  
2 limiting the turtle, and would be replaced with higher-value habitats for western pond turtle.

3 The conservation strategy for western pond turtle involves restoration and protection of aquatic  
4 and adjacent upland habitat, and establishment of an interconnected reserve system that provides  
5 for western pond turtle dispersal. The habitat protection and restoration needs for this species are  
6 addressed at the landscape and natural community levels. The BDCP has committed to late long-  
7 term restoration and creation of up to 74,300 acres of aquatic habitat (Objective L1.1, Objective  
8 L1.3, Objective NFEW/NPANC1.1, MWNC1.1) and up to 8,000 acres of upland habitat (Objective  
9 GNC1.1). In addition, the protection and management of existing managed wetland habitat in Suisun  
10 Marsh may increase the value of aquatic habitat. The most beneficial restoration would occur in  
11 freshwater emergent wetland consisting of slow-moving slough and marsh adjacent to protected,  
12 undisturbed grassland. Aquatic features (e.g., ditches and ponds) and adjacent uplands that are  
13 preserved and managed as part of the 45,405 acres of protected cultivated lands described above for  
14 giant garter snake are also expected to benefit the species. Additionally, basking platforms would be  
15 installed as needed in restored freshwater marsh to benefit the western pond turtle.

16 Riparian and floodplain restoration would potentially increase the quantity and value of aquatic and  
17 nesting and overwintering habitat. Where the floodplain is widened and restored, this would allow  
18 oxbows and slow-moving side channels to form, providing suitable aquatic habitat for this species  
19 (Bury and Germano 2008; Ernst and Lovich 2009). Where riparian vegetation is restored adjacent to  
20 slower-moving channels, sloughs, and ponds, downed trees can provide important basking habitat  
21 and cover habitat for turtles. Riparian restoration in those more interior portions of Old and Middle  
22 Rivers that would be managed for riparian brush rabbit habitat have potential to benefit resident  
23 western pond turtles as riparian-adjacent grassland is an important habitat characteristic for the  
24 rabbit.

25 The study area represents only a small portion of the range of the western pond turtle in California  
26 (which includes most all the Pacific drainages) and southern Oregon. Effects from permanent and  
27 temporary loss or conversion of habitat for the western pond turtle, and other effects described  
28 above, are not expected to result in an adverse effect on the long-term survival and recovery of  
29 western pond turtle because for the following reasons.

- 30 • The study area represents a small portion of the species' entire range.
- 31 • Only 1% of the habitat in the study area would be removed or converted.

32 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*  
33 *Plant Species*) estimates that the restoration and protection actions discussed above, as well as the  
34 restoration of managed wetland, nontidal freshwater perennial emergent wetland, nontidal  
35 perennial aquatic, tidal brackish emergent wetland, tidal freshwater emergent wetland, grassland,  
36 valley foothill riparian, that could overlap with the species model, would result in the restoration of  
37 29,738 acres of aquatic and 1,421 acres of upland modeled habitat for western pond turtle. In  
38 addition, protection of cultivated land, managed wetland, grassland, and valley/foothill riparian  
39 could overlap with the species model and would result in the protection of 1,281 acres of aquatic  
40 and 4,993 acres of upland western pond turtle modeled habitat.

41 The loss of western pond turtle habitat associated with Alternative 9 as a whole would represent an  
42 adverse effect as a result of habitat modification of a special-status species and the potential for  
43 direct mortality of turtles. However, considering the habitat restoration and protection associated

1 with the conservation components, guided by landscape-scale goals and objectives and AMM1–  
2 AMM6, AMM10, and AMM17, which would be in place throughout the construction phase, the loss of  
3 habitat and potential mortality would not have an adverse effect on western pond turtle. Therefore,  
4 the loss of western pond turtle habitat and potential mortality of turtles from Alternative 9 would  
5 have a less-than-significant impact on western pond turtle.

### 6 **Impact BIO-53: Indirect Effects of Plan Implementation on Western Pond Turtle**

7 Indirect effects on western pond turtle within 200 feet of construction activities could temporarily  
8 affect the use of aquatic habitat and upland nesting, overwintering, and dispersal habitat for the  
9 western pond turtle. Construction activities outside the construction footprint but within 200 feet of  
10 water conveyance facilities, conservation components and ongoing habitat enhancement, as well as  
11 operation and maintenance of above-ground water conveyance facilities, including the transmission  
12 facilities, could result in ongoing periodic postconstruction disturbances with localized impacts on  
13 western pond turtle habitat, and temporary noise and visual disturbances over the term of the  
14 BDCP. The use of mechanical equipment during water conveyance facilities construction could cause  
15 the accidental release of petroleum or other contaminants that could affect western pond turtle or  
16 its aquatic prey. The inadvertent discharge of sediment or excessive dust adjacent to western pond  
17 turtle aquatic habitat could also have a negative effect on the species or its prey. AMM1–AMM6, and  
18 AMM10 would minimize the likelihood of such spills and would ensure measures are in place to  
19 prevent runoff from the construction area and potential effects of sediment or dust on western pond  
20 turtle or its prey.

21 Water operations would affect salinity gradients in Suisun Marsh. This effect mechanism cannot be  
22 disaggregated from tidal natural community restoration in Suisun Marsh. It is expected that the  
23 salinity of water in Suisun Marsh would generally increase as a result of water operations and  
24 operation of salinity control gates to mimic a more natural water flow. Results of modeling for full  
25 implementation of the BDCP show salinity to double by the late long-term compared with current  
26 conditions during late fall and winter months. Changes in salinity would not be uniform across  
27 Suisun Marsh, as salinity would likely be more pronounced in some tidal channels and sloughs than  
28 others, and most of the salinity increase would occur during the fall and winter. Western pond  
29 turtles are primarily a freshwater species, although they can also be found in brackish marsh, and  
30 could respond negatively to increased salinity in Suisun Marsh. However, most of the Suisun Marsh  
31 pond turtle observations have been in the interior drainage ditches or near water control structures  
32 not connected to tidal channels and sloughs in Suisun Marsh which is where increases in salinity  
33 would occur. Therefore, the potential effects associated with changes in salinity are not expected to  
34 adversely affect western pond turtles.

35 **NEPA Effects:** With implementation of AMM1–AMM6, AMM10, and AMM17 as part of Alternative 9,  
36 the BDCP would avoid the potential for substantial adverse effects on western pond turtles, either  
37 directly or through habitat modifications. These AMMs would also avoid and minimize effects that  
38 could substantially reduce the number of western pond turtles or restrict the species range.  
39 Therefore, the indirect effects of Alternative 9 would not have an adverse effect on western pond  
40 turtle.

41 **CEQA Conclusion:** Indirect effects resulting from conservation measure operations and maintenance  
42 as well as construction-related noise and visual disturbances could impact western pond turtle in  
43 aquatic and upland habitats. The use of mechanical equipment during construction could cause the  
44 accidental release of petroleum or other contaminants that could affect western pond turtle or its

1 prey. The inadvertent discharge of sediment or excessive dust adjacent to western pond turtle  
2 habitat could also have a negative effect on the species or its prey. Changes in water salinity would  
3 have a less-than-significant impact on western pond turtles because most of the salinity increases  
4 would occur in areas not used extensively by western pond turtles. With implementation of AMM1-  
5 AMM6, AMM10, AMM17, and AMM37 as part of Alternative 9 construction, operation, and  
6 maintenance, the BDCP would avoid the potential for substantial adverse effects on western pond  
7 turtles, either indirectly or through habitat modifications, and would not result in a substantial  
8 reduction in numbers or a restriction in the range of western pond turtles. The indirect effects of  
9 BDCP Alternative 9 would have a less-than-significant impact on western pond turtles.

10 **Impact BIO-54: Periodic Effects of Inundation of Western Pond Turtle Habitat as a Result of**  
11 **Implementation of Conservation Components**

12 *CM2 Yolo Bypass Fisheries Enhancement* would result in periodic inundation that could affect  
13 western pond turtle and its upland habitat. Appendix 5.J, *Effects on Natural Communities, Wildlife,*  
14 *and Plants* provides the method used to estimate periodic inundation effects in the Yolo Bypass.  
15 Based on this method, periodic inundation could affect from an estimated 283 acres of habitat  
16 during 1,000 cfs notch flow to an estimated 798 acres of habitat during 4,000 cfs notch flow (Table  
17 12-4-23). This effect would occur during an estimated maximum of 30% of years, in areas that are  
18 already inundated in more than half of all years; therefore, these areas are expected to provide only  
19 marginal overwintering habitat for the western pond turtle under Existing Conditions. Furthermore,  
20 Yolo Bypass inundation is not expected to affect nesting western pond turtles because operations  
21 would not occur during the nesting season (approximately May through October). Therefore, Yolo  
22 Bypass operations are expect to have a minimal effect, if any, on western pond turtles in the Yolo  
23 Bypass.

24 *CM5 Seasonally Inundated Floodplain Restoration* would periodically inundate 331 acres of upland  
25 habitat for the western pond turtle in the south Delta (CZ 7). Seasonal flooding in restored  
26 floodplains is not expected to adversely affect aquatic and dispersal habitat, because these habitat  
27 functions are expected to remain in the seasonally inundated floodplains. Floodplains are not  
28 expected to be inundated during the nesting season; however, turtle hatchlings may overwinter in  
29 the nest and could be affected by flooding. Restored floodplains would transition for areas that flood  
30 frequently (e.g., every 1 to 2 years) to areas that flood infrequently (e.g., every 10 years or more);  
31 adverse effects on turtle hatchlings are most likely at the lower elevations of the restored floodplain,  
32 where frequent flooding occurs.

33 **NEPA Effects:** Periodic effects on upland habitat for western pond turtle from CM2 and CM5  
34 associated with implementing Alternative 9 are not expected to result in substantial adverse effects  
35 either directly or through habitat modifications because there would not be a substantial reduction  
36 in numbers or a restriction in the range of western pond turtles. Therefore, Alternative 9 would not  
37 adversely affect the species.

38 **CEQA Conclusion:** Flooding of the Yolo Bypass and creation of seasonally inundated floodplain in  
39 various parts of the study area would periodically affect a total of up to 283-798 acres from CM2 and  
40 approximately 331 acres from CM5 of upland habitat for western pond turtle. These acreages  
41 represent only 1% of the total upland western pond turtle habitat in the study area. Most of the  
42 increase in inundation would occur in the winter and early spring months, when western pond  
43 turtles may be in the water or overwintering and occupying upland habitats. Therefore,  
44 implementing Alternative 9, including AMM1-AMM6, AMM10, and AMM17, would not be expected

1 to result in substantial adverse effects on western pond turtle, either directly or through habitat  
2 modifications, because it would not result in a substantial reduction in numbers or a restriction in  
3 the range of western pond turtles. Periodic effects of inundation under Alternative 9 would have a  
4 less-than-significant impact on the species.

#### 5 **Silvery Legless Lizard, San Joaquin Coachwhip, and Blainville's Horned Lizard**

6 This section describes the effects of Alternative 9 on the silvery legless lizard, San Joaquin  
7 coachwhip, and Blainville's horned lizard (special-status reptiles). The habitat types used to assess  
8 effects on silvery legless lizard are limited to inland sand dunes near Antioch (CZ 9 and CZ 10),  
9 which would not be affected by construction or restoration activities. This species is not discussed  
10 any further.

11 The habitat types used to assess effects on the San Joaquin coachwhip are alkali seasonal wetland  
12 complex, grassland, and inland dune scrub west of Byron Highway (CZ 7) and west of Old River and  
13 West Canal (CZ 8). The habitat types used to assess effects on the Blainville's horned lizard are the  
14 same as those for the coachwhip in CZ 7 and CZ 8. There is also potential habitat for the horned  
15 lizard to occur in grassland habitat around Stone Lake (CZ 4) Although the expected range for San  
16 Joaquin coachwhip and Blainville's horned lizard extends into the study area, there are no records  
17 for either of these species within the study area (California Department of Fish and Wildlife 2013).

18 Alternative 9 is expected to result in the temporary and permanent removal of habitat that special-  
19 status reptiles uses for cover and dispersal (Table 12-9-24). BDCP actions that could affect this  
20 habitat are limited to construction and maintenance of the water conveyance facilities in the vicinity  
21 of Clifton Court Forebay, and grassland restoration, protection and management. Full  
22 implementation of Alternative 9 would also include the following biological objectives over the term  
23 of the BDCP that would also benefit special-status reptiles (BDCP Chapter 3, *Conservation Strategy*).

- 24 ● Increase the size and connectivity of the reserve system by acquiring lands adjacent to and  
25 between existing conservation lands (Objective L1.6, associated with CM3).
- 26 ● Increase native species diversity and relative cover of native plant species, and reduce the  
27 introduction and proliferation of nonnative species (Objective L2.6, associated with CM11).
- 28 ● Protect and improve habitat linkages that allow terrestrial covered and other native species to  
29 move between protected habitats within and adjacent to the Plan Area (Objective L3.1,  
30 associated with CM3, CM8, and CM11).
- 31 ● Protect 8,000 acres of grassland (Objective GNC1.1, associated with CM3).
- 32 ● Restore 2,000 acres of grasslands to connect fragmented patches of protected grassland  
33 (Objective GNC1.2, associated with CM3 and CM8).

34 As explained below, with the restoration or protection of these amounts of habitat, in addition to  
35 implementation of AMMs, impacts on special-status reptiles would not be adverse for NEPA  
36 purposes and would be less than significant for CEQA purposes.

1 **Table 12-9-24. Changes in Special-Status Reptile Habitat Associated with Alternative 9 (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>e</sup>	
		NT	LLT <sup>d</sup>	NT	LLT <sup>d</sup>	CM2	CM5
CM1	Grassland <sup>c</sup>	20	20	10	10	NA	NA
<b>Total Impacts CM1</b>		<b>20</b>	<b>20</b>	<b>10</b>	<b>10</b>	<b>NA</b>	<b>NA</b>
CM2–CM18	Grassland <sup>c</sup>	0	0	0	0	0	0
<b>Total Impacts CM2–CM18</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>TOTAL IMPACTS</b>		<b>20</b>	<b>20</b>	<b>10</b>	<b>10</b>	<b>0</b>	<b>0</b>

<sup>a</sup> See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> Grassland impacts include alkali seasonal wetland complex, grassland, and inland dune scrub habitats.

<sup>d</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>e</sup> Periodic effects were estimated for the late long-term only.

NT = near-term

LLT = late long-term

NA = not applicable

2

3 **Impact BIO-55: Loss or Conversion of Habitat for and Direct Mortality of Special-Status**  
4 **Reptiles**

5 Alternative 9 conservation measures would result in the permanent and temporary loss of 30 acres  
6 of potential habitat for special-status reptiles (Table 12-9-24). Water conveyance facilities and  
7 transmission line construction, including establishment and use of RTM, borrow, and spoils areas,  
8 (CM1) would cause the loss of special-status reptile habitat. In addition, habitat enhancement and  
9 management activities (CM11), such as ground disturbance or removal of nonnative vegetation,  
10 could result in local adverse habitat effects for special-status reptiles. In addition to habitat loss and  
11 conversion, construction activities, such as grading, the movement of construction vehicles or heavy  
12 equipment, and the installation of water conveyance facilities components and new transmission  
13 lines, may result in the direct mortality, injury, or harassment of special-status reptiles, including the  
14 potential crushing of individuals and disruption of essential behaviors. Construction of access roads  
15 could fragment suitable habitat, impede upland movements in some areas, and increase the risk of  
16 road mortality. Construction activities related to conservation components could have similar  
17 affects. Each of these individual activities is described below. A summary statement of the combined  
18 impacts and NEPA effects and a CEQA conclusion follow the individual conservation measure  
19 discussions.

- 20 • *CM1 Water Facilities and Operation*: Development of the conveyance facilities would result in the  
21 permanent loss of approximately 20 acres of habitat for special-status reptiles in the vicinity of  
22 Clifton Court Forebay. Construction-related effects would temporarily disturb 10 acres of  
23 suitable habitat for special-status reptiles in the study area.

- 1 • *CM11 Natural Communities Enhancement and Management*: A variety of habitat management  
2 actions included in *CM11* that are designed to enhance wildlife values in BDCP-protected  
3 habitats may result in localized ground disturbances that could temporarily remove small  
4 amounts of special-status reptile habitat. Ground-disturbing activities, such as removal of  
5 nonnative vegetation and road and other infrastructure maintenance, are expected to have  
6 minor adverse effects on available special-status reptile habitat and are expected to result in  
7 overall improvements to and maintenance of species habitat values over the term of the BDCP.  
8 These effects cannot be quantified, but are expected to be minimal and would be reduced  
9 through implementation of Mitigation Measure BIO-55 *Conduct Preconstruction Surveys for*  
10 *Noncovered Special-Status Reptiles and Implement Applicable CM22 Measures*.
- 11 • Operations and maintenance: Ongoing facilities operation and maintenance is expected to have  
12 little if any adverse effect on special-status reptiles. Postconstruction operation and  
13 maintenance of the above-ground water conveyance facilities could result in ongoing but  
14 periodic disturbances that could affect special-status reptiles' use of suitable habitat in the study  
15 area. These effects, however, would be minimized with implementation of Mitigation Measure  
16 BIO-55.
- 17 • Injury and direct mortality: Construction vehicles may cause injury to or mortality of special-  
18 status reptiles. The operation of equipment for land clearing, construction, operation and  
19 maintenance, and restoration, enhancement, and management activities could result in injury or  
20 mortality. This risk is highest from late fall through early spring, when special-status reptiles are  
21 not as active. Increased vehicular traffic associated with BDCP actions could contribute to a  
22 higher incidence of road kill. However, conducting construction during the late-spring through  
23 early fall periods when feasible and implementation of Mitigation Measure BIO-55 would avoid  
24 and minimize injury or mortality of special-status reptiles during construction.

25 The following paragraphs summarize the combined effects discussed above and describe other  
26 BDCP conservation actions that offset or avoid these effects. NEPA effects and a CEQA conclusion are  
27 also included.

### 28 ***Near-Term Timeframe***

29 Because the water conveyance facilities construction is being evaluated at the project level, the near-  
30 term BDCP conservation strategy has been evaluated to determine whether it would provide  
31 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
32 construction effects would not be adverse under NEPA.

33 Alternative 9 would remove 30 acres of grassland habitat for special-status reptiles. The typical  
34 NEPA mitigation ratio (2:1 for protection) for this natural community would indicate that 60 acres  
35 should be protected in the near-term to offset CM1 losses.

36 The BDCP has committed to near-term restoration of 1,140 acres of grassland (CM8) and protection  
37 of up to 2,000 acres of grassland in the Plan Area (CM3). These conservation actions are all  
38 associated with CM3 and CM8 and would occur in the same timeframe as CM1 construction and  
39 early restoration losses, thereby avoiding adverse effects on special-status reptiles.

40 Considering the BDCP conservation strategy and the implementation of Mitigation Measure BIO-55.  
41 to avoid and minimize injury or mortality of special-status reptiles during construction, the

1 permanent and temporary loss of special-status reptile habitat and the potential mortality of either  
2 species from Alternative 9 would not be an adverse effect.

### 3 **Late Long-Term Timeframe**

4 Alternative 9 as a whole would result in the permanent loss of 30 acres of habitat for special-status  
5 reptiles over the life of the plan.

6 Effects of water conveyance facilities construction would be offset through the plan's long-term  
7 commitment to protect 8,000 acres of grassland, and grassland associated with alkali seasonal  
8 wetlands and vernal pool complexes, and to restore 2,000 acres of grassland in the Plan Area.  
9 Grassland protection would focus in particular on acquiring the largest remaining contiguous  
10 patches of unprotected grassland habitat, which are located south of SR 4 in CZ 8 (Objective  
11 GNC1.1). This area connects to more than 620 acres of existing habitat that is protected under the  
12 East Contra Costa County HCP/NCCP.

13 Other effects would be reduced through implementation of Mitigation Measure BIO-55, *Conduct*  
14 *Preconstruction Surveys for Noncovered Special-Status Reptiles and Implement Applicable CM22*  
15 *Measures*. The plan as a whole is expected to benefit special-status reptiles that could be present by  
16 protecting potential habitat from loss or degradation that otherwise could occur with future changes  
17 in existing land use. To the extent that grassland habitat is restored in CZ 8, restoration would  
18 replace unsuitable special-status reptile habitat, such as cultivated land, with high-value cover,  
19 foraging, and dispersal habitat. The overall effect would be beneficial because the plan would result  
20 in a net increase in acreage of grassland habitat in the study area.

21 BDCP's commitment to protect the largest remaining contiguous habitat patches (including  
22 grasslands and the grassland component of alkali seasonal wetland and vernal pool complexes) in  
23 CZ 8 would sufficiently offset the adverse effects resulting from water conveyance facilities  
24 construction.

25 **NEPA Effects:** In the near-term and late long-term, the loss of special-status reptile habitat under  
26 Alternative 9 would be not be adverse because the BDCP has committed to protecting the acreage  
27 required to meet the typical mitigation ratios described above and because of the implementation of  
28 Mitigation Measure BIO-55.

### 29 **CEQA Conclusion:**

#### 30 **Near-Term Timeframe**

31 Because the water conveyance facilities construction is being evaluated at the project level, the near-  
32 term BDCP conservation strategy has been evaluated to determine whether it would provide  
33 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
34 construction effects would be less than significant under CEQA.

35 Alternative 9 would remove 30 acres of grassland habitat for special-status reptiles. The typical  
36 CEQA mitigation ratio (2:1 for protection) for this natural community would indicate that 60 acres  
37 should be protected in the near-term to offset CM1 losses.

38 The BDCP has committed to near-term restoration of 1,140 acres of grassland (CM8) and protection  
39 of up to 2,000 acres of grassland in the Plan Area (CM3). These conservation actions are all

1 associated with CM3 and CM8 and would occur in the same timeframe as CM1 construction and  
2 early restoration losses, thereby avoiding adverse effects on special-status reptiles.

3 The natural community restoration and protection activities are expected to be concluded during  
4 the first 10 years of Plan implementation, which would be close enough to the timing of construction  
5 impacts to constitute mitigation for CEQA purposes. Considering the BDCP conservation strategy  
6 and the implementation of Mitigation Measure BIO-55, the permanent and temporary loss of  
7 special-status reptile habitat and the potential mortality of either species would be a less-than-  
8 significant impact under CEQA.

### 9 **Late Long-Term Timeframe**

10 Alternative 9 as a whole would result in the permanent loss of 30 acres of habitat for special-status  
11 reptiles over the life of the plan. Effects of water conveyance facilities construction would be offset  
12 through the plan's long-term commitment to protect up to 8,000 acres of grassland, and grassland  
13 associated with alkali seasonal wetlands and vernal pool complexes, and to restore 2,000 acres of  
14 grassland in the Plan Area (Objective GNC1.1 and Objective GNC1.2). Grassland protection would  
15 focus in particular on acquiring the largest remaining contiguous patches of unprotected grassland  
16 habitat, which are located south of SR 4 in CZ 8 (Objective GNC1.1). This area connects to more than  
17 620 acres of existing habitat that is protected under the East Contra Costa County HCP/NCCP.

18 Other effects would be reduced through implementation of Mitigation Measure BIO-55, *Conduct*  
19 *Preconstruction Surveys for Noncovered Special-Status Reptiles and Implement Applicable CM22*  
20 *Measures*. The plan as a whole is expected to benefit special-status reptiles that could be present by  
21 protecting potential habitat from loss or degradation that otherwise could occur with future changes  
22 in existing land use. To the extent that grassland habitat is restored in CZ 8, restoration would  
23 replace unsuitable special-status reptile habitat, such as cultivated land, with high-value cover,  
24 foraging, and dispersal habitat. The overall effect would be beneficial because the plan would result  
25 in a net increase in acreage of grassland habitat in the Plan Area.

26 BDCP's commitment to protect the largest remaining contiguous habitat patches (including  
27 grasslands and the grassland component of alkali seasonal wetland and vernal pool complexes) in  
28 CZ 8 would sufficiently offset the adverse effects resulting from water conveyance facilities  
29 construction. Considering the BDCP conservation strategy and the implementation of Mitigation  
30 Measure BIO-55, the permanent and temporary loss of special-status reptile habitat and the  
31 potential mortality of either species under Alternative 9 would not result in a significant impact  
32 under CEQA.

### 33 **Mitigation Measure BIO-55: Conduct Preconstruction Surveys for Noncovered Special-** 34 **Status Reptiles and Implement Applicable CM22 Measures**

35 DWR will retain a qualified biologist to conduct a habitat assessment in areas that are relatively  
36 undisturbed or have a moderate to high potential to support noncovered special-status reptiles  
37 (Blainville's horned lizard and San Joaquin coachwhip) in CZ 4, CZ 7, and CZ 8. The qualified  
38 biologist will survey for noncovered special-status reptiles in areas of suitable habitat  
39 concurrent with the preconstruction surveys for covered species in CZ 4, CZ 7, and CZ 8. If  
40 special-status reptiles are detected, the biologist will passively relocate the species out of the  
41 work area prior to construction if feasible.

1 In addition, *CM22 Avoidance and Minimization Measures*, specifically *AMM1 Worker Awareness*  
2 *Training*, *AMM2 Construction Best Management Practices and Monitoring*, *AMM6 Disposal and*  
3 *Reuse of Spoils*, *Reusable Tunnel Material*, and *Dredged Material*, and *AMM10 Restoration of*  
4 *Temporarily Affected Natural Communities*, will be implemented for all noncovered special-  
5 status reptiles adversely affected by the BDCP to avoid, minimize, or compensate for impacts.

## 6 **Impact BIO-56: Indirect Effects of Plan Implementation on Special-Status Reptile Species**

7 Construction activities associated with water conveyance facilities, conservation components and  
8 ongoing habitat enhancement, as well as operations and maintenance of above-ground water  
9 conveyance facilities, including the transmission facilities, could result in ongoing periodic  
10 postconstruction disturbances and noise with localized effects on special-status reptiles and their  
11 habitat over the term of the BDCP. In addition, construction activities could indirectly affect special-  
12 status reptiles if construction resulted in the introduction of invasive weeds that create vegetative  
13 cover that is too dense for the species to navigate. Construction vehicles and equipment can  
14 transport in their tires and various parts under the vehicles invasive weed seeds and vegetative  
15 parts from other regions to construction sites, resulting in habitat degradation. These potential  
16 effects would be reduced through implementation of *AMM10 Restoration of Temporarily Affected*  
17 *Natural Communities*. Water conveyance facilities operations and maintenance activities would  
18 include vegetation and weed control, ground squirrel control, canal maintenance, infrastructure and  
19 road maintenance, levee maintenance, and maintenance and upgrade of electrical systems. While  
20 maintenance activities are not expected to remove special-status reptile habitat, operation of  
21 equipment could disturb small areas of vegetation around maintained structures and could result in  
22 injury or mortality of individual special-status reptiles, if present.

23 **NEPA Effects:** Implementation of the Mitigation Measure BIO-55, *Conduct Preconstruction Surveys*  
24 *for Noncovered Special-Status Reptiles and Implement Applicable CM22 Measures* would avoid the  
25 potential for substantial adverse effects on these species, either indirectly or through habitat  
26 modifications. The mitigation measures would also avoid and minimize effects that could  
27 substantially reduce the number of special-status reptiles, or restrict either species' range.  
28 Therefore, with implementation of Mitigation Measure BIO-55, the indirect effects of Alternative 9  
29 on special-status reptiles would not be adverse under NEPA.

30 **CEQA Conclusion:** Indirect effects from conservation measure operations and maintenance as well  
31 as construction-related noise and visual disturbances could impact special-status reptiles. In  
32 addition, construction activities could indirectly affect special-status reptiles if construction resulted  
33 in the introduction of invasive weeds that create vegetative cover that is too dense for the species to  
34 navigate. Water conveyance facilities operations and maintenance activities, such as vegetation and  
35 weed control, and road maintenance, are not expected to remove special-status reptile habitat, but  
36 operation of equipment could disturb small areas of vegetation around maintained structures and  
37 could result in injury or mortality of individual special-status reptiles, if present.

38 With implementation of Mitigation Measure BIO-55 as part of Alternative 9 construction, operation,  
39 and maintenance, the BDCP would avoid the potential for significant effects on special-status reptile  
40 species, either indirectly or through habitat modifications, and would not result in a substantial  
41 reduction in numbers or a restriction in the range of either species. With implementation of  
42 Mitigation Measure BIO-55, the indirect effects of BDCP Alternative 9 would have a less-than-  
43 significant impact on special-status reptiles.

1           **Mitigation Measure BIO-55: Conduct Preconstruction Surveys for Noncovered Special-**  
2           **Status Reptiles and Implement Applicable CM22 Measures**

3           See description of Mitigation Measure BIO-55 under Impact BIO-55.

4           **California Black Rail**

5           This section describes the effects of Alternative 9, including water conveyance facilities construction  
6           and implementation of other conservation components, on the California black rail. The habitat  
7           model used to assess effects for the California black rail is based on primary breeding habitat and  
8           secondary habitat. Primary (breeding) habitat for this species within the Delta includes all  
9           *Schoenoplectus* and *Typha*-dominated tidal and nontidal freshwater emergent wetland in patches  
10          greater than 0.55 acre (essentially instream islands of the San Joaquin River and its tributaries and  
11          White Slough Wildlife Area). In Suisun Marsh, primary habitat includes all *Schoenoplectus* and  
12          *Typha*-dominated, and *Salicornia*-dominated patches greater than 0.55 acre, with the exception that  
13          all low marsh habitats dominated by *Schoenoplectus acutus* and *S. californicus* and all managed  
14          wetlands, in general, are considered secondary habitat with lesser ecological value. Upland  
15          transitional zones, providing refugia during high tides, within 150 feet of the tidal wetland edge  
16          were also included as secondary habitat. Secondary habitats generally provide only a few ecological  
17          functions such as foraging (low marsh and managed wetlands) or extreme high tide refuge (upland  
18          transition zones), while primary habitats provide multiple functions, including breeding, effective  
19          predator cover, and valuable foraging opportunities.

20          Construction and restoration associated with Alternative 9 conservation measures would result in  
21          both temporary and permanent losses of California black rail modeled habitat as indicated in Table  
22          12-9-25. Full implementation of Alternative 9 would also include the following conservation actions  
23          over the term of the BDCP to benefit the California black rail (BDCP Chapter 3 Section 3.3, *Biological*  
24          *Goals and Objectives*).

- 25          • Restore or create at least 6,000 acres of tidal brackish emergent wetland in CZ 11, including at  
26          at least 1,500 acres of middle and high marsh (Objectives TBEWNC1.1 and TBEWNC1.2, associated  
27          with CM4).
- 28          • Restore or create at least 24,000 acres of tidal freshwater emergent wetland in CZs 1, 2, 4, 5, 6,  
29          and/or 7 (Objective TFEWNC1.1, associated with CM4).
- 30          • Protect and enhance at least 8,100 acres of managed wetland, at least 1,500 acres of which are  
31          in the Grizzly Island Marsh Complex (Objective MWNC1.1, associated with CM3).
- 32          • Create 1,700 acres of black rail habitat between restored tidal freshwater emergent wetlands  
33          and transitional uplands to provide upland refugia (Objective CBR1.1, associated with CM4).
- 34          • Create topographic heterogeneity in restored tidal brackish and freshwater emergent wetlands  
35          (Objectives TBEWNC1.4 and TFEWNC2.2, associated with CM4).
- 36          • Limit perennial pepperweed to no more than 10% cover in the tidal brackish emergent wetland  
37          natural community within the reserve system (Objective TBEWNC2.1, associated with CM11).

38          As explained below, with the restoration and protection of these amounts of habitat, in addition to  
39          natural community enhancement and management commitments (including *CM12 Methylmercury*  
40          *Management*) and implementation of AMM1–AMM7, *AMM19 California Clapper Rail and California*

1 *Black Rail*, and *AMM27 Selenium Management*, impacts on the California black rail would not be  
2 adverse for NEPA purposes and would be less than significant for CEQA purposes.

3 **Table 12-9-25. Changes in California Black Rail Modeled Habitat Associated with Alternative 9**  
4 **(acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	Primary	15	15	296	296	NA	NA
	Secondary	0	0	0	0	NA	NA
<b>Total Impacts CM1</b>		<b>15</b>	<b>15</b>	<b>296</b>	<b>296</b>	<b>NA</b>	<b>NA</b>
CM2-CM18	Primary	76	84	0	0	0	0
	Secondary	986	3,044	0	0	0	6
<b>Total Impacts CM2-CM18</b>		<b>1,062</b>	<b>3,128</b>	<b>0</b>	<b>0</b>	<b>09</b>	<b>6</b>
<b>TOTAL IMPACTS</b>		<b>1,077</b>	<b>3,143</b>	<b>296</b>	<b>296</b>		

<sup>a</sup> See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only.

NT = near-term

LLT = late long-term

NA = not applicable

5

6 **Impact BIO-57: Loss or Conversion of Habitat for and Direct Mortality of California Black Rail**

7 Alternative 9 conservation measures would result in the combined permanent loss or conversion  
8 and temporary loss of up to 395 acres of modeled primary habitat, and up to 3,044 acres of modeled  
9 secondary habitat for California black rail (Table 12-9-25). Conservation measures that would result  
10 in these losses are conveyance facilities and transmission line construction, and establishment and  
11 use of borrow and spoil areas (CM1) and tidal habitat restoration (CM4). Habitat enhancement and  
12 management activities (CM11) activities, which include ground disturbance or removal of nonnative  
13 vegetation, could result in local adverse habitat effects. In addition, maintenance activities  
14 associated with the long-term operation of the water conveyance facilities and other BDCP physical  
15 facilities could degrade or eliminate California black rail habitat. Each of these individual activities is  
16 described below. A summary statement of the combined NEPA effects, and a CEQA conclusion follow  
17 the individual conservation measure discussions.

- 18 • *CM1 Water Conveyance Facilities and Operation*: Construction of Alternative 9 conveyance  
19 facilities would result in the combined permanent and temporary loss of up to 311 acres of  
20 modeled California black rail primary habitat, (15 acres of permanent loss, 296 acres of  
21 temporary loss) habitat, Table 12-9-25). Activities that would permanently impact black rail  
22 habitat consist of instream island channel dredging. Permanent losses of habitat would occur  
23 from the dredging of Victoria Canal. Although the channel dredging in Middle River would avoid

1 the majority of the instream islands, small portions of these islands would be permanently  
2 affected by this activity. Temporary disturbances of California black rail habitat would primarily  
3 occur from dredging activities in Middle River, which would cause temporary disturbances from  
4 dredging equipment use, turbidity, and other temporary effects. The CM1 permanent  
5 construction footprint overlaps with 16 California black rail occurrences in Middle River. Three  
6 of these occurrences overlap with the channel dredging footprint, and 13 occurrences are  
7 located in temporary dredging work areas. *AMM19 California Clapper Rail and California Black*  
8 *Rail* would minimize potential effects of construction on nesting California black rail. Refer to  
9 the Terrestrial Biology Map Book for a detailed view of Alternative 9 construction locations.

- 10 ● *CM2 Yolo Bypass Fisheries Enhancement*: Construction or channel modification from fish passage  
11 improvements associated with the Yolo Bypass would result in the permanent removal of  
12 approximately 5 acres of primary California black rail habitat in CZ 2. There are no occurrences  
13 of California black rail that intersect with the CM1 footprint. The loss is expected to occur during  
14 the first 10 years of Alternative 9 implementation.
- 15 ● *CM4 Tidal Natural Communities Restoration*: California black rail modeled habitat would be  
16 affected by tidal marsh restoration. Some California black rail modeled habitat would be  
17 permanently lost such that it no longer serves as habitat, while other modeled habitat would  
18 change value through conversion from one habitat type to another. Tidal habitat restoration site  
19 preparation and inundation would result in the permanent loss of 79 acres of primary habitat  
20 and 3,044 acres of secondary habitat for California black rail. Of the 79 acres of primary habitat  
21 lost, an estimated 76 acres would be converted to low marsh, or secondary habitat, for the  
22 species due to increased water elevations.

23 The majority of the effects of tidal natural communities restoration would occur in Suisun Marsh  
24 (CZ 11). Much of the natural wetland habitat that would be removed occurs in isolated patches  
25 and would be replaced by larger continuous areas of tidal wetlands that are expected to support  
26 higher habitat functions for the rail than the impacted wetlands. As described in the BDCP,  
27 restoration of up to 24,000 acres of tidal freshwater emergent wetland in the Delta and at least  
28 6,000 acres of tidal brackish emergent wetland natural communities in CZ 11 by the late long-  
29 term would benefit California black rail. The primary habitat for the species in the Delta consists  
30 of inchannel islands, which are in areas that are most vulnerable to the effects of sea level rise in  
31 the study area. Tidal restoration under CM4 would ensure that land is protected adjacent to  
32 current habitat in the delta with the consideration of sea level rise. Tidal restoration projects  
33 would include an ecotone between wetlands and transitional uplands which would provide  
34 upland refugia for the species.

35 The tidal natural communities restoration would be phased through the course of the BDCP  
36 restoration program to allow for recovery of some areas before the initiation of restoration  
37 actions in other areas. However, California black rails have a greater use of mature tidal marshes  
38 and, therefore, it would be years before the newly restored marshes provided suitable habitat  
39 for the species. In the long-term, tidal natural communities restoration is expected to have little  
40 to no adverse effects on California black rail habitat because the habitat removed would be  
41 replaced by a greater acreage of high-value tidal wetland and, thus, is expected to provide a  
42 benefit for California black rail.

- 43 ● *CM11 Natural Communities Enhancement and Management*: A variety of habitat management  
44 actions contained in *CM11 Natural Communities Enhancement and Management* that are  
45 designed to enhance wildlife values in restored and protected tidal wetland habitats may result

1 in localized ground disturbances that could temporarily remove small amounts of California  
2 black rail habitat. Ground-disturbing activities, such as removal of nonnative vegetation and  
3 road and other infrastructure maintenance activities, are expected to have minor adverse effects  
4 on available California black rail habitat and are expected to result in overall improvements and  
5 maintenance of California black rail habitat values over the term of the BDCP. Noise and visual  
6 disturbances during implementation of habitat management actions could also result in  
7 temporary disturbances that affect California black rail use of the surrounding habitat. These  
8 effects cannot be quantified, but would be avoided and minimized by the AMMs listed below.  
9 Additional actions under CM11 include the control of nonnative predators to reduce nest  
10 predation as needed.

- 11 ● Operations and Maintenance: Postconstruction operation and maintenance of the above-ground  
12 water conveyance facilities and restoration infrastructure could result in ongoing but periodic  
13 disturbances that could affect California black rail use of the surrounding habitat in Suisun and  
14 the central Delta. Maintenance activities would include vegetation management, levee and  
15 structure repair, and re-grading of roads and permanent work areas. These effects, however,  
16 would be reduced by AMMs and conservation actions as described below.
- 17 ● Injury and Direct Mortality: Construction vehicle activity may cause injury or mortality to  
18 California black rail. If rails are present adjacent to covered activities, the operation of  
19 equipment for land clearing, construction, conveyance facilities operation and maintenance, and  
20 habitat restoration, enhancement, and management could result in injury or mortality of  
21 California black rail. Increased vehicular traffic associated with BDCP actions could contribute to  
22 a higher incidence of road kill. However, conducting construction outside of the breeding season  
23 where feasible (reducing the risk of impacting active nests), construction monitoring, and other  
24 measures would be implemented to avoid and minimize injury or mortality of the species during  
25 construction, as required by AMM1–AMM7 and *AMM19 California Clapper Rail and California*  
26 *Black Rail* listed below.

27 The following paragraphs summarize the combined effects discussed above and describe other  
28 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also  
29 included.

### 30 ***Near-Term Timeframe***

31 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
32 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
33 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
34 effects of construction would not be adverse under NEPA. With Alternative 9 implementation, there  
35 would be a loss of 1,373 acres of modeled habitat for California black rail in the study area in the  
36 near-term. These effects would result from the construction of the water conveyance facilities (CM1,  
37 311 acres of primary habitat), and implementing other conservation measures (*CM2 Yolo Bypass*  
38 *Fisheries Enhancement* and *CM4 Tidal Natural Communities Restoration*—76 acres of primary  
39 habitat, 986 acres of secondary habitat).

40 The typical NEPA and CEQA project-level mitigation ratio for those natural communities that would  
41 be affected and that are identified in the biological goals and objectives for California black rail in  
42 Chapter 3 of the BDCP would be 1:1 for restoration/creation of wetland natural communities such  
43 as tidal freshwater emergent wetland, tidal brackish emergent wetland, and managed wetland.  
44 Using this ratio would indicate that 311 acres of tidal natural communities should be

1 restored/created to compensate for the CM1 losses of California black rail habitat. The near-term  
2 effects of other conservation actions would remove 1,062 acres of tidal natural communities,  
3 therefore requiring 1,062 acres of tidal natural communities restoration using the same typical  
4 NEPA and CEQA ratio (1:1 for restoration).

5 The BDCP has committed to near-term goals of restoring 2,000 acres of tidal brackish emergent  
6 wetland, 8,850 acres of tidal freshwater emergent wetland, and 4,800 acres of managed wetland in  
7 the Plan Area (Table 3-4 in Chapter 3, *Description of Alternatives*). These conservation actions are all  
8 associated with CM4 and would occur in the same timeframe as the construction and early  
9 restoration losses, thereby avoiding adverse effects of habitat loss on California black rail. The tidal  
10 brackish emergent wetland would be restored in CZ 11 among the Western Suisun/Hill Slough  
11 Marsh Complex, the Suisun Slough/Cutoff Slough Marsh Complex, and the Nurse Slough/Denverton  
12 Marsh complex (Objective TBEWNC1.1 in BDCP Chapter 3, *Conservation Strategy*) and the tidal  
13 freshwater emergent wetland would be restored in CZ 1, CZ 2, CZ 4, CZ 5, CZ 6, and/or CZ 7  
14 (Objective TFEWNC1.1). In addition, tidal brackish and tidal freshwater emergent wetlands would  
15 be restored in a way that creates topographic heterogeneity and in areas that increase connectivity  
16 among protected lands (Objectives TBEWNC1.4 and TFEWNC2.2). Portions of the 4,800 acres of  
17 managed wetland protected and enhanced in CZ 11 would benefit the California black rail through  
18 the enhancement of degraded areas (such as areas of bare ground or marsh where the predominant  
19 vegetation consists of invasive species such as perennial pepperweed) to vegetation such as  
20 pickleweed-alkali heath-American bulrush plant associations (Objective MWNC1.1). These Plan  
21 objectives represent performance standards for considering the effectiveness of CM4 restoration  
22 actions. The acres of restoration and protection contained in the near-term Plan goals and the  
23 additional detail in the biological objectives for California black rail satisfy the typical mitigation that  
24 would be applied to the project-level effects of CM1, as well as mitigate the near-term effects of the  
25 other conservation measures.

26 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
27 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
28 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
29 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
30 *Material*, *AMM7 Barge Operations Plan*, and *AMM19 California Clapper Rail and California Black Rail*.  
31 All of these AMMs include elements that would avoid or minimize the risk of affecting individuals  
32 and species habitats adjacent to work areas. The AMMs are described in detail in BDCP Appendix  
33 3.C, *Avoidance and Minimization Measures*.

#### 34 **Late Long-Term Timeframe**

35 The study area supports approximately 7,467 acres of primary and 17,915 acres of secondary  
36 habitat for California black rail. Alternative 9 as a whole would result in the permanent loss of and  
37 temporary effects on 395 acres of primary habitat and 3,044 acres of secondary habitat for  
38 California black rail during the term of the Plan (2% of the total primary habitat in the study area  
39 and 17% of the total secondary habitat in the study area). The locations of these losses are described  
40 above in the analyses of individual conservation measures. The Plan includes conservation  
41 commitments through *CM4 Tidal Natural Communities Restoration* to restore or create at least 6,000  
42 acres of tidal brackish emergent wetland in CZ 11 (Objective TBEWNC1.1) and at least 24,000 acres  
43 of tidal freshwater emergent wetland in CZs 1, 2, 4, 5, 6, and/or 7 (Objective TFEWNC1.1). These  
44 tidal wetlands would be restored as a mosaic of large, interconnected and biologically diverse  
45 patches, and at least 1,500 acres of restored marsh would consist of middle-and high-marsh

1 vegetation with dense, tall stands of pickleweed and bulrush cover serving as primary habitat for  
2 California black rail in Suisun Marsh (Objective TBEWNC1.1). In the Delta, at least 1,700 acres of  
3 upland refugia for California black rail would be created between the restored tidal freshwater  
4 emergent wetlands and transitional uplands to provide cover from predators (Objectives  
5 TBEWNC1.4, TFEWNC2.2, and CBR1.1). Portions of the 8,100 acres of managed wetland protected  
6 and enhanced in CZ 11 as part of *CM3 Natural Communities Protection and Restoration* would benefit  
7 the California black rail through the enhancement of degraded areas (such as areas of bare ground  
8 or marsh where the predominant vegetation consists of invasive species such as perennial  
9 pepperweed) to vegetation such as pickleweed-alkali heath-American bulrush plant associations  
10 (Objective MWNC1.1). Additional pressures on the species such as loss of habitat from invasive  
11 species and mortality from nest predators would also be addressed through the BDCP. Perennial  
12 pepperweed, which outcompetes suitable nesting habitat for California black rail (such as  
13 pickleweed) would be reduced to no more than 10% cover in the tidal brackish emergent wetland  
14 natural community within CZ 11 (TBEWNC2.1). In addition, nonnative predators would be  
15 controlled to reduce nest predation if necessary through *CM11 Natural Communities Enhancement  
16 and Management*.

17 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and  
18 Plant Species*) estimates that the restoration and protection actions discussed above would result in  
19 the restoration of 3,579 acres of primary habitat and 12,115 acres of secondary habitat for  
20 California black rail and the protection of 275 acres of secondary habitat for the species.

21 **NEPA Effects:** The loss of California black rail habitat and potential direct mortality of this special-  
22 status species under Alternative 9 would represent an adverse effect in the absence of other  
23 conservation actions. However, with habitat protection and restoration associated with CM4, guided  
24 by the biological objectives for the species and by *AMM1 Worker Awareness Training, AMM2  
25 Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention  
26 Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and  
27 Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged  
28 Material, AMM7 Barge Operations Plan, and AMM19 California Clapper Rail and California Black Rail,*  
29 which would be in place throughout the construction period, the effects of Alternative 9 as a whole  
30 on California black rail would not be adverse under NEPA.

### 31 **CEQA Conclusion:**

#### 32 **Near-Term Timeframe**

33 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
34 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
35 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
36 effects of construction would be less than significant under CEQA. With Alternative 9  
37 implementation, there would be a loss of 1,373 acres of modeled habitat for California black rail in  
38 the study area in the near-term. These effects would result from the construction of the water  
39 conveyance facilities (CM1, 311 acres of primary habitat), and implementing other conservation  
40 measures (*CM2 Yolo Bypass Fisheries Enhancement and CM4 Tidal Natural Communities  
41 Restoration*—76 acres of primary habitat, 986 acres of secondary habitat).

42 The typical NEPA and CEQA project-level mitigation ratio for those natural communities that would  
43 be affected and that are identified in the biological goals and objectives for California black rail in

1 Chapter 3 of the BDCP would be 1:1 for restoration/creation of wetland natural communities such  
2 as tidal freshwater emergent wetland, tidal brackish emergent wetland, and managed wetland.  
3 Using this ratio would indicate that 311 acres of tidal natural communities should be  
4 restored/created to compensate for the CM1 losses of California black rail habitat. The near-term  
5 effects of other conservation actions would remove 1,062 acres of tidal natural communities,  
6 therefore requiring 1,062 acres of tidal natural communities restoration using the same typical  
7 NEPA and CEQA ratio (1:1 for restoration).

8 The BDCP has committed to near-term goals of restoring 2,000 acres of tidal brackish emergent  
9 wetland, 8,850 acres of tidal freshwater emergent wetland, and 4,800 acres of managed wetland in  
10 the Plan Area (Table 3-4 in Chapter 3). These conservation actions are all associated with CM4 and  
11 would occur in the same timeframe as the construction and early restoration losses, thereby  
12 avoiding adverse effects of habitat loss on California black rail. The tidal brackish emergent wetland  
13 would be restored in CZ 11 among the Western Suisun/Hill Slough Marsh Complex, the Suisun  
14 Slough/Cutoff Slough Marsh Complex, and the Nurse Slough/Denverton Marsh complex (Objective  
15 TBEWNC1.1) and the tidal freshwater emergent wetland would be restored in CZ 1, CZ 2, CZ 4, CZ 5,  
16 CZ 6, and/or CZ 7 (Objective TFEWNC1.1). In addition, tidal brackish and tidal freshwater emergent  
17 wetlands would be restored in a way that creates topographic heterogeneity and in areas that  
18 increase connectivity among protected lands (Objectives TBEWNC1.4 and TFEWNC2.2). Portions of  
19 the 4,800 acres of managed wetland protected and enhanced in CZ 11 would benefit the California  
20 black rail through the enhancement of degraded areas (such as areas of bare ground or marsh where  
21 the predominant vegetation consists of invasive species such as perennial pepperweed) to  
22 vegetation such as pickleweed-alkali heath-American bulrush plant associations (Objective  
23 MWNC1.1). These Plan objectives represent performance standards for considering the  
24 effectiveness of CM4 restoration actions.

25 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
26 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
27 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
28 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
29 *Material*, *AMM7 Barge Operations Plan*, and *AMM19 California Clapper Rail and California Black Rail*.  
30 All of these AMMs include elements that would avoid or minimize the risk of affecting individuals  
31 and species habitats adjacent to work areas. The AMMs are described in detail in BDCP Appendix  
32 3.C, *Avoidance and Minimization Measures*.

33 The natural community restoration and protection activities would be concluded in the first 10  
34 years of Alternative 9 implementation, which is close enough in time to the occurrence of impacts to  
35 constitute adequate mitigation for CEQA purposes. In addition, *AMM19 California Clapper Rail and*  
36 *California Black Rail* and *AMM1–AMM7* would avoid and minimize potential impacts on the species  
37 from construction-related habitat loss and noise and disturbance. Because the number of acres  
38 required to meet the typical mitigation ratio described above would be only 3,608 acres of  
39 restored/created tidal natural communities, the 10,850 acres of tidal brackish and tidal freshwater  
40 emergent wetland restoration and the 4,100 acres of managed wetland protection and enhancement  
41 contained in the near-term Plan goals, and the additional detail in the biological objectives for  
42 California black rail, are more than sufficient to support the conclusion that the near-term impacts of  
43 habitat loss and direct mortality under Alternative 9 would be less than significant under CEQA.

1 **Late Long-Term Timeframe**

2 The study area supports approximately 7,467 acres of primary and 17,915 acres of secondary  
3 habitat for California black rail. Alternative 9 as a whole would result in the permanent loss of and  
4 temporary effects on 395 acres of primary habitat and 3,044 acres of secondary habitat for  
5 California black rail during the term of the Plan (2% of the total primary habitat in the study area  
6 and 17% of the total secondary habitat in the study area). The locations of these losses are described  
7 above in the analyses of individual conservation measures. The Plan includes conservation  
8 commitments through *CM4 Tidal Natural Communities Restoration* to restore or create at least 6,000  
9 acres of tidal brackish emergent wetland in CZ 11 (Objective TBEWNC1.1) and at least 24,000 acres  
10 of tidal freshwater emergent wetland in CZs 1, 2, 4, 5, 6, and/or 7 (TFEWNC1.1). These tidal  
11 wetlands would be restored as a mosaic of large, interconnected and biologically diverse patches  
12 and much of the restored marsh would consist of middle-and high-marsh vegetation with dense, tall  
13 stands of pickleweed and bulrush cover, serving as primary habitat for California black rail in Suisun  
14 Marsh (Objective TBEWNC1.1). In the Delta, at least 1,700 acres of upland refugia for California  
15 black rail would be created between the restored tidal freshwater emergent wetlands and  
16 transitional uplands to provide cover from predators (Objectives TBEWNC1.4, TFEWNC2.2, and  
17 CBR1.1). Portions of the 8,100 acres of managed wetland protected and enhanced in CZ 11 as part of  
18 *CM3 Natural Communities Protection and Restoration* would benefit the California black rail through  
19 the enhancement of degraded areas (such as areas of bare ground or marsh where the predominant  
20 vegetation consists of invasive species such as perennial pepperweed) to vegetation such as  
21 pickleweed-alkali heath-American bulrush plant associations (Objective MWNC1.1). Additional  
22 pressures on the species such as loss of habitat from invasive species and mortality from nest  
23 predators would also be addressed through the BDCP. Perennial pepperweed, which outcompetes  
24 suitable nesting habitat for California black rail (such as pickleweed) would be reduced to no more  
25 than 10% cover in the tidal brackish emergent wetland natural community within CZ 11 (Objective  
26 TBEWNC2.1). In addition, nonnative predators would be controlled to reduce nest predation if  
27 necessary through *CM11 Natural Communities Enhancement and Management*.

28 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
29 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
30 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
31 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
32 *Material*, *AMM7 Barge Operations Plan*, and *AMM19 California Clapper Rail and California Black Rail*.  
33 All of these AMMs include elements that would avoid or minimize the risk of affecting individuals  
34 and species habitats adjacent to work areas. The AMMs are described in detail in BDCP Appendix  
35 3.C, *Avoidance and Minimization Measures*.

36 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*  
37 *Plant Species*) estimates that the restoration and protection actions discussed above would result in  
38 the restoration of 3,579 acres of primary habitat and 12,115 acres of secondary habitat for  
39 California black rail and the protection of 275 acres of secondary habitat for the species.

40 Considering these protection and restoration provisions, which would provide acreages of new or  
41 enhanced habitat in amounts greater than necessary to compensate for habitats lost to construction  
42 and restoration activities, loss of habitat or direct mortality through implementation of Alternative 9  
43 would not result in a substantial adverse effect through habitat modifications and would not  
44 substantially reduce the number or restrict the range of the species. Therefore, the alternative  
45 would have a less-than-significant impact on California black rail.

1 **Impact BIO-58: Effects on California Black Rail Associated with Electrical Transmission**  
2 **Facilities**

3 New transmission lines would increase the risk for bird-power line strikes, which could result in  
4 injury or mortality of California black rail. Black rails are known to suffer mortality from  
5 transmission line collision, likely associated with migration and flights between foraging areas  
6 (Eddleman et al 1994). Due to their wing shape and body size, rails have low to moderate flight  
7 maneuverability (Bevanger 1998), increasing susceptibility to collision mortality. However, there  
8 are relatively few records of California black rail collisions with overhead wires. California black  
9 rails exhibit daytime site fidelity and a lack of long-distance night migration, two factors which are  
10 associated with low collision risk in avian species (Eddleman et al. 1994). California black rail  
11 movements in the study area are likely short, seasonal, and at low altitudes, typically less than 16  
12 feet (5 meters) (Eddleman et al 1994). While the species may have low to moderate flight  
13 maneuverability, the bird's behavior (e.g., sedentary, nonmigratory, ground-nesting and foraging,  
14 solitary, no flocking, secretive) reduces potential exposure to overhead wires and vulnerability to  
15 collision mortality (BDCP Appendix 5.J, Attachment 5J.C, *Analysis of Potential Bird Collisions at*  
16 *Proposed BDCP Powerlines*).

17 Transmission line poles and towers also provide perching substrate for raptors, which could result  
18 in increased predation pressure on local black rails. Little is currently known about the seasonal  
19 movements of black rails or the potential for increased predation on rails near power poles.  
20 However, transmission facilities are expected to have few adverse effects on the black rail  
21 population.

22 **NEPA Effects:** The construction and presence of new transmission lines would not represent an  
23 adverse effect because the risk of bird strike is considered to be minimal based on the species' flight  
24 behaviors. In addition, *AMM20 Greater Sandhill Crane* contains the commitment to place bird strike  
25 diverters on all new powerlines and select existing powerlines, which would further minimize risk  
26 of bird strike for California black rails in the Delta. Transmission line structures could increase  
27 predation on local black rails by providing perching structures for raptors. However, these impacts  
28 on the California black rail population are not expected to be adverse.

29 **CEQA Conclusion:** The construction and presence of new transmission lines would have a less-than-  
30 significant impact on California black rail because the risk of bird strike is considered to be minimal  
31 based on the species' flight behaviors. In addition, *AMM20 Greater Sandhill Crane* contains the  
32 commitment to place bird strike diverters on all new powerlines and select existing powerlines,  
33 which would further minimize risk of bird strike for California black rails in the Delta. Transmission  
34 line structures could increase predation on local black rails by providing perching structures for  
35 raptors. However, these impacts on the California black rail population are expected to be less than  
36 significant.

37 **Impact BIO-59: Indirect Effects of Plan Implementation on California Black Rail**

38 **Indirect construction-related effects:** Both primary and secondary habitat for California black rail  
39 within the vicinity of proposed construction areas could be indirectly affected by construction  
40 activities. Indirect effects associated with construction include noise, dust, and visual disturbance  
41 caused by grading, filling, contouring, and other ground-disturbing operations outside the project  
42 footprint but within 500 feet from the construction edge. Construction noise above background  
43 noise levels (greater than 50 dBA) could extend 1,900 to 5,250 feet from the edge of construction

1 activities (BDCP Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of the BDCP*  
2 *Conveyance Facility on Sandhill Crane*, Table 4), although there are no available data to determine  
3 the extent to which these noise levels could affect California black rail. The use of mechanical  
4 equipment during water conveyance facilities construction could cause the accidental release of  
5 petroleum or other contaminants that could affect California black rail in the surrounding habitat.  
6 The inadvertent discharge of sediment or excessive dust adjacent to California black rail habitat  
7 could also affect the species.

8 If construction occurs during the nesting season, these indirect effects could result in the loss or  
9 abandonment of nests, and mortality of any eggs and/or nestlings. However, there is a commitment  
10 in AMM19 (as described in BDCP Appendix 3.C, *Avoidance and Minimization Measures*) that  
11 preconstruction surveys of potential breeding habitat would be conducted within 700 feet of project  
12 activities, and a 500-foot no-disturbance buffer would be established around any territorial call-  
13 centers during the breeding season. In addition, construction would be avoided altogether if  
14 breeding territories cannot be accurately delimited.

15 **Salinity:** Water operations under Operational Scenario A would have an effect on salinity gradients  
16 in Suisun Marsh. These effects cannot be disaggregated from tidal habitat restoration, which would  
17 also cause changes in salinity gradients. It is expected that the salinity of water in Suisun Marsh  
18 would generally increase as a result of water operations and operations of salinity-control gates to  
19 mimic a more natural water flow. This would likely encourage the establishment of tidal wetland  
20 plant communities tolerant of more brackish environments, which should be beneficial to California  
21 black rail because its historical natural Suisun Marsh habitat was brackish tidal marsh.

22 **Methylmercury Exposure:** Marsh (tidal and nontidal) and floodplain restoration have the potential  
23 to increase exposure to methylmercury. Mercury is transformed into the more bioavailable form of  
24 methylmercury in aquatic systems, especially areas subjected to regular wetting and drying such as  
25 tidal marshes and flood plains. Thus, BDCP restoration activities that create newly inundated areas  
26 could increase bioavailability of mercury (see BDCP Chapter 3, *Conservation Strategy*, for details of  
27 restoration). Increased methylmercury associated with natural community and floodplain  
28 restoration may indirectly affect California black rail, via uptake in lower trophic levels (as described  
29 in the BDCP, Appendix 5.D, *Contaminants*). In general, the highest methylation rates are associated  
30 with high tidal marshes that experience intermittent wetting and drying and associated anoxic  
31 conditions (Alpers et al. 2008). The potential mobilization or creation of methylmercury within the  
32 study area varies with site-specific conditions and would need to be assessed at the project level.  
33 *CM12 Methylmercury Management* contains provisions for project-specific Mercury Management  
34 Plans. Along with avoidance and minimization measures and adaptive management and monitoring,  
35 CM12 is expected to reduce the effects of methylmercury resulting from BDCP natural communities  
36 and floodplain restoration on California black rail.

37 Concentrations of methylmercury known to cause reproductive effects in birds have been found in  
38 blood and feather samples of San Francisco Bay black rails (Tsao et al. 2009). Because they forage  
39 directly in contaminated sediments, California black rails may be especially prone to methylmercury  
40 contamination. Currently, it is unknown how much of the sediment-derived methylmercury enters  
41 the food chain in Suisun Marsh or what tissue concentrations are actually harmful to the California  
42 black rail. Although tidal habitat restoration might increase methylation of mercury export to other  
43 habitats, it is unlikely to increase the exposure of California black rails to methylmercury, as they  
44 currently reside in tidal marshes in the Delta and the San Francisco Bay, where elevated  
45 methylmercury levels exist. Sites-specific restoration plans that address the creation and

1 mobilization of mercury, as well as monitoring and adaptive management as described in CM12  
2 would address the uncertainty of methylmercury levels in restored tidal marsh.

3 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in  
4 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,  
5 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,  
6 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz  
7 2009). The effect of selenium toxicity differs widely between species and also between age and sex  
8 classes within a species. In addition, the effect of selenium on a species can be confounded by  
9 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith  
10 2009).

11 The primary source of selenium bioaccumulation in birds is through their diet (Ackerman and  
12 Eagles-Smith 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the  
13 trophic level at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At  
14 Kesterson Reservoir in the San Joaquin Valley, selenium concentrations in invertebrates have been  
15 found to be two to six times the levels in rooted plants. Furthermore, bivalves sampled in the San  
16 Francisco Bay contained much higher selenium levels than crustaceans such as copepods (Stewart et  
17 al. 2004). Studies conducted at the Grasslands in Merced County recorded higher selenium levels in  
18 black-necked stilts which feed on aquatic invertebrates than in mallards and pintails, which are  
19 primarily herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which  
20 forage on bivalves) have much higher levels of selenium levels than shorebirds that prey on aquatic  
21 invertebrates (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high  
22 levels of selenium have a higher risk of selenium toxicity.

23 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations  
24 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to  
25 exacerbate bioaccumulation of selenium in avian species, including California black rail. Marsh (tidal  
26 and nontidal) and floodplain restoration have the potential to mobilize selenium, and therefore  
27 increase avian exposure from ingestion of prey items with elevated selenium levels. Thus, BDCP  
28 restoration activities that create newly inundated areas could increase bioavailability of selenium  
29 (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Changes in selenium  
30 concentrations were analyzed in Chapter 8, *Water Quality*, and it was determined that, relative to  
31 Existing Conditions and the No Action Alternative, CM1 would not result in substantial, long-term  
32 increases in selenium concentrations in water in the Delta under any alternative. However, it is  
33 difficult to determine whether the effects of potential increases in selenium bioavailability  
34 associated with restoration-related conservation measures (CM4, CM5) would lead to adverse  
35 effects on California black rail.

36 Because of the uncertainty that exists at this programmatic level of review, there could be a  
37 substantial effect on California black rail from increases in selenium associated with restoration  
38 activities. This effect would be addressed through the implementation of *AMM27 Selenium*  
39 *Management* (BDCP Appendix 3.C, *Avoidance and Minimization Measures*) which would provide  
40 specific tidal habitat restoration design elements to reduce the potential for bioaccumulation of  
41 selenium and its bioavailability in tidal habitats. Furthermore, the effectiveness of selenium  
42 management to reduce selenium concentrations and/or bioaccumulation would be evaluated  
43 separately for each restoration effort as part of design and implementation. This avoidance and  
44 minimization measure would be implemented as part of the tidal habitat restoration design  
45 schedule.

1 **NEPA Effects:** Potential effects of noise and visual disturbances on California black rail would be  
2 minimized with *AMM19 California Clapper Rail and California Black Rail*. *AMM1–AMM7*, including  
3 *AMM2 Construction Best Management Practices and Monitoring*, would minimize the likelihood of  
4 spills from occurring and ensure that measures were in place to prevent runoff from the  
5 construction area and to avoid negative effects of dust on the species. Implementation of  
6 Operational Scenario A, including operation of salinity-control gates, and tidal habitat restoration  
7 are expected to increase water salinity in Suisun Marsh, which would be expected to establish tidal  
8 marsh similar to historic conditions. Tidal habitat restoration could result in increased exposure of  
9 California black rail to selenium. This effect would be addressed through the implementation of  
10 *AMM27 Selenium Management*, which would provide specific tidal habitat restoration design  
11 elements to reduce the potential for bioaccumulation of selenium and its bioavailability in tidal  
12 habitats. The indirect effects associated with noise and visual disturbances, potential spills of  
13 hazardous material, changes in salinity, and increased exposure to selenium from Alternative 9  
14 implementation would not have an adverse effect on California black rail. Tidal habitat restoration is  
15 unlikely to have a significant impact on California black rail through increased exposure to  
16 methylmercury, as rails currently reside in tidal marshes where elevated methylmercury levels  
17 exist. However, it is unknown what concentrations of methylmercury are harmful to the species and  
18 the potential for increased exposure varies substantially within the study area. Site-specific  
19 restoration plans in addition to monitoring and adaptive management, described in *CM12*  
20 *Methylmercury Management*, would address the uncertainty of methylmercury levels in restored  
21 tidal marsh. The site-specific planning phase of marsh restoration would be the appropriate place to  
22 assess the potential for risk of methylmercury exposure for California black rail, once site specific  
23 sampling and other information could be developed.

24 **CEQA Conclusion:** Noise and visual disturbances related to construction-related activities and other  
25 conservation measures could disturb primary and secondary California black rail habitat adjacent to  
26 work sites. *AMM19 California Clapper Rail and California Black Rail* would avoid and minimize  
27 impacts on California black rail from noise and visual disturbance. The use of mechanical equipment  
28 during water conveyance facilities construction could cause the accidental release of petroleum or  
29 other contaminants that could affect California black rail in the surrounding habitat. The inadvertent  
30 discharge of sediment or excessive dust adjacent to California black rail habitat could also affect the  
31 species. These impacts on California black rail would be less than significant with the incorporation  
32 of *AMM1–AMM7*, including *AMM2 Construction Best Management Practices and Monitoring*, into the  
33 BDCP. Implementation of Operational Scenario A, including operation of salinity-control gates, and  
34 tidal habitat restoration are expected to increase water salinity in Suisun Marsh. These salinity  
35 gradient changes should have a beneficial impact on California black rail through the establishment  
36 of tidal marsh similar to historic conditions. Tidal habitat restoration is unlikely to have a significant  
37 impact on California black rail through increased exposure to methylmercury, as rails currently  
38 reside in tidal marshes where elevated methylmercury levels exist. However, it is unknown what  
39 concentrations of methylmercury are harmful to the species. Site-specific restoration plans in  
40 addition to monitoring and adaptive management, described in *CM12 Methylmercury Management*,  
41 would address the uncertainty of methylmercury levels in restored tidal marsh. Tidal habitat  
42 restoration could result in increased exposure of California black rail to selenium. This effect would  
43 be addressed through the implementation of *AMM27 Selenium Management*, which would provide  
44 specific tidal habitat restoration design elements to reduce the potential for bioaccumulation of  
45 selenium and its bioavailability in tidal habitats. Therefore, the indirect effects of Alternative 9  
46 implementation would have a less-than-significant impact on California black rail.

1 **Impact BIO-60: Fragmentation of California Black Rail Habitat as a Result of Conservation**  
2 **Component Implementation**

3 Restoration activities may temporarily fragment existing wetlands in Suisun Marsh and could create  
4 temporary barriers to California black rail movements. Grading, filling, contouring and other initial  
5 ground-disturbing activities could remove habitat along movement corridors used by individuals  
6 and potentially temporarily reduce access to adjacent habitat areas. The temporary adverse effects  
7 of fragmentation of tidal brackish emergent wetland habitat for California black rail or restoration  
8 activities resulting in barriers to movement would be minimized through sequencing of *CM4 Tidal*  
9 *Natural Community Restoration* activities. The tidal natural communities restoration would be  
10 phased through the course of the BDCP restoration program to allow for recovery of some areas  
11 before restoration actions are initiated in other areas. In addition, *AMM19 California Clapper Rail*  
12 *and California Black Rail* would avoid and minimize effects on California black rail.

13 **NEPA Effects:** The fragmentation of existing wetlands and creation of temporary barriers to  
14 movement would not represent an adverse effect on California black rail as a result of habitat  
15 modification of a special-status species because *CM4 Tidal Natural Communities Restoration* would  
16 be phased to allow for the recovery of some areas before restoration actions are initiated in other  
17 areas. In addition, *AMM19 California Clapper Rail and California Black Rail* would avoid and  
18 minimize effects on California black rail.

19 **CEQA Conclusion:** The fragmentation of existing wetlands and creation of temporary barriers to  
20 movement would represent a less-than-significant impact on California black rail as a result of  
21 habitat modification of a special-status species because *CM4 Tidal Natural Communities Restoration*  
22 would be phased to allow for the recovery of some areas before restoration actions are initiated in  
23 other areas. In addition, *AMM19 California Clapper Rail and California Black Rail* would avoid and  
24 minimize impacts on California black rail.

25 **Impact BIO-61: Periodic Effects of Inundation of California Black Rail Habitat as a Result of**  
26 **Implementation of Conservation Components**

27 Flooding of the Yolo Bypass from *CM2 Yolo Bypass Fisheries Enhancement* would not result in the  
28 periodic inundation of modeled habitat for California black rail. There are no records for California  
29 black rails in the Yolo Bypass, although the species is highly secretive and the extent to which the  
30 area has been surveyed for California black rails is unknown. Therefore, there is potential for the  
31 species to occur in the Yolo Bypass. In addition, rails may occur in the bypass after restoration  
32 activities are completed. However, periodic inundation would not result in permanent habitat loss  
33 and would not prevent use of the bypass by current or future rail populations.

34 Based on hypothetical floodplain restoration for *CM5 Seasonally Inundated Floodplain Restoration*,  
35 construction of setback levees could result in increased magnitude, frequency and duration of  
36 periodic inundation by up to 6 acres of modeled California black rail habitat in CZ 7. The risk of  
37 changes in inundation frequency, magnitude, and duration through CM2 and CM5 affecting  
38 California black rail are considered to be low, and would not be expected to result in adverse effects  
39 on the species.

40 **NEPA Effects:** Periodic inundation under *CM2 Yolo Bypass Fisheries Enhancement* and *CM5*  
41 *Seasonally Inundated Floodplain Restoration* would not represent an adverse effect on California  
42 black rail as a result of habitat modification of a special-status species because periodic inundation  
43 would not result in permanent habitat loss and would not prevent use of the bypass by current or

1 future rail populations. The risk of changes in inundation frequency and duration through CM2 and  
2 CM5 affecting California black rail is considered to be low.

3 **CEQA Conclusion:** Periodic inundation under *CM2 Yolo Bypass Fisheries Enhancement* and *CM5*  
4 *Seasonally Inundated Floodplain Restoration* would represent a less-than-significant impact on  
5 California black rail because periodic inundation would not result in permanent habitat loss and  
6 would not prevent use of the bypass by current or future rail populations. The risk of changes in  
7 inundation frequency and duration as a result of CM2 and CM5 affecting California black rail is  
8 considered to be low.

### 9 **California Clapper Rail**

10 This section describes the effects of Alternative 9, including water conveyance facilities construction  
11 and implementation of other conservation components, on California clapper rail. California clapper  
12 rail habitat includes mostly middle marsh habitat with select emergent wetland plant alliances.  
13 Secondary habitats generally provide only a few ecological functions such as foraging (low marsh)  
14 or high-tide refuge (upland transition zones), while primary habitats provide multiple functions  
15 including breeding, effective predator cover, and forage. Further details regarding the habitat model,  
16 including assumptions on which the model is based, are provided in Appendix 2.A, *Covered Species*  
17 *Accounts*.

18 Construction and restoration associated with Alternative 9 conservation measures would result in  
19 both temporary and permanent losses of California clapper rail modeled habitat as indicated in  
20 Table 12-9-26. Full implementation of Alternative 9 would also include the following conservation  
21 actions over the term of the BDCP to benefit the California clapper rail (BDCP Chapter 3, Section 3.3,  
22 *Biological Goals and Objectives*).

- 23 • Restore or create at least 6,000 acres of tidal brackish emergent wetland in CZ 11 including at  
24 least 1,500 acres of middle and high marsh (Objectives TBEWNC1.1 and TBEWNC1.2, associated  
25 with CM4).

26 As explained below, with the restoration and protection of these amounts of habitat, in addition to  
27 natural community enhancement and management commitments (including *CM12 Methylmercury*  
28 *Management*) and implementation of AMM1–AMM7, *AMM19 California Clapper Rail and California*  
29 *Black Rail*, and *AMM27 Selenium Management*, impacts on the California clapper rail would not be  
30 adverse for NEPA purposes and would be less than significant for CEQA purposes.

1 **Table 12-9-26. Changes to California Clapper Rail Modeled Habitat Associated with Alternative 9**  
2 **(acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	Primary	0	0	0	0	NA	NA
	Secondary	0	0	0	0	NA	NA
<b>Total Impacts CM1</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>NA</b>	<b>NA</b>
CM2–CM18	Primary	26	27	0	0	0	0
	Secondary	50	50	0	0	0	0
<b>Total Impacts CM2–CM18</b>		<b>76</b>	<b>77</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>TOTAL IMPACTS</b>		<b>76</b>	<b>77</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

<sup>a</sup> See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only.

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-62: Loss or Conversion of Habitat for and Direct Mortality of California Clapper**  
5 **Rail**

6 Alternative 9 conservation measures would result in the total loss or conversion of up to 77 acres of  
7 modeled clapper rail habitat consisting of 27 acres of primary habitat and 50 acres of secondary  
8 habitat (Table 12-9-26). The conservation measure that would result in these losses is tidal natural  
9 communities restoration (CM4). Habitat enhancement and management activities (CM11), which  
10 include ground disturbance or removal of nonnative vegetation, could also result in local adverse  
11 habitat effects. Each of these individual activities is described below. A summary statement of the  
12 combined impacts and NEPA effects, and a CEQA conclusion follow the individual conservation  
13 measure discussions.

- 14 • *CM4 Tidal Natural Communities Restoration*: Site preparation and inundation would convert  
15 approximately 77 acres of modeled California clapper rail habitat (27 acres of primary habitat,  
16 50 acres of secondary habitat), the majority of which would occur in CZ 11. The tidal marsh  
17 restoration action would not result in the permanent loss of any California clapper rail habitat in  
18 the study area. However, approximately 27 acres of primary habitat would be converted to  
19 secondary low marsh habitat and 50 acres of secondary habitat would be converted to middle or  
20 high marsh. Full implementation of CM4 would restore or create at least 6,000 acres of tidal  
21 brackish emergent wetland in CZ 11. Tidal wetlands would be restored as a mosaic of large,  
22 interconnected, and biologically diverse patches that supported a natural gradient extending  
23 from subtidal to the upland fringe. Much of the restored tidal brackish emergent wetland would  
24 meet the primary habitat requirements of the California clapper rail, including development of

1 mid- and high-marsh vegetation with dense, tall stands of pickleweed cover. Restoration would  
2 be sequenced and spaced in a manner that minimizes any temporary, initial loss of habitat and  
3 habitat fragmentation.

- 4 ● *CM11 Natural Communities Enhancement and Management*: Because the entire California  
5 clapper rail population is restricted to the San Francisco Bay Area estuary, BDCP enhancement  
6 and restoration actions would be expected to benefit the species by creating the potential for  
7 extending its abundance and distribution in Suisun Marsh. Occupied California clapper rail  
8 habitat would be monitored to determine if there is a need for predator control actions. If  
9 implemented, nonnative predators would be controlled as needed to reduce nest predation and  
10 to help maintain species abundance. A variety of habitat management actions included in *CM11*  
11 *Natural Communities Enhancement and Management* that are designed to enhance wildlife  
12 values in restored and protected tidal wetland habitats could result in localized ground  
13 disturbances that could temporarily remove small amounts of California clapper rail habitat.  
14 Ground-disturbing activities, such as removal of nonnative vegetation and road and other  
15 infrastructure maintenance activities, would be expected to have minor adverse effects on  
16 available California clapper rail habitat. These potential effects are currently not quantifiable,  
17 but would be minimized with implementation *AMM19 Clapper Rail and California Black Rail*  
18 (*BDCP Appendix 3.C, Avoidance and Minimization Measures*).
- 19 ● *Operations and Maintenance*: Postconstruction operation and maintenance of the restoration  
20 infrastructure could result in ongoing but periodic disturbances that could affect California  
21 clapper rail use of the surrounding habitat in Suisun. Maintenance activities could include  
22 vegetation management, and levee repair. These effects, however, would be reduced by AMMs  
23 and conservation actions as described below.
- 24 ● *Injury and Direct Mortality*: Construction vehicle activity may cause injury or mortality to  
25 California black rail. If rails are present adjacent to covered activities, the operation of  
26 equipment for land clearing, and habitat restoration, enhancement, and management could  
27 result in injury or mortality of California clapper rail. Operation of construction equipment could  
28 result in injury or mortality of California clapper rails. Risk would be greatest to eggs and  
29 nestlings susceptible to land clearing activities, nest abandonment, or increased exposure to the  
30 elements or to predators. Injury to adults and fledged juveniles is less likely as these individuals  
31 are expected to avoid contact with construction equipment. However, nest sites would be  
32 avoided during the nesting season as required by AMM1–AMM7 and *AMM19 California Clapper*  
33 *Rail and California Black Rail* listed below.

34 The following paragraphs summarize the combined effects discussed above and describe other  
35 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also  
36 included.

### 37 ***Near-Term Timeframe***

38 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
39 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
40 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
41 effects of construction would not be adverse under NEPA. There would be no impacts resulting from  
42 the construction of the water conveyance facilities (CM1). However, there would be a loss of 76  
43 acres of modeled habitat for California clapper rail in the study area in the near-term. These effects

1 would result from implementing *CM4 Tidal Natural Communities Restoration* (26 acres of primary  
2 and 50 acres of secondary habitat).

3 The typical NEPA and CEQA project-level mitigation ratio for those natural communities affected by  
4 CM4 and that are identified in the biological goals and objectives for California clapper rail in  
5 Chapter 3 of the BDCP would be 1:1 for restoration/creation of tidal brackish emergent habitat.  
6 Using this ratio would indicate that 76 acres of tidal brackish emergent wetland should be  
7 restored/created to compensate for the CM4 losses of California clapper rail habitat.

8 The BDCP has committed to near-term goals of restoring 2,000 acres of tidal brackish emergent  
9 wetland in the Plan Area (Table 3-4 in Chapter 3, *Description of Alternatives*). These conservation  
10 actions are associated with CM4 and would occur in the same timeframe as the early restoration  
11 losses, thereby avoiding adverse effects on California clapper rail. The tidal brackish emergent  
12 wetland would be restored in CZ 11 among the Western Suisun/Hill Slough Marsh Complex, the  
13 Suisun Slough/Cutoff Slough Marsh Complex, and the Nurse Slough/Denverton Marsh complex  
14 (Objective TBEWNC1.1) and would be restored in a way that creates topographic heterogeneity and  
15 in areas that increase connectivity among protected lands (Objectives TBEWNC1.4). These biological  
16 goals and objectives would inform the near-term restoration efforts and represent performance  
17 standards for considering the effectiveness of restoration actions. These Plan objectives represent  
18 performance standards for considering the effectiveness of CM4 restoration actions. The acres of  
19 restoration contained in the near-term Plan goals satisfy the typical mitigation that would be  
20 applied to the near-term effects of tidal restoration.

21 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
22 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
23 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
24 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
25 *Material*, *AMM7 Barge Operations Plan*, and *AMM19 California Clapper Rail and California Black Rail*.  
26 All of these AMMs include elements that would avoid or minimize the risk of affecting individuals  
27 and species habitats adjacent to work areas. The AMMs are described in detail in BDCP Appendix  
28 3.C, *Avoidance and Minimization Measures*.

### 29 ***Late Long-Term Timeframe***

30 The habitat model indicates that the study area supports approximately 296 acres of primary and  
31 6,420 acres of secondary habitat for California clapper rail. Alternative 9 as a whole would result in  
32 the permanent loss of and temporary effects on 27 acres of primary habitat and 50 acres of  
33 secondary habitat for California clapper rail during the term of the Plan (9% of the total primary  
34 habitat in the study area and less than 1% of the total secondary habitat in the study area). The  
35 locations of these losses are described above in the analyses of individual conservation measures.  
36 The Plan includes a commitments through *CM4 Tidal Natural Communities Restoration* to restore or  
37 create at least 6,000 acres of tidal brackish emergent wetlands for California clapper rail in Suisun  
38 Marsh in CZ 11 (Objective TBEWNC1.1). These tidal wetlands would be restored as a mosaic of large,  
39 interconnected and biologically diverse patches and at least 1,500 acres of the restored marsh  
40 would consist of middle-and high-marsh vegetation, serving as primary habitat for California  
41 clapper rail in Suisun Marsh (Objectives TBEWNC1.1 and TBEWNC1.2). Additional pressures on the  
42 species such as loss of habitat from invasive species and mortality from nest predators would also  
43 be addressed through the BDCP. Perennial pepperweed, which outcompetes suitable clapper rail  
44 habitat (such as pickleweed) would be reduced to no more than 10% cover in the tidal brackish

1 emergent wetland natural community within CZ 11 (Objective TBEWNC2.1). In addition, nonnative  
2 predators would be controlled to reduce nest predation if necessary through *CM11 Natural*  
3 *Communities Enhancement and Management*.

4 The BDCP's beneficial effects analysis (BDCP Chapter 5, *Effects Analysis*) estimates that the  
5 restoration and protection actions discussed above, would result in the restoration of 1,500 acres of  
6 primary habitat and 4,500 acres of secondary habitat for California clapper rail.

7 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
8 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
9 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
10 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
11 *Material*, *AMM7 Barge Operations Plan*, and *AMM19 California Clapper Rail and California Black Rail*.  
12 All of these AMMs include elements that would avoid or minimize the risk of affecting individuals  
13 and species habitats adjacent to work areas. The AMMs are described in detail in BDCP Appendix  
14 3.C, *Avoidance and Minimization Measures*.

15 **NEPA Effects:** In the absence of other conservation actions, the loss of California clapper rail habitat  
16 associated with Alternative 9 would represent an adverse effect as a result of habitat modification  
17 and potential direct mortality of a special-status species. However, with habitat protection and  
18 restoration associated with CM4, guided by biological goals and objectives and by *AMM1 Worker*  
19 *Awareness Training*, *AMM2 Construction Best Management Practices and Monitoring*, *AMM3*  
20 *Stormwater Pollution Prevention Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill*  
21 *Prevention, Containment, and Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable*  
22 *Tunnel Material, and Dredged Material*, *AMM7 Barge Operations Plan*, and *AMM19 California Clapper*  
23 *Rail and California Black Rail*, which would be in place throughout the construction period, the  
24 effects of Alternative 9 as a whole on clapper rail would not be adverse under NEPA.

25 **CEQA Conclusion:**

26 ***Near-Term Timeframe***

27 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
28 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
29 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
30 effects of construction would be less than significant under CEQA. There would be no impacts  
31 resulting from the construction of the water conveyance facilities (CM1). However, there would be a  
32 loss of 76 acres of modeled habitat for California clapper rail in the study area in the near-term from  
33 the implementation of *CM4 Tidal Natural Communities Restoration* (26 acres of primary and 50 acres  
34 of secondary habitat).

35 The typical NEPA and CEQA project-level mitigation ratio for those natural communities affected by  
36 CM4 and that are identified in the biological goals and objectives for California clapper rail in  
37 Chapter 3 of the BDCP would be 1:1 for restoration/creation of tidal brackish emergent habitat.  
38 Using this ratio would indicate that 76 acres of tidal brackish emergent wetland should be  
39 restored/created to mitigate the CM4 losses of California clapper rail habitat.

40 The BDCP has committed to near-term goals of restoring 2,000 acres of tidal brackish emergent  
41 wetland in the study area. These conservation actions are associated with CM4 and would occur in  
42 the same timeframe as the early restoration losses, thereby avoiding adverse effects on California

1 clapper rail. The tidal brackish emergent wetland would be restored in CZ 11 among the Western  
2 Suisun/Hill Slough Marsh Complex, the Suisun Slough/Cutoff Slough Marsh Complex, and the Nurse  
3 Slough/Denverton Marsh complex (Objective TBEWNC1.1) and would be restored in a way that  
4 creates topographic heterogeneity and in areas that increase connectivity among protected lands  
5 (Objectives TBEWNC1.4).

6 These biological goals and objectives would inform the near-term restoration efforts and represent  
7 performance standards for considering the effectiveness of restoration actions. These Plan  
8 objectives represent performance standards for considering the effectiveness of CM4 restoration  
9 actions.

10 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
11 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
12 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
13 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
14 *Material*, *AMM7 Barge Operations Plan*, and *AMM19 California Clapper Rail and California Black Rail*.  
15 All of these AMMs include elements that would avoid or minimize the risk of affecting individuals  
16 and species habitats adjacent to work areas. The AMMs are described in detail in BDCP Appendix  
17 3.C, *Avoidance and Minimization Measures*.

18 The natural community restoration and protection activities would be concluded in the first 10  
19 years of Plan implementation, which is close enough in time to the occurrence of restoration impacts  
20 to constitute adequate mitigation for CEQA purposes. In addition, *AMM19 California Clapper Rail and*  
21 *California Black Rail* and *AMM1–AMM7* would avoid and minimize potential impacts on the species  
22 from construction-related habitat loss and noise and disturbance. Because the number of acres  
23 required to meet the typical mitigation ratio described above would be only 76 acres of restored  
24 tidal natural communities, the 2,000 acres of tidal brackish emergent wetland restoration contained  
25 in the near-term Plan goals, and the additional detail in the biological objectives for California  
26 clapper rail, are more than sufficient to support the conclusion that the near-term impacts of habitat  
27 loss and direct mortality under Alternative 9 would be less than significant under CEQA.

### 28 ***Late Long-Term Timeframe***

29 The habitat model indicates that the study area supports approximately 296 acres of primary and  
30 6,420 acres of secondary habitat for California clapper rail. Alternative 9 as a whole would result in  
31 the permanent loss of and temporary effects on 27 acres of primary habitat and 8 acres of secondary  
32 habitat for California clapper rail during the term of the Plan (9% of the total primary habitat in the  
33 study area and less than 1% of the total secondary habitat in the study area). The locations of these  
34 losses are described above in the analyses of individual conservation measures. The Plan includes a  
35 commitment to restore or create at least 6,000 acres of tidal brackish emergent wetlands for  
36 California clapper rail in Suisun Marsh in CZ 11 (Objective TBEWNC1.1). These tidal wetlands would  
37 be restored as a mosaic of large, interconnected and biologically diverse patches and much of the  
38 restored marsh would consist of middle-and high-marsh vegetation with dense, tall stands of  
39 pickleweed, serving as primary habitat for clapper rail in Suisun Marsh (Objective TBEWNC1.1).  
40 Additional pressures on the species such as loss of habitat from invasive species and mortality from  
41 nest predators would also be addressed through the BDCP. Perennial pepperweed, which  
42 outcompetes suitable clapper rail habitat (such as pickleweed) would be reduced to no more than  
43 10% cover in the tidal brackish emergent wetland natural community within CZ 11 (Objective

1 TBEWNC2.1). In addition, nonnative predators would be controlled to reduce nest predation if  
2 necessary through *CM11 Natural Communities Enhancement and Management*.

3 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*  
4 *Plant Species*) estimates that the restoration and protection actions discussed above, would result in  
5 the restoration of 1,500 acres of primary habitat and 4,500 acres of secondary habitat for California  
6 clapper rail.

7 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
8 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
9 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
10 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
11 *Material*, *AMM7 Barge Operations Plan*, and *AMM19 California Clapper Rail and California Black Rail*.  
12 All of these AMMs include elements that would avoid or minimize the risk of affecting individuals  
13 and species habitats adjacent to work areas. The AMMs are described in detail in BDCP Appendix  
14 3.C, *Avoidance and Minimization Measures*.

15 Considering Alternative 9's protection and restoration provisions, which would provide acreages of  
16 new or enhanced habitat in amounts greater than necessary to compensate for habitats lost to  
17 construction and restoration activities, loss of habitat or direct mortality through implementation of  
18 Alternative 9 would not result in a substantial adverse effect through habitat modifications and  
19 would not substantially reduce the number or restrict the range of California clapper rail. Therefore,  
20 the alternative would have a less-than-significant impact on California clapper rail.

### 21 **Impact BIO-63: Indirect Effects of Plan Implementation on California Clapper Rail**

22 **Indirect construction-related effects:** California clapper rail habitat within the vicinity of  
23 proposed restoration areas could be indirectly affected by construction activities. Indirect effects  
24 associated with construction include noise, dust, and visual disturbance caused by grading, filling,  
25 contouring, and other ground-disturbing operations outside the project footprint but within 500  
26 feet from the construction edge. Construction noise above background noise levels (greater than 50  
27 dBA) could extend 1,900 to 5,250 feet from the edge of construction activities (BDCP Appendix 5.J,  
28 Attachment 5J.D, *Indirect Effects of the Construction of the BDCP Conveyance Facility on Sandhill*  
29 *Crane*, Table 4), although there are no available data to determine the extent to which these noise  
30 levels could affect California clapper rail. The use of mechanical equipment during construction-  
31 related restoration activities could cause the accidental release of petroleum or other contaminants  
32 that could affect California clapper rail in the surrounding habitat. The inadvertent discharge of  
33 sediment or excessive dust adjacent to California clapper habitat could also affect the species. If  
34 construction occurs during the nesting season, these indirect effects could result in the loss or  
35 abandonment of nests, and mortality of any eggs and/or nestlings. However, there is a commitment  
36 in *AMM19 California Clapper Rail and California Black Rail* (as described in BDCP Appendix 3.C,  
37 *Avoidance and Minimization Measures*) that preconstruction surveys of potential breeding habitat  
38 would be conducted within 500 feet of project activities, and a 500-foot no-disturbance buffer would  
39 be established around any territorial call-centers during the breeding season. In addition,  
40 construction would be avoided altogether if breeding territories cannot be accurately delimited.

41 Preconstruction surveys conducted under *AMM19 California Clapper Rail and California Black Rail*  
42 would ensure construction-related noise and visual disturbances would not have an adverse effect  
43 on California clapper rail. AMM1-AMM7, including *AMM2 Construction Best Management Practices*

1 *and Monitoring*, would minimize the likelihood of such spills from occurring and ensure measures  
2 were in place to prevent runoff from the construction area and to avoid negative effects of dust on  
3 the species. Therefore, with the implementation of AMM1–AMM7 and *AMM19 California Clapper Rail*  
4 *and California Black Rail*, there would be no adverse effect on California black rail.

5 **Salinity:** Water operations under Operational Scenario A would have an effect on salinity gradients  
6 in Suisun Marsh. These effects cannot be disaggregated from tidal habitat restoration, which would  
7 also cause changes in salinity gradients. It is expected that the salinity of water in Suisun Marsh  
8 would generally increase as a result of water operations and operations of salinity-control gates to  
9 mimic a more natural water flow. This would likely encourage the establishment of tidal wetland  
10 plant communities tolerant of more brackish environments, which would be beneficial to California  
11 clapper rail because its historical natural Suisun Marsh habitat was brackish tidal marsh.

12 **Methylmercury Exposure:** Marsh (tidal and nontidal) and floodplain restoration also have the  
13 potential to increase exposure to methylmercury. Mercury is transformed into the more bioavailable  
14 form of methylmercury in aquatic systems, especially areas subjected to regular wetting and drying  
15 such as tidal marshes and flood plains. Thus, BDCP restoration activities that create newly  
16 inundated areas could increase bioavailability of mercury (see BDCP Chapter 3, *Conservation*  
17 *Strategy*, for details of restoration). Concentrations of methylmercury known to be toxic to bird  
18 embryos have been found in the eggs of San Francisco Bay clapper rails (Schwarzbach and  
19 Adelsbach 2003). In general, the highest methylation rates are associated with high tidal marshes  
20 that experience intermittent wetting and drying and associated anoxic conditions (Alpers et al.  
21 2008). Currently, it is unknown how much of the sediment-derived methylmercury enters the food  
22 chain in Suisun Marsh or what tissue concentrations are actually harmful to the California clapper  
23 rail. However, although tidal habitat restoration might increase methylation of mercury export to  
24 other habitats, it is unlikely to significantly increase the exposure of California clapper rails to  
25 methylmercury, as they currently reside in tidal marshes where elevated methylmercury levels  
26 exist. *CM12 Methylmercury Management* includes project-specific management plans including  
27 monitoring and adaptive management to address the uncertainty of methylmercury levels in  
28 restored tidal marsh.

29 **Selenium Exposure: Selenium:** Selenium is an essential nutrient for avian species and has a  
30 beneficial effect in low doses. However, higher concentrations can be toxic (Ackerman and Eagles-  
31 Smith 2009, Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks,  
32 and adults, and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf  
33 and Heinz 2009). The effect of selenium toxicity differs widely between species and also between  
34 age and sex classes within a species. In addition, the effect of selenium on a species can be  
35 confounded by interactions with the effects of other contaminants such as mercury (Ackerman and  
36 Eagles-Smith 2009).

37 The primary source of selenium bioaccumulation in birds is through their diet (Ackerman and  
38 Eagles-Smith 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the  
39 trophic level at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At  
40 Kesterson Reservoir in the San Joaquin Valley, selenium concentrations in invertebrates have been  
41 found to be two to six times the levels in rooted plants. Furthermore, bivalves sampled in the San  
42 Francisco Bay contained much higher selenium levels than crustaceans such as copepods (Stewart et  
43 al. 2004). Studies conducted at the Grasslands in Merced County recorded higher selenium levels in  
44 black-necked stilts which feed on aquatic invertebrates than in mallards and pintails, which are  
45 primarily herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which

1 forage on bivalves) have much higher levels of selenium levels than shorebirds that prey on aquatic  
2 invertebrates (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high  
3 levels of selenium have a higher risk of selenium toxicity.

4 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations  
5 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to  
6 exacerbate bioaccumulation of selenium in avian species, including California clapper rail. Marsh  
7 (tidal and nontidal) and floodplain restoration have the potential to mobilize selenium, and  
8 therefore increase avian exposure from ingestion of prey items with elevated selenium levels. Thus,  
9 BDCP restoration activities that create newly inundated areas could increase bioavailability of  
10 selenium (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Changes in  
11 selenium concentrations were analyzed in Chapter 8, *Water Quality*, and it was determined that,  
12 relative to Existing Conditions and the No Action Alternative, CM1 would not result in substantial,  
13 long-term increases in selenium concentrations in water in the Delta under any alternative.  
14 However, it is difficult to determine whether the effects of potential increases in selenium  
15 bioavailability associated with restoration-related conservation measures (CM4, CM5) would lead to  
16 adverse effects on California clapper rail.

17 Because of the uncertainty that exists at this programmatic level of review, there could be a  
18 substantial effect on California clapper rail from increases in selenium associated with restoration  
19 activities. This effect would be addressed through the implementation of *AMM27 Selenium*  
20 *Management* (BDCP Appendix 3.C, *Avoidance and Minimization Measures*) which would provide  
21 specific tidal habitat restoration design elements to reduce the potential for bioaccumulation of  
22 selenium and its bioavailability in tidal habitats. Furthermore, the effectiveness of selenium  
23 management to reduce selenium concentrations and/or bioaccumulation would be evaluated  
24 separately for each restoration effort as part of design and implementation. This avoidance and  
25 minimization measure would be implemented as part of the tidal habitat restoration design  
26 schedule.

27 **NEPA Effects:** Potential effects of noise and visual disturbances on California clapper rail would be  
28 minimized with *AMM19 California Clapper Rail and California Black Rail*. *AMM1-AMM7*, including  
29 *AMM2 Construction Best Management Practices and Monitoring*, would minimize the likelihood of  
30 spills from occurring and ensure that measures were in place to prevent runoff from the  
31 construction area and to avoid negative effects of dust on the species. Implementation of  
32 Operational Scenario A, including operation of salinity-control gates, and tidal habitat restoration  
33 are expected to increase water salinity in Suisun Marsh, which would be expected to establish tidal  
34 marsh similar to historic conditions. Tidal habitat restoration could result in increased exposure of  
35 California clapper rail to selenium. This effect would be addressed through the implementation of  
36 *AMM27 Selenium Management*, which would provide specific tidal habitat restoration design  
37 elements to reduce the potential for bioaccumulation of selenium and its bioavailability in tidal  
38 habitats. The indirect effects associated with noise and visual disturbances, potential spills of  
39 hazardous material, changes in salinity, and increased exposure to selenium from Alternative 9  
40 implementation would not have an adverse effect on California clapper rail. Tidal habitat restoration  
41 is unlikely to have an adverse effect on California clapper rail through increased exposure to  
42 methylmercury, as rails currently reside in tidal marshes where elevated methylmercury levels  
43 exist. However, it is unknown what concentrations of methylmercury are harmful to the species and  
44 the potential for increased exposure varies substantially within the study area. Site-specific  
45 restoration plans in addition to monitoring and adaptive management, described in *CM12*

1 *Methylmercury Management*, would address the uncertainty of methylmercury levels in restored  
2 tidal marsh. The site-specific planning phase of marsh restoration would be the appropriate place to  
3 assess the potential for risk of methylmercury exposure for California clapper rail, once site specific  
4 sampling and other information could be developed.

5 **CEQA Conclusion:** Noise and visual disturbances related to construction-related activities from the  
6 CMs could disturb approximately 542 acres of California clapper rail habitat adjacent to work sites.  
7 *AMM19 California Clapper Rail and California Black Rail* would avoid and minimize impacts on  
8 California clapper rail from noise and visual disturbance. The use of mechanical equipment during  
9 water conveyance facilities construction could cause the accidental release of petroleum or other  
10 contaminants that could affect California clapper rail in the surrounding habitat. The inadvertent  
11 discharge of sediment or excessive dust adjacent to California clapper rail habitat could also affect  
12 the species. These impacts on California clapper rail would be less than significant with the  
13 incorporation of AMM1–AMM7 into the BDCP. Implementation of Operational Scenario A, including  
14 operation of salinity-control gates, and tidal habitat restoration are expected to increase water  
15 salinity in Suisun Marsh. These salinity gradient changes should have a beneficial impact on  
16 California clapper rail through the establishment of tidal marsh similar to historic conditions.  
17 Although tidal habitat restoration might increase methylation of mercury export to other habitats, it  
18 is unlikely to significantly increase the exposure of California clapper rails to methylmercury, as they  
19 currently reside in tidal marshes in the San Francisco Bay, where elevated methylmercury levels  
20 exist. It is unknown what concentrations of methylmercury are harmful to the species. *CM12*  
21 *Methylmercury Management* includes project-specific management plans including monitoring and  
22 adaptive management to address the uncertainty of methylmercury levels in restored tidal marsh.  
23 Tidal habitat restoration could result in increased exposure of California clapper rail to selenium.  
24 This effect would be addressed through the implementation of *AMM27 Selenium Management*, which  
25 would provide specific tidal habitat restoration design elements to reduce the potential for  
26 bioaccumulation of selenium and its bioavailability in tidal habitats. Therefore, the indirect effects of  
27 Alternative 9 implementation would have a less-than-significant impact on California clapper rail.

#### 28 **Impact BIO-64: Effects on California Clapper Rail Associated with Electrical Transmission** 29 **Facilities**

30 Isolated patches of suitable California clapper rail habitat may occur in the Plan Area as far east as  
31 (but not including) Sherman Island. Home range and territory of the California clapper rail is not  
32 known, but in locations outside of California, clapper rail territory ranges 0.3 acre to 8 acres (0.1 to  
33 3.2 hectares) (Rush et al. 2012), indicating that known occurrences are not likely to intersect with  
34 the proposed lines (BDCP Attachment 5J.C, *Analysis of Potential Bird Collisions at Proposed BDCP*  
35 *Transmission Lines*). The location of the current population and suitable habitat for the species make  
36 collision with the proposed transmission lines highly unlikely.

37 **NEPA Effects:** The construction and presence of new transmission lines would not have an adverse  
38 effect on California clapper rail because the location of the current population and suitable habitat  
39 for the species would make collision with the proposed transmission lines highly unlikely.

40 **CEQA Conclusion:** The construction and presence of new transmission lines would have a less-than-  
41 significant impact on California clapper rail because the location of the current population and  
42 suitable habitat for the species would make collision with the proposed transmission lines highly  
43 unlikely.

1 **Impact BIO-65: Fragmentation of California Clapper Rail Habitat as a Result of Conservation**  
2 **Component Implementation**

3 Restoration activities may temporarily fragment existing wetlands in Suisun Marsh and could create  
4 temporary barriers to movements of California clapper rail. Grading, filling, contouring and other  
5 initial ground-disturbing activities could remove habitat along movement corridors used by  
6 individuals and, thus, temporarily reduce access to adjacent habitat areas. The temporary adverse  
7 effects of fragmentation of tidal brackish emergent wetland habitat for California clapper rail or  
8 restoration activities resulting in barriers to movement would be minimized through sequencing of  
9 restoration activities to minimize effects of temporary habitat loss. In addition, *AMM19 California*  
10 *Clapper Rail and California Black Rail* would avoid and minimize effects on California clapper rail.

11 **NEPA Effects:** The fragmentation of existing wetlands and creation of temporary barriers to  
12 movement would not represent an adverse effect on California clapper rail as a result of special-  
13 status species habitat modification because *CM4 Tidal Natural Communities Restoration* would be  
14 phased to allow for the recovery of some areas before restoration actions are initiated in other  
15 areas. In addition, *AMM19 California Clapper Rail and California Black Rail* would avoid and  
16 minimize effects on California clapper rail.

17 **CEQA Conclusion:** The fragmentation of existing wetlands and creation of temporary barriers to  
18 movement would represent a less-than-significant impact on California clapper rail as a result of  
19 habitat modification of a special status species because Tidal Natural Communities Restoration  
20 (CM4) would be phased to allow for the recovery of some areas before initiating restoration actions  
21 in other areas. In addition, *AMM19 California Clapper Rail and California Black Rail*  
22 would avoid and minimize effects on California clapper rail.

23 **California Least Tern**

24 This section describe the effects of Alternative 9, including water conveyance facilities construction  
25 and implementation of other conservation components on California least tern. California least tern  
26 modeled habitat identifies foraging habitat as all tidal perennial aquatic natural community in the  
27 study area. Breeding habitat is not included in the model because most of the natural shoreline in  
28 the study area that historically provided nesting sites has been modified or removed.

29 Construction and restoration associated with Alternative 9 conservation measures would result in  
30 both temporary and permanent losses of California least tern modeled habitat as indicated in Table  
31 12-9-27. Full implementation of Alternative 9 would also include the following conservation actions  
32 over the term of the BDCP to benefit California least tern (BDCP Chapter 3, Section 3.3, *Biological*  
33 *Goals and Objectives*).

- 34 ● Restore and protect at least 65,000 acres of tidal natural communities and transitional uplands  
35 to accommodate sea level rise (Objective L1.3, associated with CM4).
- 36 ● Within the 65,000 acres of tidal natural communities and transitional uplands, restore or create  
37 tidal perennial aquatic natural community as necessary when creating tidal emergent wetland  
38 (Objective TPANC1.1, associated with CM4).
- 39 ● Control invasive aquatic vegetation that adversely affects native fish habitat (Objective  
40 TPANC2.1, associated with CM13).

Least terns currently nest on artificial fill adjacent to tidal perennial aquatic habitat in the vicinity of Suisun Marsh and the west Delta, and additional nesting could occur at the edge of tidal perennial waters whenever disturbed or artificial sites mimic habitat conditions sought for nesting (i.e., sandy or gravelly substrates with sparse vegetation).

As explained below, with the restoration and protection of tidal perennial aquatic foraging habitat, in addition to natural community enhancement and management commitments (including CM12 *Methylmercury Management*) and implementation of AMM1–AMM7, *AMM27 Selenium Management*, and mitigation to avoid impacts on terns should they nest in the study area, impacts on the California least tern would not be adverse for NEPA purposes and would be less than significant for CEQA purposes.

**Table 12-9-27. Changes in California Least Tern Modeled Habitat Associated with Alternative 9 (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	Foraging	675	675	345	345	NA	NA
<b>Total Impacts CM1</b>		<b>675</b>	<b>675</b>	<b>345</b>	<b>345</b>	<b>NA</b>	<b>NA</b>
CM2–CM18	Foraging	38	46	11	16	NA	NA
<b>Total Impacts CM2–CM18</b>		<b>38</b>	<b>46</b>	<b>11</b>	<b>16</b>	<b>NA</b>	<b>NA</b>
<b>TOTAL IMPACTS</b>		<b>713</b>	<b>721</b>	<b>356</b>	<b>361</b>	<b>NA</b>	<b>NA</b>

<sup>a</sup> See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only.

NT = near-term

LLT = late long-term

NA = not applicable

**Impact BIO-66: Loss or Conversion of Habitat for and Direct Mortality of California Least Tern**

Alternative 9 conservation measures would result in the combined permanent and temporary loss of up to 1,082 acres of modeled foraging habitat for California least tern, consisting of 721 acres of permanent loss and 361 acres of temporary loss (Table 12-9-27). The conservation measures that would result in these losses are construction of water conveyance facilities and operation (CM1), Yolo Bypass improvements (CM2), tidal habitat restoration (CM4), and floodplain restoration (CM5). The majority of the permanent and temporary losses would occur during the first 10 years of BDCP implementation, as water conveyance facilities are constructed and habitat restoration is initiated. The majority of the permanent and temporary losses would occur during the first 10 years of BDCP implementation, as water conveyance facilities are constructed and habitat restoration is initiated. Habitat enhancement and management activities (CM11), which include ground disturbance or removal of nonnative vegetation, could also result in local adverse habitat effects. In addition,

1 maintenance activities associated with the long-term operation of the water conveyance facilities  
2 and other BDCP physical facilities could degrade or eliminate California least tern foraging habitat.  
3 Each of these individual activities is described below. A summary statement of the combined  
4 impacts, NEPA effects, and a CEQA conclusion follow the individual conservation measure  
5 discussions.

- 6 • *CM1 Water Facilities and Operation*: Construction of Alternative 9 conveyance facilities would  
7 result in the combined permanent and temporary loss of up to 1,020 acres of modeled California  
8 least tern aquatic foraging habitat (Table 12-9-27). Of the 1,020 acres of modeled habitat that  
9 would be removed for the construction of the conveyance facilities, 345 acres would be a  
10 temporary loss. Permanent impacts on California least tern foraging habitat would include canal  
11 Construction, dredging for channel enlargement, and operable barrier construction. However,  
12 impacts would not permanently remove the waterways, but would permanently modify the  
13 channel bottoms and eliminate any associated aquatic vegetation. The temporary effects on  
14 California least tern foraging habitat would occur primarily along the channels of the Middle  
15 River and Victoria Canal, where temporary work areas would be needed to support channel  
16 dredging operations. Several smaller temporary impact areas would occur where barge  
17 operations areas would be developed. The CM1 footprint does not overlap with any California  
18 least tern occurrences. Mitigation Measure BIO-66, *California Least Tern Nesting Colonies Shall*  
19 *Be Avoided and Indirect Effects on Colonies Will Be Minimized*, (described below) would require  
20 preconstruction surveys and the establishment of no-disturbance buffers and would be  
21 available to address potential effects on terns were they to nest in the vicinity of the  
22 construction footprint. Refer to the Terrestrial Biology Map Book for a detailed view of  
23 Alternative 9 construction locations.
- 24 • *CM2 Yolo Bypass Fisheries Enhancement*: Construction of Yolo Bypass fisheries enhancement  
25 would result in the permanent loss of 8 acres and the temporary loss of 11 acres of modeled  
26 aquatic foraging habitat for California least tern in CZ 2. Activities from Fremont and  
27 Sacramento Weir improvements, Putah Creek realignment, and Lisbon Weir modification could  
28 involve excavation and grading in tidal perennial aquatic areas to improve passage of fish  
29 through the bypasses. The loss is expected to occur during the first 10 years of Alternative 9  
30 implementation.
- 31 • *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration actions would result in the  
32 permanent loss of 36 acres of modeled aquatic foraging habitat for California least tern. An  
33 estimated 65,000 acres of tidal wetlands would be restored during tidal habitat restoration,  
34 consistent with BDCP Objective L1.3. Of these acres, an estimated 27,000 acres of tidal perennial  
35 aquatic would be restored, based on modeling conducted by ESAPWA (refer to Table 5 in BDCP  
36 Appendix 3.B, *BDCP Tidal Habitat Evolution Assessment*). This restoration is consistent with  
37 BDCP Objective TPANC1.1. Tidal perennial aquatic restoration would be expected to  
38 substantially increase the primary productivity of fish, increasing the prey base for California  
39 least tern. Approximately 3,400 acres of the restoration would happen during the first 10 years  
40 of BDCP implementation, which would coincide with the timeframe of water conveyance  
41 facilities construction. The remaining restoration would be phased over the following 30 years.  
42 Some of the restoration would occur in the lower Yolo Bypass, but restoration would also be  
43 spread among the Suisun Marsh, South Delta, Cosumnes/Mokelumne and West Delta ROAs.
- 44 • *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore  
45 seasonally inundated floodplain would result in the permanent loss of 2 acres and the

1 temporary loss of 5 acres of modeled aquatic foraging habitat for California least tern. This  
2 activity is scheduled to start following construction of water conveyance facilities, which is  
3 expected to take 10 years. Specific locations for the floodplain restoration have not been  
4 identified, but it is expected that much of the activity would occur in the south Delta along the  
5 major rivers.

- 6 • *CM11 Natural Communities Enhancement and Management*: Noise and visual disturbances  
7 during implementation of habitat management actions could result in temporary disturbances  
8 that affect California least tern use of the surrounding habitat. These effects cannot be  
9 quantified, but are expected to be minimal because few management activities would be  
10 implemented in aquatic habitat and because terns are not expected to nest on protected lands.  
11 Surveys would be conducted prior to ground disturbance in any areas that have suitable nesting  
12 substrate for California least tern (flat, unvegetated areas near aquatic foraging habitat) and  
13 injury mortality and noise and visual disturbance of nesting terns would be avoided and  
14 minimized by the AMMs and Mitigation Measure BIO-66, *California Least Tern Nesting Colonies  
15 Shall Be Avoided and Indirect Effects on Colonies Will Be Minimized*, described below.
- 16 • *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground  
17 water conveyance facilities and restoration infrastructure could result in ongoing but periodic  
18 postconstruction disturbances, localized impacts on California least tern foraging habitat, and  
19 temporary noise and disturbances over the term of the BDCP. Maintenance activities would  
20 include vegetation management, levee and structure repair, and re-grading of roads and  
21 permanent work areas which could be adjacent to California least tern foraging habitat. These  
22 effects, however, would be reduced by AMMs listed below.
- 23 • *Injury and Direct Mortality*: California least terns currently nest in the vicinity of potential  
24 restoration sites in Suisun Marsh and west Delta area (CZ 10 and CZ 11). New nesting colonies  
25 could establish if suitable nesting habitat is created during restoration activities (e.g., placement  
26 of unvegetated fill to raise surface elevations prior to breaching levees during restoration  
27 efforts). If nesting occurs where covered activities are undertaken, the operation of equipment  
28 for land clearing, construction, conveyance facilities operation and maintenance, and habitat  
29 restoration, enhancement, and management could result in injury or mortality of California least  
30 tern. Risk of injury or disturbance would be greatest to eggs and nestlings susceptible to land-  
31 clearing activities, abandonment of nests and nesting colonies, or increased exposure to the  
32 elements or to predators. Injury to adults or fledged juveniles is less likely as these individuals  
33 would be expected to avoid contact with construction equipment. However, injury or mortality  
34 would be avoided through planning and preconstruction surveys to identify nesting colonies,  
35 the design of projects to avoid locations with least tern colonies, and the provision for 500-foot  
36 buffers as required by Mitigation Measure BIO-66, *California Least Tern Nesting Colonies Shall Be  
37 Avoided and Indirect Effects on Colonies Will Be Minimized*.

38 The following paragraph summarizes the combined effects discussed above and describe other  
39 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also  
40 included.

#### 41 ***Near-Term Timeframe***

42 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
43 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
44 provide sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that

1 the effects of construction would not be adverse under NEPA. With Alternative 9 implementation,  
2 there would be a loss of 1,069 acres of modeled foraging habitat for California least tern in the study  
3 area in the near-term. These effects would result from the construction of the water conveyance  
4 facilities (CM1, 1,020 acres), and implementing other conservation measures (Yolo Bypass fisheries  
5 improvements [CM2], and tidal habitat restoration [CM4] - 49 acres). All modeled foraging habitat  
6 impacts would occur in tidal perennial aquatic natural communities.

7 The typical NEPA and CEQA project-level mitigation ratio for those natural communities affected by  
8 CM1 would be 1:1 for restoration/creation of tidal perennial aquatic habitat. Using this ratio would  
9 indicate that 1,069 acres of the tidal perennial aquatic natural community should be  
10 restored/created to compensate for the CM1 losses of California least tern foraging habitat. The  
11 near-term effects of other conservation actions would remove 49 acres of tidal perennial aquatic  
12 habitat, and therefore require 49 acres of tidal perennial aquatic natural community restoration  
13 using the same typical NEPA and CEQA ratio (1:1 for restoration).

14 The BDCP has committed to near-term goals of restoring 19,150 acres of tidal natural communities  
15 in the Plan Area through *CM4 Tidal Natural Communities Restoration* (Table 3-4 in Chapter 3,  
16 *Description of Alternatives*). This conservation action would result in the creation of approximately  
17 3,400 acres of high quality tidal perennial aquatic natural community, based on modeling conducted  
18 by ESAPWA (refer to Table 5 in BDCP Appendix 3.B, *BDCP Tidal Habitat Evolution Assessment*) (Tidal  
19 perennial aquatic restoration would occur in the same timeframe as the construction and early  
20 restoration losses, thereby avoiding adverse effects on California least tern from loss of foraging  
21 habitat.

22 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
23 *Construction Best Management Practices and Monitoring*, *AMM3, Stormwater Pollution Prevention*  
24 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment and*  
25 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
26 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
27 minimize the risk of affecting individuals and species habitats at or adjacent to work areas and  
28 storage sites. The AMMs are described in detail in BDCP Appendix 3.C, *Avoidance and Minimization*  
29 *Measures*.

30 The California least tern is not a species that is covered under the BDCP. Although nesting by  
31 California least tern is not expected to occur, restoration sites could attract individuals wherever  
32 disturbed or artificial sites mimic habitat conditions sought for nesting (i.e., sandy or gravelly  
33 substrates with sparse vegetation). If nesting were to occur, construction activities could have an  
34 adverse effect on California least tern. Mitigation Measure BIO-66, *California Least Tern Nesting*  
35 *Colonies Shall be Avoided and Indirect Effects on Colonies Will be Minimized*, would be available to  
36 address this adverse effect on nesting California least terns.

### 37 **Late Long-Term Timeframe**

38 The habitat model indicates that the study area supports approximately 86,263 acres of foraging  
39 habitat for California least tern. Alternative 9 as a whole would result in the permanent loss of and  
40 temporary effects on 1,082 acres of foraging habitat during the term of the Plan (1% of the total  
41 habitat in the study area). The locations of these losses are described above in the analyses of  
42 individual conservation measures. The Plan includes conservation commitments through *CM4 Tidal*  
43 *Natural Communities Restoration* would restore an estimated 27,000 acres of high quality tidal

1 perennial aquatic natural community would be restored (estimated from Table 5 in BDCP Appendix  
2 3.B, *BDCP Tidal Habitat Evolution Assessment*). The restoration would occur over a wide region of  
3 the study area, including within the Suisun Marsh, Cosumnes/Mokelumne, Cache Creek, and South  
4 Delta ROAs (see Figure 12-1).

5 **NEPA Effects:** The loss of California least tern foraging habitat and potential direct mortality  
6 associated with Alternative 9 would represent an adverse effect in the absence of other conservation  
7 actions. Although nesting by California least tern is not expected to occur, restoration sites could  
8 attract individuals wherever disturbed or artificial sites mimic habitat conditions sought for nesting  
9 (i.e., sandy or gravelly substrates with sparse vegetation). If nesting were to occur, construction  
10 activities could have an adverse effect on California least tern. Mitigation Measure BIO-66, *California*  
11 *Least Tern Nesting Colonies Shall be Avoided and Indirect Effects on Colonies will be Minimized*, would  
12 be available to address this adverse effect on nesting California least terns. With habitat restoration  
13 associated with CM4 and guided by *AMM1 Worker Awareness Training, AMM2 Construction Best*  
14 *Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention Plan, AMM4 Erosion*  
15 *and Sediment Control Plan, AMM5 Spill Prevention, Containment, and Countermeasure Plan, AMM6*  
16 *Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged Material, and AMM7 Barge*  
17 *Operations Plan*, which would be in place throughout the construction period, the effects of  
18 Alternative 9 as a whole on California least tern would not be adverse under NEPA.

19 **CEQA Conclusion:**

20 **Near-Term Timeframe**

21 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
22 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
23 provide sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that  
24 the effects of construction would be less than significant under CEQA. With Alternative 9  
25 implementation, there would be a loss of 1,069 acres of modeled foraging habitat for California least  
26 tern in the study area in the near-term. These effects would result from the construction of the  
27 water conveyance facilities (CM1, 1,020 acres), and implementing other conservation measures  
28 (Yolo Bypass fisheries improvements [CM2], and tidal habitat restoration [CM4] - 49 acres). All  
29 modeled foraging habitat impacts would occur in tidal perennial aquatic natural communities.

30 The typical NEPA and CEQA project-level mitigation ratio for those natural communities affected by  
31 CM1 would be 1:1 for restoration/creation of tidal perennial aquatic habitat. Using this ratio would  
32 indicate that 1,069 acres of the tidal perennial aquatic natural community should be  
33 restored/created to compensate for the CM1 losses of California least tern foraging habitat. The  
34 near-term effects of other conservation actions would remove 49 acres of tidal perennial aquatic  
35 habitat, and therefore require 49 acres of tidal perennial aquatic natural community restoration  
36 using the same typical NEPA and CEQA ratio (1:1 for restoration).

37 The BDCP has committed to near-term goals of restoring 19,150 acres of tidal natural communities  
38 in the Plan Area through *CM4 Tidal Natural Communities Restoration* (Table 3-4 in Chapter 3).  
39 Modeling conducted by ESA PWA indicates that this conservation action would result in the creation  
40 of approximately 3,400 acres of high-value tidal perennial aquatic natural community (refer to Table  
41 5 in BDCP Appendix 3.B, *BDCP Tidal Habitat Evolution Assessment*). Tidal perennial aquatic  
42 restoration would occur in the same timeframe as the construction and early restoration losses,  
43 thereby avoiding adverse effects on California least tern.

1 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*  
2 *Construction Best Management Practices and Monitoring, AMM3, Stormwater Pollution Prevention*  
3 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment and*  
4 *Countermeasure Plan, AMM6 Spoils, Reusable Tunnel Material, and Dredged Material Disposal Plan,*  
5 *and AMM7 Barge Operations Plan.* All of these AMMs include elements that would avoid or minimize  
6 the risk of affecting individuals and species habitats at or adjacent to work areas and storage sites.  
7 The AMMs are described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures.*

8 Although nesting by California least tern is not expected to occur, restoration sites could attract  
9 individuals wherever disturbed or artificial sites mimic habitat conditions sought for nesting (i.e.,  
10 sandy or gravelly substrates with sparse vegetation). If nesting were to occur, construction activities  
11 could have an adverse effect on California least tern. Mitigation Measure BIO-66, *California Least*  
12 *Tern Nesting Colonies Shall be Avoided and Indirect Effects on Colonies will be Minimized,* would  
13 reduce the impact on nesting California least terns to a less-than-significant level.

14 The natural community restoration and protection activities would be concluded in the first 10  
15 years of Plan implementation, which is close enough in time to the occurrence of impacts to  
16 constitute adequate mitigation for CEQA purposes. In addition, AMM1-AMM7 and Mitigation  
17 Measure BIO-66, *California Least Tern Nesting Colonies Shall be Avoided and Indirect Effects on*  
18 *Colonies will be Minimized,* would avoid and minimize potential impacts on the species from  
19 construction-related habitat loss and noise and disturbance. Because the number of acres required  
20 to meet the typical mitigation ratio described above would be only 2,309 acres of restored tidal  
21 perennial aquatic habitat, the 3,400 acres of tidal perennial aquatic restoration estimated in the  
22 near-term, are more than sufficient to support the conclusion that the near-term impacts of habitat  
23 loss and direct mortality under Alternative 9 would be less than significant under CEQA.

#### 24 **Late Long-Term Timeframe**

25 The habitat model indicates that the study area supports approximately 86,263 acres of foraging  
26 habitat for California least tern. Alternative 9 as a whole would result in the permanent loss of and  
27 temporary effects on 1,082 acres of foraging habitat during the term of the Plan (1% of the total  
28 habitat in the study area). The locations of these losses are described above in the analyses of  
29 individual conservation measures. The Plan includes conservation commitments through *CM4 Tidal*  
30 *Natural Communities Restoration* to restore an estimated 27,000 acres of high-value tidal perennial  
31 aquatic natural community (estimated from Table 5 in BDCP Appendix 3.B, *BDCP Tidal Habitat*  
32 *Evolution Assessment*). The restoration would occur over a wide region of the study area, including  
33 within the Suisun Marsh, Cosumnes/Mokelumne, Cache Creek, and South Delta ROAs (see Figure  
34 12-1).

35 The loss of California least tern foraging habitat and potential direct mortality associated with  
36 Alternative 9 would represent a significant impact in the absence of other conservation actions.  
37 However, with habitat restoration associated with CM4, and guided by *AMM1 Worker Awareness*  
38 *Training, AMM2 Construction Best Management Practices and Monitoring, AMM3 Stormwater*  
39 *Pollution Prevention Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention,*  
40 *Containment, and Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel*  
41 *Material, and Dredged Material, AMM7 Barge Operations Plan,* and with implementation of Mitigation  
42 Measure BIO-66, *California Least Tern Nesting Colonies Shall Be Avoided and Indirect Effects on*  
43 *Colonies Will Be Minimized,* the loss of habitat or mortality under this alternative would have a less-  
44 than-significant impact on California least tern.

1           **Mitigation Measure BIO-66: California Least Tern Nesting Colonies Shall Be Avoided and**  
2           **Indirect Effects on Colonies Will Be Minimized**

3           If suitable nesting habitat for California least tern (flat unvegetated areas near aquatic foraging  
4           habitat) is identified during planning level surveys, DWR will ensure that a qualified biologist  
5           with experience observing the species and its nests conducts at least three preconstruction  
6           surveys for this species during the nesting season. DWR will design projects to avoid the loss of  
7           California least tern nesting colonies. No construction will take place within 500 feet of  
8           California least tern nests during the nesting season (April 15 to August 15 or as determined  
9           through surveys). Only inspection, maintenance, research, or monitoring activities may be  
10          performed during the least tern breeding season in areas within or adjacent to least tern  
11          breeding habitat with USFWS and CDFW approval under the supervision of a qualified biologist.

12          **Impact BIO-67: Indirect Effects of Plan Implementation on California Least Tern**

13          **Indirect construction- and operation-related effects:** Indirect effects associated with  
14          construction that could affect California least tern include noise, dust, and visual disturbance caused  
15          by grading, filling, contouring, and other ground-disturbing operations outside the project footprint  
16          but within 500 feet from the construction edge. Construction noise above background noise levels  
17          (greater than 50 dBA) could extend 1,900 to 5,250 feet from the edge of construction activities  
18          (BDCP Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of the BDCP Conveyance*  
19          *Facility on Sandhill Crane*, Table 4), although there are no available data to determine the extent to  
20          which these noise levels could affect California least tern. The use of mechanical equipment during  
21          water conveyance facilities construction could cause the accidental release of petroleum or other  
22          contaminants that could affect California least tern or their prey species in the surrounding habitat.  
23          The inadvertent discharge of sediment or excessive dust adjacent to foraging habitat could also  
24          affect the species. Noise and visual disturbance is not expected to have an adverse effect on  
25          California least tern foraging behavior. As described in Mitigation Measure BIO-66, *California Least*  
26          *Tern Nesting Colonies Shall Be Avoided and Indirect Effects on Colonies Will Be Minimized*, if least tern  
27          nests were found during planning or preconstruction surveys, no construction would take place  
28          within 500 feet of active nests. In addition, AMM1-AMM7, including construction best management  
29          practices, would minimize the likelihood of spills from occurring or excessive dust being created  
30          during construction. Should a spill occur, implementation of these AMMs would greatly reduce the  
31          likelihood of individuals being affected.

32          **Methylmercury Exposure:** Covered activities have the potential to exacerbate the bioaccumulation  
33          of mercury in avian species including the California least tern. The operational impacts of new flows  
34          under CM1 were analyzed using a DSM-2 based model to assess potential effects on mercury  
35          concentration and bioavailability. Subsequently, a regression model was used to estimate fish-tissue  
36          concentrations under these future operational conditions (evaluated starting operations or ESO).  
37          Results indicated that changes in total mercury levels in water and fish tissues due to ESO were  
38          insignificant (see BDCP Appendix 5.D, Tables 5D.4-3, 5D.4-4, and 5D.4-5).

39          Marsh (tidal and nontidal) and floodplain restoration also have the potential to increase exposure to  
40          methylmercury. Mercury is transformed into the more bioavailable form of methylmercury in  
41          aquatic systems, especially areas subjected to regular wetting and drying such as tidal marshes and  
42          flood plains. Thus, BDCP restoration activities that create newly inundated areas could increase  
43          bioavailability of mercury (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration).  
44          Increased methylmercury associated with natural community and floodplain restoration may

1 indirectly affect California least tern, via uptake in lower trophic levels (as described in the BDCP,  
2 Appendix 5.D, *Contaminants*). In general, the highest methylation rates are associated with high tidal  
3 marshes that experience intermittent wetting and drying and associated anoxic conditions (Alpers  
4 et al. 2008). The potential mobilization or creation of methylmercury within the study area varies  
5 with site-specific conditions and would need to be assessed at the project level.

6 Schwarzbach and Adelsbach (2003) investigated mercury exposure in 15 species of birds inhabiting  
7 the Bay-Delta ecosystem. Among the species studied, the highest concentrations of mercury were  
8 found in the eggs of piscivorous birds (terns and cormorants) that bioaccumulate mercury from  
9 their fish prey. The very highest concentrations were found in Caspian and Forster's terns, especially  
10 those inhabiting South San Francisco Bay. Based on three California least tern eggs collected from  
11 Alameda Naval Air Station in the San Francisco Central Bay, concentrations in California least tern  
12 eggs were a third (0.3 ppm) those of the eggs of the other two terns. Because of the small sample  
13 size, there is a high degree of uncertainty regarding the levels of mercury that may be present in  
14 California least tern eggs. If the mercury levels measured at Alameda Naval Air Station are  
15 representative of the population in the San Francisco Bay, they would not be expected to result in  
16 adverse effects on tern hatchlings. Hatching and fledging success were not reduced in common tern  
17 eggs in Germany with mercury concentrations of 6.7 ppm (Hothem and Powell 2000).

18 *CM12 Methylmercury Management* includes provisions for project-specific Mercury Management  
19 Plans. Site-specific restoration plans that address the creation and mobilization of mercury, as well  
20 as monitoring and adaptive management as described in CM12 would be available to address the  
21 uncertainty of methylmercury levels in restored tidal marsh and potential impacts on California  
22 least tern.

23 **Selenium:** Selenium is an essential nutrient for avian species and has a beneficial effect in low  
24 doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009, Ohlendorf  
25 and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults, and can also  
26 result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz 2009). The  
27 effect of selenium toxicity differs widely between species and also between age and sex classes  
28 within a species. In addition, the effect of selenium on a species can be confounded by interactions  
29 with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith 2009).

30 The primary source of selenium bioaccumulation in birds is through their diet (Ackerman and  
31 Eagles-Smith 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the  
32 trophic level at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At  
33 Kesterson Reservoir in the San Joaquin Valley, selenium concentrations in invertebrates have been  
34 found to be two to six times the levels in rooted plants. Furthermore, bivalves sampled in the San  
35 Francisco Bay contained much higher selenium levels than crustaceans such as copepods (Stewart et  
36 al. 2004). Studies conducted at the Grasslands in Merced County recorded higher selenium levels in  
37 black-necked stilts which feed on aquatic invertebrates than in mallards and pintails, which are  
38 primarily herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which  
39 forage on bivalves) have much higher levels of selenium levels than shorebirds that prey on aquatic  
40 invertebrates (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high  
41 levels of selenium have a higher risk of selenium toxicity.

42 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations  
43 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to  
44 exacerbate bioaccumulation of selenium in avian species, including California least tern. Marsh (tidal

1 and nontidal) and floodplain restoration have the potential to mobilize selenium, and therefore  
2 increase avian exposure from ingestion of prey items with elevated selenium levels. Thus, BDCP  
3 restoration activities that create newly inundated areas could increase bioavailability of selenium  
4 (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Changes in selenium  
5 concentrations were analyzed in Chapter 8, *Water Quality*, and it was determined that, relative to  
6 Existing Conditions and the No Action Alternative, CM1 would not result in substantial, long-term  
7 increases in selenium concentrations in water in the Delta under any alternative. However, it is  
8 difficult to determine whether the effects of potential increases in selenium bioavailability  
9 associated with restoration-related conservation measures (CM4 and CM5) would lead to adverse  
10 effects on California least tern.

11 Because of the uncertainty that exists at this programmatic level of review, there could be a  
12 substantial effect on California least tern from increases in selenium associated with restoration  
13 activities. This effect would be addressed through the implementation of *AMM27 Selenium*  
14 *Management* (BDCP Appendix 3.C, *Avoidance and Minimization Measures*) which would provide  
15 specific tidal habitat restoration design elements to reduce the potential for bioaccumulation of  
16 selenium and its bioavailability in tidal habitats. Furthermore, the effectiveness of selenium  
17 management to reduce selenium concentrations and/or bioaccumulation would be evaluated  
18 separately for each restoration effort as part of design and implementation. This avoidance and  
19 minimization measure would be implemented as part of the tidal habitat restoration design  
20 schedule.

21 **NEPA Effects:** Noise and visual disturbances within 500 feet of construction-related activities from  
22 the CMs could disturb California least tern foraging habitat adjacent to work sites. Mitigation  
23 Measure BIO-66, *California Least Tern Nesting Colonies Shall Be Avoided and Indirect Effects on*  
24 *Colonies Will Be Minimized*, would be available to address this adverse effect. AMM1-AMM7,  
25 including *AMM2 Construction Best Management Practices and Monitoring*, would minimize the  
26 likelihood of spills from occurring and ensure that measures were in place to prevent runoff from  
27 the construction area and to avoid negative effects of dust on the species. Tidal habitat restoration  
28 could result in increased exposure of California least tern to selenium. This effect would be  
29 addressed through the implementation of *AMM27 Selenium Management*, which would provide  
30 specific tidal habitat restoration design elements to reduce the potential for bioaccumulation of  
31 selenium and its bioavailability in tidal habitats. The indirect effects associated with noise and visual  
32 disturbances, potential spills of hazardous material, and increased exposure to selenium from  
33 Alternative 9 implementation would not have an adverse effect on California least tern. Tidal habitat  
34 restoration could result in increased exposure of California least tern to methylmercury. However, it  
35 is unknown what concentrations of methylmercury are harmful to the species, and the potential for  
36 increased exposure varies substantially within the study area. Site-specific restoration plans that  
37 address the creation and mobilization of mercury, as well as monitoring and adaptive management  
38 as described in *CM12 Methylmercury Management*, would be available to address the uncertainty of  
39 methylmercury levels in restored tidal marsh and potential impacts on California least tern. The  
40 site-specific planning phase of marsh restoration would be the appropriate place to assess the  
41 potential for risk of methylmercury exposure for California least tern, once site specific sampling  
42 and other information could be developed.

43 **CEQA Conclusion:** Noise and visual disturbances within 500 feet of construction-related activities  
44 from the CMs could disturb California least tern foraging habitat adjacent to work sites.  
45 Implementation of Mitigation Measure BIO-66, *California Least Tern Nesting Colonies Shall Be*

1 *Avoided and Indirect Effects on Colonies Will Be Minimized*, would avoid and minimize impacts on  
2 potential nesting California least terns from noise and visual disturbance. The use of mechanical  
3 equipment during water conveyance facilities construction could cause the accidental release of  
4 petroleum or other contaminants that could affect California least tern if present in the surrounding  
5 habitat. The inadvertent discharge of sediment or excessive dust adjacent to California least tern  
6 habitat could also affect the species. These impacts on California least tern would be less than  
7 significant with the incorporation of AMM1–AMM7 into the BDCP. Tidal habitat restoration could  
8 result in increased exposure of California least tern to methylmercury. However, it is unknown what  
9 concentrations of methylmercury are harmful to the species. Sites-specific restoration plans that  
10 address the creation and mobilization of mercury, as well as monitoring and adaptive management  
11 as described in *CM12 Methylmercury Management*, would be available to address the uncertainty of  
12 methylmercury levels in restored tidal marsh and potential impacts on California least tern. This  
13 effect would be addressed through the implementation of *AMM27 Selenium Management*, which  
14 would provide specific tidal habitat restoration design elements to reduce the potential for  
15 bioaccumulation of selenium and its bioavailability in tidal habitats. Therefore, the indirect effects of  
16 plan implementation would not have an adverse effect on California least tern.

17 **Mitigation Measure BIO-66, California Least Tern Nesting Colonies Shall Be Avoided and**  
18 **Indirect Effects on Colonies Will Be Minimized**

19 See Mitigation Measure BIO-66 under Impact BIO-66.

20 **Impact BIO-68: Effects on California Least Tern Associated with Electrical Transmission**  
21 **Facilities**

22 New transmission lines would increase the risk for bird-power line strikes, which could result in  
23 injury or mortality of California least tern. This risk is considered to be minimal based on tern flight  
24 behaviors and its unlikely use of habitats near the transmission line corridors.

25 **NEPA Effects:** The construction and presence of new transmission lines would not represent an  
26 adverse effect on California least tern as a result of direct mortality of a special-status species  
27 because they are not known to be present in areas of disturbance and because the probability of  
28 bird-powerline strikes is unlikely due to tern flight behaviors.

29 **CEQA Conclusion:** The construction and presence of new transmission lines would represent a less-  
30 than-significant impact on California least tern as a result of direct mortality of a special-status  
31 species because they are not known to be present in areas of disturbance and because the  
32 probability of bird-powerline strikes is unlikely due to tern flight behaviors.

33 **Greater Sandhill Crane**

34 This section describes the effects of Alternative 9, including water conveyance facilities construction  
35 and implementation of other conservation components, on greater sandhill crane. Greater sandhill  
36 cranes in the Plan Area are almost entirely dependent on privately owned agricultural lands for  
37 foraging. Long-term sustainability of the species is thus dependent on providing a matrix of  
38 compatible crop types that afford suitable foraging habitat and maintaining compatible agricultural  
39 practices, while sustaining and increasing the extent of other essential habitat elements such as  
40 night roosting habitat. The habitat model for greater sandhill crane includes “roosting and foraging”  
41 and “foraging” habitat. These habitat types include certain agricultural types, specific grassland

1 types, irrigated pastures and hay crops, managed seasonal wetland, and other natural seasonal  
2 wetland. Roosting and foraging habitat includes known, traditional roost sites that also provide  
3 foraging habitat (BDCP Appendix 2.A, *Covered Species Accounts*). Both temporary and permanent  
4 roost sites were identified for greater Sandhill crane. Permanent roosting and foraging sites are  
5 those used regularly, year after year, while temporary roosting and foraging sites are those used in  
6 some years. Factors included in assessing the value of affected habitat for the greater sandhill crane  
7 includes the relative habitat value of specific crop or land cover types, and proximity to known roost  
8 sites. Foraging habitat for greater sandhill crane included crop types and natural communities up to  
9 4 miles from known roost sites, within the boundary of the winter crane use area (BDCP Appendix  
10 2A).

11 Construction and restoration associated with Alternative 9 conservation measures would result in  
12 both temporary and permanent losses of foraging and roosting habitat for greater sandhill crane as  
13 indicated in Table 12-9-28. Full implementation of Alternative 9 would also include the following  
14 conservation actions over the term of the BDCP to benefit the greater sandhill crane (BDCP Chapter  
15 3, Section 3.3, *Biological Goals and Objectives*).

- 16 • Protect at least 7,300 acres of high- to very high-value habitat for greater sandhill crane, with at  
17 least 80% maintained in very high-value types in any given year. This protected habitat would  
18 be within 2 miles of known roosting sites in CZs 3, 4, 5, and/or 6. Selection of protected habitat  
19 locations would consider sea level rise and local seasonal flood events, greater sandhill crane  
20 population levels, and the location of foraging habitat loss. Patch size of protected cultivated  
21 lands will be at least 160 acres (Objective GSHC1.1, associated with CM3).
- 22 • To create additional high-value greater sandhill crane winter foraging habitat, 10% of the  
23 habitat protected under Objective GSHC1.1 would involve acquiring low-value habitat or  
24 nonhabitat areas and converting them to high- or very high-value habitat. Habitat would be  
25 created within 2 miles of known roosting sites in CZs 3, 4, 5, and/or 6. Selection of protected  
26 habitat locations would consider sea level rise and local seasonal flood events, greater sandhill  
27 crane population levels, and the location of foraging habitat loss (Objective GSHC1.2, associated  
28 with CM3).
- 29 • Create at least 320 acres of managed wetlands in minimum patch sizes of 40 acres within the  
30 Greater Sandhill Crane Winter Use Area in CZs 3, 4, 5, or 6, with consideration of sea level rise  
31 and local seasonal flood events. The wetlands would be located within 2 miles of existing  
32 permanent roost sites and protected in association with other protected natural community  
33 types (excluding nonhabitat cultivated lands) at a ratio of 2:1 upland to wetland to provide  
34 buffers around the wetlands (Objective GSHC1.3, associated with CM3).
- 35 • Create at least two 90-acre wetland complexes within the Stone Lakes NWR project boundary.  
36 The complexes would be no more than 2 miles apart and would help provide connectivity  
37 between the Stone Lakes and Cosumnes greater sandhill crane populations. Each complex would  
38 consist of at least three wetlands totaling at least 90 acres of greater sandhill crane roosting  
39 habitat, and would be protected in association with other protected natural community types  
40 (excluding nonhabitat cultivated lands) at a ratio of at least 2:1 uplands to wetlands (i.e., two  
41 sites with at least 90 acres of wetlands each). One of the 90-acre wetland complexes may be  
42 replaced by 180 acres of cultivated lands (e.g., cornfields) that would be flooded following  
43 harvest to support roosting cranes and provide highest-value foraging habitat, provided such  
44 substitution is consistent with the long-term conservation goals of Stone Lakes NWR for greater  
45 sandhill crane (Objective GSHC1.4, associated with CM10).

- 1 • Create an additional 95 acres of roosting habitat within 2 miles of existing permanent roost  
2 sites. The habitat would consist of active cornfields that are flooded following harvest to support  
3 roosting cranes and that provide highest-value foraging habitat. Individual fields would be at  
4 least 40 acres and locations may be shifted throughout the Greater Sandhill Crane Winter Use  
5 Area, but would be sited with consideration of the location of roosting habitat loss and would be  
6 in place prior to roosting habitat loss (Objective GSCH1.5, associated with CM3).
- 7 • Protect at least 48,625 acres of cultivated lands that provide suitable habitat for covered and  
8 other native wildlife species (Objective CLNC1.1, associated with CM3).
- 9 • Target cultivated land conservation to provide connectivity between other conservation lands  
10 (Objective CLNC1.2, associated with CM3).
- 11 • Maintain and protect the small patches of important wildlife habitats associated with cultivated  
12 lands that occur in cultivated lands within the reserve system, including water conveyance  
13 channels, grasslands, ponds, and wetlands (Objective CLNC1.3, associated with CM3).

14 As explained below, with the restoration and protection of these amounts of habitat, in addition to  
15 natural community enhancement and management commitments (including *CM12 Methylmercury*  
16 *Management*) and implementation of AMM1–AMM7, *AMM20 Greater Sandhill Crane*, *AMM27*  
17 *Selenium Management*, and *AMM30 Transmission Line Design and Alignment Guidelines*, impacts on  
18 the greater sandhill crane would be less than significant for CEQA purposes.

19 **Table 12-9-28. Changes in Greater Sandhill Crane Modeled Habitat Associated with Alternative 9**  
20 **(acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	Roosting and Foraging - Permanent	0	0	0	0	NA	NA
	Roosting and Foraging - Temporary	0	0	25	25	NA	NA
	Foraging	37	37	552	552	0	0
<b>Total Impacts CM1</b>		<b>37</b>	<b>37</b>	<b>577</b>	<b>577</b>	<b>0</b>	<b>0</b>
CM2–CM18	Roosting and Foraging - Permanent	0	0	0	0	0	0
	Roosting and Foraging - Temporary	0	41	0	0	0	0
	Foraging	2,776	4,367	0	0	0	0
<b>Total Impacts CM2–CM18</b>		<b>2,776</b>	<b>4,408</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>Total Roosting/Foraging – Permanent</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>Total Roosting/Foraging – Temporary</b>		<b>0</b>	<b>41</b>	<b>25</b>	<b>25</b>	<b>0</b>	<b>0</b>
<b>Total Foraging</b>		<b>2,813</b>	<b>4,404</b>	<b>552</b>	<b>552</b>	<b>0</b>	<b>0</b>
<b>TOTAL IMPACTS</b>		<b>2,813</b>	<b>4,445</b>	<b>577</b>	<b>577</b>	<b>0</b>	<b>0</b>

<sup>a</sup> See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected

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over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only.

NT = near-term

LLT = late long-term

NA = not applicable

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1

2 **Impact BIO-69: Loss or Conversion of Habitat for and Direct Mortality of Greater Sandhill**  
3 **Crane**

4 Alternative 9 conservation measures would result in the combined permanent and temporary loss  
5 of up to 66 acres of modeled roosting and foraging habitat for greater sandhill crane (41 acres of  
6 permanent loss and 25 acres of temporary loss) and 4,956 acres of foraging habitat for greater  
7 sandhill crane (4,404 of permanent loss, 552 acres of temporary loss, Table 12-9-28). Conservation  
8 measures that would result in these losses are conveyance facilities and transmission line  
9 construction, and establishment and use of borrow and spoil areas (CM1), Tidal Natural  
10 Communities Restoration (CM4), Grassland Natural Community Restoration (CM8), Nontidal Marsh  
11 Natural Community Restoration (CM10), and Natural Communities Enhancement and Management  
12 (CM11). The majority of habitat loss would result from water conveyance facility construction and  
13 conversion of habitat to tidal natural communities through CM4. Habitat enhancement and  
14 management activities through CM11, which include ground disturbance or removal of nonnative  
15 vegetation, could also result in local adverse habitat effects. In addition, maintenance activities  
16 associated with the long-term operation of the water conveyance facilities and other BDCP physical  
17 facilities could degrade or eliminate greater sandhill crane modeled habitat. Each of these individual  
18 activities is described below. A summary statement of the combined impacts, NEPA effects and a  
19 CEQA conclusion follow the individual conservation measure discussions.

- 20 • *CM1 Water Facilities and Operation:* Construction of Alternative 9 conveyance facilities as they  
21 are currently designed would result in the permanent loss of up to 37 acres of modeled greater  
22 sandhill crane foraging habitat. Foraging habitat that would be permanently impacted by CM1  
23 would consist of 1 acre of very high-value, 8 acres of high-value, and 24 acres of medium-value  
24 foraging habitat (Table 12-9-29). Permanent loss of foraging habitat would result from intake  
25 and fish screen construction, channel enlargement, and transmission line construction in CZ 4, 5,  
26 and 6. Fish barrier construction would permanently impact foraging habitat in CZ 6 on Bradford  
27 Island, Bacon Island, north of Woodward Island, and between Mandeville and Bradford Island.  
28 In addition, 25 acres of temporary roosting and foraging habitat, and 552 acres of foraging  
29 habitat would be temporarily removed (Table 12-9-28). Temporary habitat loss would primarily  
30 result from potential borrow and spoil areas (367 acres) and work areas for the above  
31 construction activities. The temporarily removed habitat would consist primarily of cultivated  
32 lands and it would be restored within 1 year following construction. However, it would not  
33 necessarily be restored to its original topography and it could be restored as grasslands in the  
34 place of cultivated lands.

35 The temporary roosting and foraging habitat that would be temporarily impacted is located on  
36 the east side of Bradford Island. The temporary roost site would be impacted by a concrete  
37 batch plant, an operable barrier work area, and a borrow and spoil area. The implementation of  
38 *AMM20 Greater Sandhill Crane* would require that all CM1 activities be designed to avoid direct  
39 loss of crane roost sites. Avoidance of crane roost sites would be accomplished either by siting

1 activities outside of identified roost sites or by relocating the roost site if it consisted of  
 2 cultivated lands (roost sites consisting of wetlands would not be subject to re-location).  
 3 Relocated roost sites would be established prior to construction activities affecting the original  
 4 roost site (as described in *AMM20 Greater Sandhill Crane*, BDCP Appendix 3C). Therefore there  
 5 would be no loss of crane roosting and foraging habitat as a result of water conveyance facility  
 6 construction once the facilities were fully designed. Refer to the Terrestrial Biology Map Book  
 7 for a detailed view of Alternative 9 construction locations.

8 **Table 12-9-29. Total Amount of Greater Sandhill Crane Foraging Habitat Affected under**  
 9 **Alternative 9**

Foraging Habitat Value Class	Land Cover Type	Acres Affected by CM1 permanent (temporary)	Acres Affected by CM2-CM18 permanent (temporary)
Very high	Corn, rice	1 (51)	525 (0)
High	Alfalfa and alfalfa mixtures, mixed pasture, native pasture, wheat, other pasture, irrigated pasture, managed wetlands, native vegetation	8 (363)	1,732 (0)
Medium	Grain and hay crops, miscellaneous grain and hay, mixed grain and hay, nonirrigated mixed grain and hay, other grain crops, miscellaneous grasses, grassland, alkali seasonal wetlands, vernal pool complex	24 (130)	1,018 (0)
Low	Other irrigated crops, idle cropland, blueberries, asparagus, clover, cropped within the last 3 years, grain sorghum, green beans, miscellaneous truck, miscellaneous field, new lands being prepped for crop production, nonirrigated mixed pasture, nonirrigated native pasture, onions, garlic, peppers, potatoes, safflower, sudan, sugar beets, tomatoes (processing), melons squash and cucumbers all types, artichokes, beans (dry)	3 (8)	1,069 (0)
None	Vineyards, orchards	0 (0)	23 (0)

10

- 11 • *CM4 Tidal Natural Communities Restoration*: Based on the hypothetical tidal restoration  
 12 footprint, this activity would result in the permanent loss or conversion of approximately 2,754  
 13 acres of greater sandhill crane habitat, consisting of 41 acres of temporary roosting and foraging  
 14 habitat and 2,713 acres of foraging habitat. Loss of foraging habitat from CM4 would consist of  
 15 78 acres of very high-value, 1,199 acres of high value, 855 acres of medium-value, and 558 acres  
 16 of low-value foraging habitat (Table 12-9-29). This loss would occur in the Cosumnes-Mokelumne  
 17 River and West Delta ROAs. Tidal wetland restoration in CZ 4 could occur between the high  
 18 crane use areas of the central Delta and the Cosumnes River Preserve. However, the conversion  
 19 of grasslands and cultivated lands to tidal wetlands would not prohibit crane movement or  
 20 reduce use of these areas. In CZ 5, loss of modeled habitat would occur along the western edge of  
 21 the greater sandhill crane winter use area and therefore would not result in fragmentation of  
 22 traditional crane habitats. Therefore fragmentation of habitat from tidal restoration activities  
 23 would be expected to be minimal. Approximately 1,951 acres of foraging habitat would be  
 24 impacted within the first 10 years of Alternative 1A implementation.

- 1       • *CM8 Grassland Natural Community Restoration*: Approximately 300 acres of cultivated lands that  
2       provide foraging habitat for greater sandhill crane would be converted to grassland by the late  
3       long-term timeframe. No roosting/foraging habitat would be impacted by grassland restoration  
4       activities. The restored grasslands would continue to provide foraging habitat value for the  
5       greater sandhill crane. Approximately 257 acres would be impacted within the first 10 years of  
6       Plan implementation.
- 7       • *CM10 Nontidal Marsh Restoration*: Nontidal marsh restoration would result in the permanent  
8       conversion of approximately 1,350 acres of modeled foraging habitat for the greater sandhill  
9       crane. A portion of the restored nontidal marsh would be expected to continue to provide  
10      roosting and foraging habitat value for the greater sandhill crane. However, some of this  
11      restored marsh would be unsuitable as it would lack emergent vegetation and consist of open  
12      water that would be too deep to provide suitable roosting or foraging habitat. Approximately  
13      567 acres of habitat would be converted to nontidal marsh within the first 10 years of  
14      Alternative 1A implementation.
- 15      • *CM11 Natural Communities Enhancement and Management*: A variety of habitat management  
16      actions included in CM11 that are designed to enhance wildlife values in restored or protected  
17      habitats could result in localized ground disturbances that could temporarily remove small  
18      amounts of modeled habitat. Ground-disturbing activities, such as removal of nonnative  
19      vegetation and road and other infrastructure maintenance activities, would be expected to have  
20      minor adverse effects on available habitat and would be expected to result in overall  
21      improvements to and maintenance of habitat values over the term of the BDCP. The potential for  
22      these activities to result in direct mortality of greater sandhill crane would be minimized with  
23      the implementation of *AMM20 Greater Sandhill Crane*. CM11 would also include the construction  
24      of recreational-related facilities including trails, interpretive signs, and picnic tables (BDCP  
25      Chapter 4, *Covered Activities and Associated Federal Actions*). The construction of trailhead  
26      facilities, signs, staging areas, picnic areas, bathrooms, etc. would be placed on existing,  
27      disturbed areas when and where possible. If new ground disturbance was necessary, greater  
28      sandhill crane habitat would be avoided, with the exception of a permanent loss of 4 acres of  
29      grassland foraging habitat (1 acre of which would be impacted within the first 10 years of  
30      Alternative 1A implementation).
- 31      • *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground  
32      water conveyance facilities and restoration infrastructure could result in ongoing but periodic  
33      disturbances that could affect greater sandhill crane use of the surrounding habitat.  
34      Maintenance activities would include vegetation management, levee and structure repair, and  
35      re-grading of roads and permanent work areas. These effects, could be adverse as sandhill  
36      cranes are sensitive to disturbance. However, impacts would be reduced by AMMs, and  
37      conservation actions as described below.
- 38      • *Injury and Direct Mortality*: Construction-related activities would not be expected to result in  
39      direct mortality of greater sandhill crane if they were present in the Plan Area, because they  
40      would be expected to avoid contact with construction and other equipment. Potential effects  
41      would be avoided and minimized with the implementation of *AMM20 Greater Sandhill Crane*.  
42      The potential for injury and direct mortality from electrical transmission facilities is discussed  
43      below under Impact BIO-70.

1 The following paragraphs summarize the combined effects discussed above and describe other  
2 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also  
3 included.

#### 4 ***Near-Term Timeframe***

5 Because the water conveyance facilities construction is being evaluated at the project level, the near-  
6 term BDCP conservation strategy has been evaluated to determine whether it would provide  
7 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the effects of  
8 construction would not be adverse under NEPA. Based on current design footprints, Alternative 9  
9 would remove 25 acres roosting and foraging habitat (temporary loss from CM1) in the study area  
10 in the near-term. In addition, 3,364 acres of foraging habitat would be removed or converted in the  
11 near-term (CM1, 589 acres; *CM4 Tidal Natural Communities Restoration*, *CM8 Grassland Natural*  
12 *Community Restoration*, and *CM11 Natural Communities Enhancement and Management*—2,776  
13 acres). Of these near-term acres of foraging habitat impact, 2,505 acres would be moderate- to very  
14 high-value habitat (CM1, 578 acres, CM4-11, 1,927 acres).

15 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by  
16 CM1 and that are identified in the biological goals and objectives for greater sandhill crane in  
17 Chapter 3 of the BDCP would be 1:1 protection and 1:1 restoration for loss of roost sites and 1:1  
18 protection of high- to very high-value foraging habitat for loss of moderate- to very high-value  
19 foraging habitat. Using these ratios would indicate that 25 acres of greater roosting habitat should  
20 be restored/created and 25 acres should be protected to compensate for the CM1 losses of greater  
21 sandhill crane roosting and foraging habitat. In addition, 578 acres of high- to very high-value  
22 foraging habitat should be protected to mitigate the CM1 losses of greater sandhill crane moderate-  
23 to very high-value foraging habitat. The near-term effects of other conservation actions would  
24 remove 1,927 acres of moderate- to very high-value foraging habitat, and therefore require 1,927  
25 acres of protection of high- to very high-value foraging habitat using the same typical NEPA and  
26 CEQA ratios (1:1 restoration and 1:1 protection for the loss of roosting and foraging habitat; 1:1  
27 protection for the loss of foraging habitat).

28 The implementation of *AMM20 Greater Sandhill Crane* would require that no greater sandhill crane  
29 roost sites were directly impacted by CM1 covered activities (including transmission lines and their  
30 associated footprints). Therefore there would be no loss of crane roosting and foraging habitat as a  
31 result of water conveyance facility construction once the facilities were fully designed, which would  
32 avoid the CM1 impact on 25 acres of roosting and foraging habitat once the project design is final.  
33 Indirect effects of construction-related noise and visual disturbance are discussed below under  
34 Impact BIO-71.

35 The BDCP has committed to near-term goals of creating 500 acres of managed wetlands and  
36 protecting 15,600 acres of cultivated lands in the Plan Area (Table 3-4 in Chapter 3, *Description of*  
37 *Alternatives*). These conservation actions are associated with CM3 and CM10 and would occur in the  
38 same timeframe as the construction and early restoration losses. Up to 95 acres of roosting habitat  
39 would be created within 2 miles of existing permanent roost sites (Objective GSHC1.5). These roosts  
40 would consist of active cornfields that are flooded following harvest to support roosting cranes and  
41 also provide the highest-value foraging habitat for the species. Individual fields would be at least 40  
42 acres could shift locations throughout the Greater Sandhill Crane Winter Use Area, and would be in  
43 place prior to roosting habitat loss. Of the 500 acres of managed wetlands to be created for roosting  
44 habitat, 320 acres would be created in minimum patch sizes of 40 acres within the Greater Sandhill

1 Crane Winter Use Area in CZs 3, 4, 5, or 6 (Objective GSHC1.3). Restoration sites would be identified  
2 with consideration of sea level rise and local seasonal flood events. These wetlands would be  
3 created within 2 miles of existing permanent roost sites and protected in association with other  
4 protected natural community types at a ratio of 2:1 upland to wetland habitat to provide buffers that  
5 will protect cranes from the types of disturbances that would otherwise result from adjacent roads  
6 and developed areas (e.g., roads, noise, visual disturbance, lighting). The remaining 180 acres of  
7 crane roosting habitat would be constructed within the Stone Lakes NWR project boundary (BDCP  
8 Chapter 3, Figure 3.3-6) and would be designed to provide connectivity between the Stone Lakes  
9 and Cosumnes greater sandhill crane populations (Objective GSHC1.4). The large patch sizes of  
10 these wetland complexes would provide additional conservation to address the threats of vineyard  
11 conversion, urbanization to the east, and sea level rise to the west of greater sandhill crane  
12 wintering habitat.

13 At least 15,600 acres of cultivated lands that provide habitat for covered and other native wildlife  
14 species would be protected in the near-term time period (Objective CLNC1.1). Mitigation Measure  
15 BIO-69a, *Compensate for the Loss of Medium- to Very High-Value Greater Sandhill Crane Foraging*  
16 *Habitat*, would be available to guide the near-term protection of cultivated lands to ensure that the  
17 near-term impacts of moderate- to very high-value habitat for greater sandhill crane were  
18 compensated for with appropriate crop types and natural communities.

19 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
20 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
21 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
22 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
23 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
24 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
25 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

### 26 **Late Long-Term Timeframe**

27 The study area supports approximately 23,919 acres of roosting and foraging habitat and 164,676  
28 acres of foraging habitat for greater sandhill crane. Alternative 9 as a whole would result in the  
29 permanent loss of and temporary effects on 66 acres of roosting and foraging habitat (less than 1%  
30 of the total habitat in the study area) and 4,956 acres of foraging habitat (3% of the total habitat in  
31 the study area) for the greater sandhill crane during the term of the Plan. The foraging habitat lost  
32 by the late long-term timeframe would consist of 3,853 acres of medium- to very high-value foraging  
33 habitat. The locations of these losses are described above in the analyses of individual conservation  
34 measures. The implementation of *AMM20 Greater Sandhill Crane* would require that no roost sites  
35 were directly affected by water conveyance facilities including transmission lines and associated  
36 footprints. In addition, temporarily removed habitat would be restored within 1 year following  
37 construction. However, it would not necessarily be restored to its original topography and it could  
38 result in the conversion of cultivated lands to grasslands.

39 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*  
40 *Restoration* and *CM10 Nontidal Marsh Restoration* to restore or create at least 595 acres  
41 of greater Sandhill crane roost habitat (Objectives GSHC1.3, GSHC1.4, and GSHC1.5) and to protect at  
42 least 7,300 acres of high- to very high-value foraging habitat for greater Sandhill crane (Objective  
43 GSHC1.1).

1 Of the 500 acres of managed wetlands to be created for roosting habitat, 320 acres would be created  
2 in minimum patch sizes of 40 acres within the Greater Sandhill Crane Winter Use Area in CZs 3, 4, 5,  
3 or 6 (Objective GSHC1.3). Restoration sites would be identified with consideration of sea level rise  
4 and local seasonal flood events. These wetlands would be created within 2 miles of existing  
5 permanent roost sites and protected in association with other protected natural community types at  
6 a ratio of 2:1 upland to wetland habitat to provide buffers that will protect cranes from the types of  
7 disturbances that would otherwise result from adjacent roads and developed areas (e.g., roads,  
8 noise, visual disturbance, lighting). The remaining 180 acres of crane roosting habitat would be  
9 constructed within the Stone Lakes NWR project boundary (BDCP Chapter 3, Figure 3.3-6) and  
10 would be designed to provide connectivity between the Stone Lakes and Cosumnes greater sandhill  
11 crane populations (Objective GSHC1.4). These wetlands would consist of two 90-acre wetland  
12 complexes each consisting of at least three wetlands and would be no more than 2 miles apart. One  
13 of the 90-acre wetland complexes created under this objective could be replaced by 180 acres of  
14 cultivated lands (e.g., cornfields) that are flooded following harvest to support roosting cranes and  
15 provide highest-value foraging habitat, provided such substitution is consistent with the long-term  
16 conservation goals of Stone Lakes National Wildlife Refuge for greater sandhill crane. The large  
17 patch sizes of these wetland complexes would provide additional conservation to address the  
18 threats of vineyard conversion, urbanization to the east, and sea level rise to the west of greater  
19 sandhill crane wintering habitat.

20 To compensate for near-term impacts on crane roosting and foraging habitat, 95 acres of roosting  
21 habitat would be created within 2 miles of existing permanent roost sites (Objective GSHC1.5).  
22 These roosts would consist of active cornfields that are flooded following harvest to support  
23 roosting cranes and also provide the highest-value foraging habitat for the species. Individual fields  
24 would be at least 40 acres could shift locations throughout the Greater Sandhill Crane Winter Use  
25 Area, but would be sited with consideration of the location of roosting habitat loss and would be in  
26 place prior to roosting habitat loss.

27 The BDCP has committed to protecting 7,300 acres of high- to very high-value greater sandhill crane  
28 foraging habitat by the late long-term timeframe with at least 80% maintained in very-high value  
29 types in any given year (Objective GSHC1.1). To create additional high-value foraging habitat in the  
30 study area, 10% of these acres of protected foraging habitat would result from the conversion of  
31 low-value or nonhabitat areas to high- or very high-value habitat (Objective GSHC1.2). These acres  
32 of protected foraging habitat would be located within 2 miles of known roosting sites in CZs 3, 4, 5,  
33 and/or 6 and would consider sea level rise and local seasonal flood events, greater Sandhill crane  
34 population levels, and the location of foraging habitat loss. The patch size of these protected lands  
35 would be at least 160 acres (Objectives GSHC1.1 and GSHC1.2). Because agricultural habitat values  
36 change over time based largely on economically driven agricultural practices, protecting crane  
37 habitat would provide enhanced stability to agricultural habitat value within the crane use area that  
38 does not currently exist.

39 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
40 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
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42 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
43 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
44 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
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1 **CEQA Conclusion:**

2 **Near-Term Timeframe**

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4 term BDCP conservation strategy has been evaluated to determine whether it would provide  
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6 construction would be less than significant. Based on current design footprints, Alternative 9 would  
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20 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
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33 footprints. In addition, temporarily removed habitat would be restored within 1 year following  
34 construction. However, it would not necessarily be restored to its original topography and it could  
35 result in the conversion of cultivated lands to grasslands.

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37 *Restoration* and *CM10 Nontidal Marsh Restoration* to restore or create at least 595 acres  
38 of greater Sandhill crane roost habitat (Objectives GSHC1.3, GSHC1.4, and GSHC1.5) and to protect at  
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8 crane populations (Objective GSHC1.4). These wetlands would consist of two 90-acre wetland  
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10 of the 90-acre wetland complexes created under this objective could be replaced by 180 acres of  
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14 patch sizes of these wetland complexes would provide additional conservation to address the  
15 threats of vineyard conversion, urbanization to the east, and sea level rise to the west of greater  
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22 Area, but would be sited with consideration of the location of roosting habitat loss and would be in  
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24 The BDCP has committed to protecting 7,300 acres of high- to very high-value greater sandhill crane  
25 foraging habitat by the late long-term timeframe with at least 80% maintained in very-high value  
26 types in any given year (Objective GSHC1.1). To create additional high-value foraging habitat in the  
27 study area, 10% of these acres of protected foraging habitat would result from the conversion of  
28 low-value or nonhabitat areas to high- or very high-value habitat (Objective GSHC1.2). These acres  
29 of protected foraging habitat would be located within 2 miles of known roosting sites in CZs 3, 4, 5,  
30 and/or 6 and would consider sea level rise and local seasonal flood events, greater Sandhill crane  
31 population levels, and the location of foraging habitat loss. The patch size of these protected lands  
32 would be at least 160 acres (Objectives GSHC1.1 and GSHC1.2). Because agricultural habitat values  
33 change over time based largely on economically driven agricultural practices, protecting crane  
34 habitat would provide enhanced stability to agricultural habitat value within the crane use area that  
35 does not currently exist.

36 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
37 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
38 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
39 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
40 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
41 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
42 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

43 Considering Alternative 9's protection and restoration provisions, in addition to Mitigation Measure  
44 BIO-69a, which would compensate for the loss of medium- to very high-value foraging habitat at a  
45 ratio of 1:1 prior to or concurrent with impacts, loss of habitat and direct mortality through

1 implementation of Alternative 9 would not result in a substantial adverse effect through habitat  
2 modifications and would not substantially reduce the number or restrict the range of the species.  
3 Therefore, the alternative would have a less-than-significant impact on greater sandhill crane.

4 **Mitigation Measure BIO-69a: Compensate for the loss of Medium to Very High-Value**  
5 **Greater Sandhill Crane Foraging Habitat**

6 DWR will compensate for the loss of greater sandhill crane medium- to very high-value foraging  
7 habitat at a ratio of 1:1 by protecting or managing high- to very high-value habitat in the Plan  
8 Area. Compensation must occur prior to or concurrent within the impacts to minimize the  
9 effects of habitat loss. The crop types and natural communities that are included in foraging  
10 habitat value categories are listed in Table 12-9-29. Foraging habitat conservation must occur  
11 within the greater sandhill crane winter use area and the location of protected habitat or  
12 conservation easements must be preapproved by the USFWS and CDFW.

13 **Impact BIO-70: Effects on Greater Sandhill Crane Associated with Electrical Transmission**  
14 **Facilities**

15 Greater sandhill cranes are susceptible to collision with power lines and other structures during  
16 periods of inclement weather and low visibility (Avian Power Line Interaction Committee 1994,  
17 Brown and Drewien 1995, Manville 2005). New transmission lines installed in the study area would  
18 increase the risk for bird-power line strikes, which could result in injury or mortality of greater  
19 sandhill cranes. Both permanent and temporary electrical transmission lines would be constructed  
20 to supply construction and operational power to BDCP facilities. Typically, higher-voltage (230-  
21 kilovolt [kV]) lines vary in height from 90 to 110 feet, while “sub” transmission (69-kV) lines vary  
22 from 50 to 70 feet (Avian Power Line Interaction Committee 2006). The Alternative 9 alignment  
23 would primarily use existing transmission and distribution lines and would require the installation  
24 of approximately 42 miles of transmission line (3 miles of 60-kV line, 38 miles of 12-kV line, and 0.5  
25 miles of 480-V line). These lines would occur in the vicinity of Walnut Grove and adjacent to fish  
26 screen and operable barrier structures throughout the CM1 footprint. Temporary lines would be  
27 removed after construction of the water conveyance facilities, within 10 years.

28 Existing transmission lines in the sandhill crane winter use area include a network of distribution  
29 lines that are between 11- and 22-kV. In addition, there are two 115-kV lines (one that overlaps with  
30 the winter use area between Antioch and I-5 east of Hood, and one that crosses the northern tip of  
31 the crane winter use area north of Clarksburg); and 69-kV lines that parallel Twin Cities Road,  
32 Herzog Road, Lambert Road, and the Southern Pacific Dredge Cut in the vicinity of Stone Lakes  
33 National Wildlife Refuge. At the south end of the winter use area, there are three 230-kV  
34 transmission lines that follow I-5, and then cut southwest through Holt, and two 500-kV lines cross  
35 the southwestern corner of the winter use area. This existing network of power lines in the study  
36 currently poses a risk for sandhill cranes, as both distribution and transmission lines cross over or  
37 surround sandhill crane roost sites in the study area. New transmission lines would increase this  
38 risk and have an adverse effect on the species in the absence of other conservation actions.

39 The potential mortality of greater sandhill crane in the area of the proposed transmission lines  
40 under Alternative 9 was estimated using collision mortality rates by Brown and Drewien (1995) and  
41 an estimate of potential crossings along the proposed lines (methods are described in BDCP  
42 Appendix 5.J, Attachment 5J.C, *Analysis of Potential Bird Collisions at Proposed BDCP Powerlines*).  
43 Results indicate that in the absence of any line marking to increase visibility and reduce collision

1 risk (i.e., without minimization measures), the average annual mortality of greater sandhill cranes at  
2 permanent lines would be up to 24 fatalities per year and would be 6 fatalities per year at  
3 temporary lines.

4 Marking transmission lines with devices that make the lines more visible to birds has been shown to  
5 dramatically reduce the incidence of bird mortality, including for sandhill cranes. Brown and  
6 Drewien (1995) estimated that marking devices in the Central Valley would reduce crane mortality  
7 by 66%. Using this assumption, by incorporating line-marking devices into the designs the annual  
8 mortality rate would be estimated to decrease to 9 fatalities per year for the permanent lines and 2  
9 fatalities per year for the temporary lines.

10 The current proposed transmission line alignment under Alternative 9 is not fully designed, and line  
11 locations are not final. The implementation of *AMM20 Greater Sandhill Crane* would require that the  
12 final transmission line alignment would not result in a net increase in bird strike risk to greater  
13 sandhill cranes in the Plan Area. This would be achieved by implementing any combination of the  
14 following: (1) siting new transmission lines in lower bird strike risk zones; (2) removing, relocating  
15 or undergrounding existing lines; (3) installing flight diverters on existing lines in the crane winter  
16 use area; and/or (4) for areas outside of the Stone Lakes National Wildlife Refuge project boundary,  
17 shifting locations of flooded areas that provide crane roosts to lower risk areas. This would be  
18 expected to reduce existing mortality and thus fully offset the overall population effects of new  
19 transmission lines. Designing the alignment to minimize risk and removing, relocating, or  
20 undergrounding existing lines would be given priority out of the above methods. With these  
21 measures and the proposed mitigation, and considering that the temporary lines would be removed  
22 within the first 10 years of Alternative 9 implementation, the risk of greater sandhill crane mortality  
23 from transmission lines would be reduced substantially.

24 **CEQA Conclusion:** Sandhill cranes are known to be susceptible to collision with overhead wires. The  
25 existing network of power lines in the study area currently poses a risk for sandhill cranes. New  
26 transmission lines would increase the risk for bird-power line strikes, which could result in injury or  
27 mortality of greater sandhill crane. By incorporating line-marking devices on new transmission lines  
28 the estimated mortality rate would be 9 fatalities per year from permanent transmission lines and 2  
29 fatalities per year from temporary transmission lines. The current proposed transmission line  
30 alignment under Alternative 9 is not fully designed, and line locations are not final. The  
31 implementation of *AMM20 Greater Sandhill Crane* would require that the final transmission line  
32 alignment avoided crane roost sites and achieved no net increase of greater sandhill crane strike  
33 risk in the Plan Area. With *AMM20 Greater Sandhill Crane* and the proposed mitigation, and  
34 considering that the temporary lines would be removed within the first 10 years of Alternative 9  
35 implementation, the risk of mortality from collision with transmission lines would result in a less-  
36 than-significant impact on the greater sandhill crane population.

### 37 **Impact BIO-71: Indirect Effects of Plan Implementation on Greater Sandhill Crane**

38 **Indirect construction-and operation-related effects:** Sandhill cranes are sensitive to disturbance.  
39 Noise and visual disturbances from the construction of water conveyance facilities and other  
40 conservation measures could reduce greater sandhill crane use of modeled habitat adjacent to work  
41 areas. Indirect effects associated with construction include noise, dust, and visual disturbance  
42 caused by grading, filling, contouring, and other ground-disturbing operations outside the project  
43 footprint but within 1,300 feet of the construction edge. Furthermore, maintenance of the  
44 aboveground water conveyance facilities could result in ongoing but periodic postconstruction noise

1 and visual disturbances that could affect greater sandhill crane use of surrounding habitat. These  
 2 effects could result from periodic vehicle use along the conveyance corridor, inspection and  
 3 maintenance of aboveground facilities, and similar activities. These potential effects would be  
 4 minimized with implementation of *AMM20 Greater Sandhill Crane* described in Appendix 3.C,  
 5 *Avoidance and Minimization Measures*.

6 The BDCP includes an analysis of the indirect effects of noise and visual disturbance that would  
 7 result from the construction of the Alternative 4 water conveyance facilities on greater sandhill  
 8 crane (BDCP Appendix 5J.D, *Indirect Effects of the Construction of the BDCP Conveyance Facility on*  
 9 *Sandhill Crane*). The same methods were employed to addresses the potential noise effects on  
 10 cranes from Alternative 9 and to determine that as much as 1,217-5,108 acres of crane habitat could  
 11 potentially be affected by general construction noise above baseline level (50–60 dBA). This would  
 12 include 44 – 157 acres of temporary crane roosting habitat and 1,173 – 4,951 acres of crane foraging  
 13 habitat. In addition, 0-40 acres of permanent crane roosting habitat, 38 – 688 acres of temporary  
 14 crane roosting habitat, and 1,392 – 7,699 acres of crane foraging habitat could be affected by noise  
 15 from pile driving that would be above baseline level (50–60dBA, Table 12-9-30). The analysis was  
 16 conducted based on the assumption that there would be direct line-of-sight from sandhill crane  
 17 habitat areas to the construction site, and, therefore, provides a worst-case estimate of effects. In  
 18 many areas the existing levees would partially or completely block the line-of-sight and would  
 19 function as effective noise barriers, substantially reducing noise transmission. However, there is  
 20 insufficient data to assess the effects that increased noise levels would have on sandhill crane  
 21 behavior.

22 **Table 12-9-30. Greater Sandhill Crane Habitat Affected By General Construction and Pile Driving**  
 23 **Noise Under Alternative 9 (acres)**

Habitat Type	General Construction		Pile Driving	
	Above 60 dBA	Above 50 dBA	Above 60 dBA	Above 50 dBA
Permanent Roosting	0	0	0	40
Temporary Roosting	44	157	38	688
Foraging	1,173	4,951	1,392	7,699
Total Habitat	1,217	5,108	1,430	8,426

24  
 25 Evening and nighttime construction activities would require the use of extremely bright lights.  
 26 Nighttime construction could also result in headlights flashing into roost sites when construction  
 27 vehicles are turning onto or off of construction access routes. Proposed surge towers would require  
 28 the use of safety lights that would alert low-flying aircraft to the presence of these structures  
 29 because of their height. Little data is available on the effects of impact of artificial lighting on  
 30 roosting birds. Direct light from automobile headlights has been observed to cause roosting cranes  
 31 to flush and it is thought that they may avoid roosting in areas where lighting is bright (BDCP  
 32 Chapter 5, *Effects Analysis*). If the birds were to roost in a brightly lit site, they may be vulnerable to  
 33 sleep-wake cycle shifts and reproductive cycle shifts. Potential risks of visual impacts from lighting  
 34 include a reduction in the cranes’ quality of nocturnal rest, and effects on their sense of photo-period  
 35 which might cause them to shift their physiology towards earlier migration and breeding (BDCP  
 36 Chapter 5, *Effects Analysis*). Effects such as these could prove detrimental to the cranes’ overall  
 37 fitness and reproductive success (which could in turn have population-level impacts). A change in  
 38 photo-period interpretation could also cause cranes to fly out earlier from roost sites to forage and

1 might increase their risk of power line collisions if they were to leave roosts before dawn (BDCP  
2 Chapter 5, *Effects Analysis*).

3 The effects of noise and visual disturbance on greater sandhill crane would be minimized through  
4 the implementation of *AMM20 Greater Sandhill Crane* (Appendix 3.C, *Avoidance and Minimization*  
5 *Measures*). Activities within 0.75 mile of crane roosting habitat would reduce construction noise  
6 during night time hours (from one hour before sunset to one hour after sunrise) such that  
7 construction noise levels do not exceed 50 dBA  $L_{eq}$  (1 hour) at the nearest temporary or permanent  
8 roosts during periods when the roost sites are available (flooded). In addition, the area of crane  
9 foraging habitat that would be affected during the day (from one hour after sunrise to one hour  
10 before sunset) by construction noise exceeding 50 dBA  $L_{eq}$  (1 hour) would also be minimized.  
11 Unavoidable noise related effects would be compensated for by the enhancement of 0.1 acre of  
12 foraging habitat for every acre indirectly affected within the 50 dBA  $L_{eq}$  (1 hour) construction noise  
13 contour. With these measures in place, indirect effects of noise and visual disturbance from  
14 construction activities are not expected to reduce the greater sandhill crane population in the study  
15 area.

16 The use of mechanical equipment during water conveyance facilities construction could cause the  
17 accidental release of petroleum or other contaminants that could affect greater sandhill crane in the  
18 surrounding habitat. The inadvertent discharge of sediment or excessive dust adjacent to greater  
19 sandhill crane habitat could also affect the species. AMM1–AMM7, including *AMM2 Construction Best*  
20 *Management Practices and Monitoring*, would minimize the likelihood of such spills and ensure that  
21 measures were in place to prevent runoff from the construction area and negative effects of dust on  
22 foraging habitat.

23 **Methylmercury Exposure:** Marsh (tidal and nontidal) and floodplain restoration also have the  
24 potential to increase exposure to methylmercury. Mercury is transformed into the more bioavailable  
25 form of methylmercury in aquatic systems, especially areas subjected to regular wetting and drying  
26 such as tidal marshes and flood plains. Thus, BDCP restoration activities that create newly  
27 inundated areas could increase bioavailability of mercury (see BDCP Chapter 3, *Conservation*  
28 *Strategy*, for details of restoration). Increased methylmercury associated with natural community  
29 and floodplain restoration may indirectly affect greater sandhill crane via uptake in lower trophic  
30 levels (Appendix 5.D, Contaminants). In general, the highest methylation rates are associated with  
31 high tidal marshes that experience intermittent wetting and drying and associated anoxic conditions  
32 (Alpers et al. 2008). The potential mobilization or creation of methylmercury within the Plan Area  
33 varies with site-specific conditions and would need to be assessed at the project level. *CM12*  
34 *Methylmercury Management* includes provisions for project-specific Mercury Management Plans.  
35 Along with avoidance and minimization measures and adaptive management and monitoring, *CM12*  
36 is expected to reduce the effects of methylmercury resulting from BDCP natural communities and  
37 floodplain restoration on greater sandhill crane.

38 The potential indirect effects of increased mercury exposure is likely low for greater sandhill crane  
39 for the following reasons: 1) greater sandhill cranes occur in the Plan Area only during the  
40 nonbreeding winter months, 2) their primary foraging habitats in the Plan Area are cultivated crops,  
41 and 3) the use of restored tidal wetlands by cranes is likely to be limited compared to seasonal  
42 managed wetlands.

43 **CEQA Conclusion:** Crane habitat could potentially be affected by general construction noise (1,217-  
44 5,108 acres) and pile driving (1,430-8,426 acres) above baseline level (50–60 dBA). Construction in

1 certain areas would take place 7 days a week and 24 hours a day and evening and nighttime  
2 construction activities would require the use of extremely bright lights, which could adversely affect  
3 roosting cranes by impacting their sense of photo-period and by exposing them to predators. The  
4 effects of noise and visual disturbances would be reduced through the implementation of *AMM20*  
5 *Greater Sandhill Crane* which would include requirements (described above) to minimize the effects  
6 of noise and visual disturbance on greater sandhill cranes. With these measures in place, in addition  
7 to *AMM1-AMM7*, noise and visual disturbances, potential spills of hazardous materials, increased  
8 dust and sedimentation, and operations and maintenance of the water conveyance facilities would  
9 have a less-than-significant impact on greater sandhill crane. The implementation of tidal natural  
10 communities restoration or floodplain restoration could result in increased exposure of greater  
11 sandhill crane to methylmercury. The potential indirect effects of increased mercury exposure is  
12 likely low for greater sandhill crane for the following reasons: 1) greater sandhill cranes occur in the  
13 Plan Area only during the nonbreeding winter months, 2) their primary foraging habitats in the Plan  
14 Area are cultivated crops, and 3) the use of restored tidal wetlands by cranes is likely to be limited  
15 compared to seasonal managed wetlands. Site-specific restoration plans that address the creation  
16 and mobilization of mercury, as well as monitoring and adaptive management as described in *CM12*  
17 *Methylmercury Management*, would reduce the potential effects of methylmercury on greater  
18 sandhill crane to a less-than-significant level. Tidal habitat restoration could result in increased  
19 exposure of greater sandhill crane to selenium. This effect would be addressed through the  
20 implementation of *AMM27 Selenium Management*, which would provide specific tidal habitat  
21 restoration design elements to reduce the potential for bioaccumulation of selenium and its  
22 bioavailability in tidal habitats. With these measures in place, the indirect effects of Alternative 9  
23 implementation would not have a significant impact on greater sandhill crane.

24 **Selenium:** Selenium is an essential nutrient for avian species and has a beneficial effect in low  
25 doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009, Ohlendorf  
26 and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults, and can also  
27 result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz 2009). The  
28 effect of selenium toxicity differs widely between species and also between age and sex classes  
29 within a species. In addition, the effect of selenium on a species can be confounded by interactions  
30 with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith 2009).

31 The primary source of selenium bioaccumulation in birds is through their diet (Ackerman and  
32 Eagles-Smith 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the  
33 trophic level at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At  
34 Kesterson Reservoir in the San Joaquin Valley, selenium concentrations in invertebrates have been  
35 found to be two to six times the levels in rooted plants. Furthermore, bivalves sampled in the San  
36 Francisco Bay contained much higher selenium levels than crustaceans such as copepods (Stewart et  
37 al. 2004). Studies conducted at the Grasslands in Merced County recorded higher selenium levels in  
38 black-necked stilts which feed on aquatic invertebrates than in mallards and pintails, which are  
39 primarily herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which  
40 forage on bivalves) have much higher levels of selenium levels than shorebirds that prey on aquatic  
41 invertebrates (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high  
42 levels of selenium have a higher risk of selenium toxicity.

43 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations  
44 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to  
45 exacerbate bioaccumulation of selenium in avian species, including greater sandhill crane. Marsh

1 (tidal and nontidal) and floodplain restoration have the potential to mobilize selenium, and  
2 therefore increase avian exposure from ingestion of prey items with elevated selenium levels. Thus,  
3 BDCP restoration activities that create newly inundated areas could increase bioavailability of  
4 selenium (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Changes in  
5 selenium concentrations were analyzed in Chapter 8, *Water Quality*, and it was determined that,  
6 relative to Existing Conditions and the No Action Alternative, CM1 would not result in substantial,  
7 long-term increases in selenium concentrations in water in the Delta under any alternative.  
8 However, it is difficult to determine whether the effects of potential increases in selenium  
9 bioavailability associated with restoration-related conservation measures (CM4 and CM5) would  
10 lead to adverse effects on greater sandhill crane.

11 Because of the uncertainty that exists at this programmatic level of review, there could be a  
12 substantial effect on greater sandhill crane from increases in selenium associated with restoration  
13 activities. This effect would be addressed through the implementation of *AMM27 Selenium*  
14 *Management* (BDCP Appendix 3.C, *Avoidance and Minimization Measures*) which would provide  
15 specific tidal habitat restoration design elements to reduce the potential for bioaccumulation of  
16 selenium and its bioavailability in tidal habitats. Furthermore, the effectiveness of selenium  
17 management to reduce selenium concentrations and/or bioaccumulation would be evaluated  
18 separately for each restoration effort as part of design and implementation. This avoidance and  
19 minimization measure would be implemented as part of the tidal habitat restoration design  
20 schedule.

21 **CEQA Conclusion:** Crane habitat could potentially be affected by general construction noise (1,217–  
22 5,108 acres) and pile driving (1,430–8,426 acres) above baseline level (50–60 dBA). Construction in  
23 certain areas would take place 7 days a week and 24 hours a day and evening and nighttime  
24 construction activities would require the use of extremely bright lights, which could adversely affect  
25 roosting cranes by impacting their sense of photo-period and by exposing them to predators. The  
26 effects of noise and visual disturbances would be reduced through the implementation of *AMM20*  
27 *Greater Sandhill Crane* which would include requirements (described above) to minimize the effects  
28 of noise and visual disturbance on greater sandhill cranes. With these measures in place, in addition  
29 to AMM1–AMM7, noise and visual disturbances, potential spills of hazardous materials, increased  
30 dust and sedimentation, and operations and maintenance of the water conveyance facilities would  
31 have a less-than-significant impact on greater sandhill crane. The implementation of tidal natural  
32 communities restoration or floodplain restoration could result in increased exposure of greater  
33 sandhill crane to methylmercury. The potential indirect effects of increased mercury exposure is  
34 likely low for greater sandhill crane for the following reasons: 1) greater sandhill cranes occur in the  
35 study area only during the nonbreeding winter months, 2) their primary foraging habitats in the  
36 study area are cultivated crops, and 3) the use of restored tidal wetlands by cranes is likely to be  
37 limited compared to seasonal managed wetlands. Site-specific restoration plans that address the  
38 creation and mobilization of mercury, as well as monitoring and adaptive management as described  
39 in *CM12 Methylmercury Management*, would be available to address the uncertainty of  
40 methylmercury levels in restored tidal marsh and potential impacts on greater sandhill crane. Tidal  
41 habitat restoration could result in increased exposure of greater sandhill crane to selenium. This  
42 effect would be addressed through the implementation of *AMM27 Selenium Management*, which  
43 would provide specific tidal habitat restoration design elements to reduce the potential for  
44 bioaccumulation of selenium and its bioavailability in tidal habitats. With these measures in place,  
45 the indirect effects of Alternative 9 implementation would have a less-than-significant impact on  
46 greater sandhill crane.

1 **Lesser Sandhill Crane**

2 Lesser sandhill cranes in the Plan Area are almost entirely dependent on privately owned  
3 agricultural lands for foraging. Long-term sustainability of the lesser sandhill crane is thus  
4 dependent on providing a matrix of compatible crop types that afford suitable foraging habitat and  
5 maintaining compatible agricultural practices, while sustaining and increasing the extent of other  
6 essential habitat elements such as night roosting habitat. The habitat model for lesser sandhill crane  
7 identifies “roosting and foraging” and “foraging” habitat. These habitat types include suitable  
8 foraging and roosting habitat in the study area as certain agricultural types, specific grassland types,  
9 irrigated pastures and hay crops, managed seasonal wetland, and other natural seasonal wetland.  
10 Roosting and foraging habitat consists of traditional roost sites that are known to be used by  
11 sandhill cranes (both greater and lesser) and that provide foraging habitat. Detail regarding the  
12 roosting and foraging modeled habitat for both subspecies of sandhill crane is included in BDCP  
13 Appendix 2.A *Covered Species Accounts*. Both temporary and permanent roost sites were identified  
14 for sandhill cranes. Permanent roosting and foraging sites are those used regularly, year after year,  
15 while temporary roosting and foraging sites are those used in some years. The assessment of the  
16 loss of foraging habitat for the lesser sandhill crane considers the relative habitat value of specific  
17 crop or land cover types. Although both the greater and the lesser sandhill crane use similar crop or  
18 land cover types, these provide different values of foraging habitat for the two subspecies based on  
19 proportional use of these habitats. Lesser sandhill cranes are less traditional than greater sandhill  
20 cranes and are more likely to move between different roost site complexes and different wintering  
21 regions (Ivey pers. comm.) The wintering range is ten times larger than the greater sandhill crane  
22 and their average foraging flight radius from roost sites is twice that of greater sandhill cranes.  
23 Because of this higher mobility, lesser sandhill cranes are more flexible in their use of foraging areas  
24 than the greater sandhill crane.

25 Construction and restoration associated with Alternative 9 conservation measures would result in  
26 both temporary and permanent losses of foraging and roosting habitat for lesser sandhill crane as  
27 indicated in Table 12-9-31. Full implementation of Alternative 9 would include the following  
28 conservation actions over the term of the BDCP that would benefit the lesser sandhill crane (BDCP  
29 Chapter 3, Section 3.3, *Biological Goals and Objectives*).

- 30 • Protect at least 7,300 acres of high- to very high-value habitat for greater sandhill crane, with at  
31 least 80% maintained in very high-value types in any given year. Habitat would be protected  
32 within 2 miles of known roosting sites in CZs 3, 4, 5, and/or 6. The selection of protected habitat  
33 locations would consider sea level rise and local seasonal flood events, greater sandhill crane  
34 population levels, and the location of foraging habitat loss. Patch size of protected cultivated  
35 lands would be at least 160 acres (Objective GSHC1.1, associated with CM3).
- 36 • To create additional high-value greater sandhill crane winter foraging habitat, 10% of the  
37 habitat protected under Objective GSHC1.1 would involve acquiring low-value habitat or  
38 nonhabitat areas and converting it to high- or very high-value habitat. Habitat would be created  
39 within 2 miles of known roosting sites in CZs 3, 4, 5, and/or 6. The selection of areas in which  
40 habitat would be created would consider sea level rise and local seasonal flood events, greater  
41 sandhill crane population levels, and the location of foraging habitat loss (Objective GSHC1.2,  
42 associated with CM3).
- 43 • Create at least 320 acres of managed wetlands in minimum patch sizes of 40 acres within the  
44 Greater Sandhill Crane Winter Use Area in CZs 3, 4, 5, or 6, with consideration of sea level rise  
45 and local seasonal flood events. The wetlands would be located within 2 miles of existing

1 permanent roost sites and protected in association with other protected natural community  
2 types (excluding nonhabitat cultivated lands) at a ratio of 2:1 upland to wetland to provide  
3 buffers around the wetlands (Objective GSHC1.3, associated with CM3).

- 4 ● Create at least two 90-acre wetland complexes within the Stone Lakes NWR project boundary.  
5 The complexes would be no more than 2 miles apart and would help provide connectivity  
6 between the Stone Lakes and Cosumnes greater sandhill crane populations. Each complex would  
7 consist of at least three wetlands totaling at least 90 acres of greater sandhill crane roosting  
8 habitat, and would be protected in association with other protected natural community types  
9 (excluding nonhabitat cultivated lands) at a ratio of at least 2:1 uplands to wetlands (i.e., two  
10 sites with at least 90 acres of wetlands each). One of the 90-acre wetland complexes may be  
11 replaced by 180 acres of cultivated lands (e.g., cornfields) that are flooded following harvest to  
12 support roosting cranes and provide highest-value foraging habitat, provided such substitution  
13 is consistent with the long-term conservation goals of Stone Lakes NWR for greater sandhill  
14 crane. (Objective GSHC1.4, associated with CM10).
- 15 ● Create an additional 95 acres of roosting habitat within 2 miles of existing permanent roost  
16 sites. The habitat would consist of active cornfields that are flooded following harvest to support  
17 roosting cranes and that provide highest-value foraging habitat. Individual fields would be at  
18 least 40 acres and can shift locations throughout the Greater Sandhill Crane Winter Use Area,  
19 but would be sited with consideration of the location of roosting habitat loss and would be in  
20 place prior to roosting habitat loss (Objective GSCH1.5, associated with CM3).
- 21 ● Target cultivated land conservation to provide connectivity between other conservation lands  
22 (Objective CLNC1.2, associated with CM3).
- 23 ● Maintain and protect the small patches of important wildlife habitats associated with cultivated  
24 lands that occur in cultivated lands within the reserve system, including, water conveyance  
25 channels, grasslands, ponds, and wetlands (Objective CLNC1.3, associated with CM3).

26 As explained below, with the restoration and protection of these amounts of habitat, in addition to  
27 natural community enhancement and management commitments (including *CM12 Methylmercury*  
28 *Management*) and implementation of *AMM1-AMM7*, *AMM20 Greater Sandhill Crane*, *AMM27*  
29 *Selenium Management*, and *AMM30 Transmission Line Design and Alignment Guidelines*, impacts on  
30 the lesser sandhill crane would not be adverse for NEPA purposes and would be less than significant  
31 for CEQA purposes.

1  
2

**Table 12-9-31. Changes in Lesser Sandhill Crane Modeled Habitat Associated with Alternative 9 (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	Roosting and Foraging - Permanent	0	0	0	0	NA	NA
	Roosting and Foraging - Temporary	0	0	25	25	NA	NA
	Foraging	44	44	1,600	1,600	NA	NA
<b>Total Impacts CM1</b>		<b>44</b>	<b>44</b>	<b>1,625</b>	<b>1,625</b>	<b>NA</b>	<b>NA</b>
CM2-CM18	Roosting and Foraging - Permanent	0	0	0	0	0	0
	Roosting and Foraging - Temporary	0	41	0	0	0	0
	Foraging	3,610	12,131	2	4	0	0
<b>Total Impacts CM2-CM18</b>		<b>3,610</b>	<b>12,172</b>	<b>2</b>	<b>4</b>	<b>0</b>	<b>0</b>
<b>Total Roosting and Foraging - Permanent</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>Total Roosting and Foraging - Temporary</b>		<b>0</b>	<b>41</b>	<b>25</b>	<b>25</b>	<b>0</b>	<b>0</b>
<b>Total Foraging</b>		<b>3,654</b>	<b>12,175</b>	<b>1,602</b>	<b>1,604</b>	<b>0</b>	<b>0</b>
<b>TOTAL IMPACTS</b>		<b>3,654</b>	<b>12,216</b>	<b>1,627</b>	<b>1,629</b>	<b>0</b>	<b>0</b>

<sup>a</sup> See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only.

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-72: Loss or Conversion of Habitat for and Direct Mortality of Lesser Sandhill**  
5 **Crane**

6 Alternative 9 conservation measures would result in the combined permanent and temporary loss  
7 of up to 66 acres of modeled roosting and foraging habitat (41 acres of permanent loss and 25 acres  
8 of temporary loss) and 13,779 acres of foraging habitat (12,175 acres of permanent loss and 1,604  
9 acres of temporary loss) for lesser sandhill crane Table 12-9-31). Conservation measures that would  
10 result in these losses are conveyance facilities and transmission line construction, and establishment  
11 and use of borrow and spoil areas (CM1), Yolo Bypass Fisheries Improvements (CM2), Tidal Natural  
12 Communities Restoration (CM4), Grassland Natural Community Restoration (CM8), Nontidal Marsh  
13 Natural Community Restoration (CM10), and Natural Communities Enhancement and Management

1 (CM11). The majority of habitat loss would result from water conveyance facility construction and  
2 conversion of habitat to tidal natural communities through CM4. Habitat enhancement and  
3 management activities through CM11, which include ground disturbance or removal of nonnative  
4 vegetation, could also result in local adverse habitat effects. In addition, maintenance activities  
5 associated with the long-term operation of the water conveyance facilities and other BDCP physical  
6 facilities could degrade or eliminate lesser sandhill crane modeled habitat. Each of these individual  
7 activities is described below. A summary statement of the combined impacts, NEPA effects and a  
8 CEQA conclusion follow the individual conservation measure discussions.

- 9 • *CM1 Water Facilities and Operation*: Construction of Alternative 9 conveyance facilities as they  
10 are currently designed would result in the permanent loss of up to 44 acres of lesser sandhill  
11 crane foraging habitat. Foraging habitat that would be permanently impacted by CM1 would  
12 consist of 9 acre of very high-value, 2 acres of high-value, and 29 acres of medium-value foraging  
13 habitat (Table 12-9-32). Permanent loss of foraging habitat would result from intake and fish  
14 screen construction, channel enlargement, and transmission line construction in CZ 4, 5, and 6.  
15 Fish barrier construction would permanently impact foraging habitat in CZ 6 on Bradford Island,  
16 Bacon Island, north of Woodward Island, and between Mandeville and Bradford Island. In  
17 addition, 25 acres of temporary roosting and foraging habitat, and 1,600 acres of foraging  
18 habitat would be temporarily removed (Table 12-9-31). Temporary habitat loss would primarily  
19 result from potential borrow and spoil areas (1,278 acres) and work areas for the above  
20 construction activities. The temporarily removed habitat would consist primarily of cultivated  
21 lands and it would be restored within 1 year following construction. However, it would not  
22 necessarily be restored to its original topography and it could be restored as grasslands in the  
23 place of cultivated lands.

24 The temporary roosting and foraging habitat that would be temporarily impacted is located on  
25 the east side of Bradford Island. The temporary roost site would be impacted by a concrete  
26 batch plant, an operable barrier work area, and a borrow and spoil area. The implementation of  
27 *AMM20 Greater Sandhill Crane* would require that all CM1 activities be designed to avoid direct  
28 loss of crane roost sites. Avoidance of crane roost sites would be accomplished either by siting  
29 activities outside of identified roost sites or by relocating the roost site if it consisted of  
30 cultivated lands (roost sites consisting of wetlands would not be subject to re-location).  
31 Relocated roost sites would be established prior to construction activities affecting the original  
32 roost site (as described in *AMM20 Greater Sandhill Crane*, BDCP Appendix 3C). Therefore there  
33 would be no loss of crane roosting and foraging habitat as a result of water conveyance facility  
34 construction once the facilities were fully designed. Refer to the Terrestrial Biology Map Book  
35 for a detailed view of Alternative 9 construction locations.

1 **Table 12-9-32. Total Amount of Lesser Sandhill Crane Foraging Habitat Affected under**  
2 **Alternative 9**

Foraging Habitat Value Class	Land Cover Type	CM1 Permanent (Temporary)	CM2–CM18 Permanent (Temporary)
Very high	Corn, alfalfa and alfalfa mixtures	9 (1,095)	4,083 (0)
High	Mixed pasture, native pasture, other pasture, irrigated pasture, native vegetation, rice	2 (29)	2,058 (0)
Medium	Grain and hay crops, miscellaneous grain and hay, mixed grain and hay, non-irrigated mixed grain and hay, other grain crops, miscellaneous grasses, grassland, wheat, other grain crops, managed wetlands	29 (235)	2,220 (2)
Low	Other irrigated crops, idle cropland, blueberries, asparagus, clover, cropped within the last 3 years, grain sorghum, green beans, miscellaneous truck, miscellaneous field, new lands being prepped for crop production, nonirrigated mixed pasture, nonirrigated native pasture, onions, garlic, peppers, potatoes, safflower, sudan, sugar beets, tomatoes (processing), melons squash and cucumbers all types, artichokes, beans (dry)	4 (241)	3,745 (2)
None	Vineyards, orchards	0 (0)	23 (0)

- 3
- 4 • *CM2 Yolo Bypass Fisheries Enhancement*: Construction under CM2 would result in a permanent  
5 loss of 267 acres and a temporary loss of 2 acres of lesser sandhill crane foraging habitat in CZ 2.  
6 Lesser sandhill crane use in this area is less common than in the central Delta. Construction  
7 impacts from CM2 would occur within the first 10 years of Alternative 9 implementation.
- 8 • *CM4 Tidal Natural Communities Restoration*: Based on the hypothetical tidal restoration  
9 footprint, this activity would result in the permanent loss or conversion of approximately  
10 10,248 acres of lesser sandhill crane habitat, consisting of 41 acres of temporary roosting and  
11 foraging habitat and 10,207 acres of foraging habitat. Loss of foraging habitat from CM4 would  
12 consist of 3,642 acres of very high-value, 1,529 acres of high value, 2,040 acres of medium-value,  
13 and 2,983 acres of low-value foraging habitat (Table 12-9-32). Habitat loss would primarily  
14 occur in the Cosumnes-Mokelumne River and West Delta ROAs. Tidal wetland restoration in CZ 4  
15 could occur between the high crane use areas of the central Delta and the Cosumnes River  
16 Preserve. However, the conversion of grasslands and cultivated lands to tidal wetlands would  
17 not prohibit crane movement or reduce use of these areas. Lesser sandhill cranes are less  
18 traditional than greater sandhill cranes and would be more adaptable to changes in land use.  
19 Approximately 2,516 acres of foraging habitat would be removed within the first 10 years of  
20 Alternative 9 implementation.
- 21 • *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees would result in  
22 the loss of 2 acres of low-value lesser sandhill crane foraging habitat (1 acre of permanent loss, 1  
23 acres of temporary loss). This impact would occur after the first 10 years of Alternative 9  
24 implementation.
- 25 • *CM8 Grassland Natural Community Restoration*: Approximately 300 acres of cultivated lands  
26 (foraging habitat) would be converted to grassland. No roosting/foraging habitat would be

1 impacted by grassland restoration activities. The restored grasslands would continue to provide  
2 foraging habitat value for the lesser sandhill crane. Approximately 257 acres would be impacted  
3 within the first 10 years of Alternative 9 implementation.

- 4 • *CM10 Nontidal Marsh Restoration*: Nontidal marsh restoration would result in the permanent  
5 conversion of approximately 1,350 acres of modeled foraging habitat for the lesser sandhill  
6 crane. A portion of the restored nontidal marsh would be expected to continue to provide  
7 roosting and foraging habitat value for the lesser sandhill crane. However, some of this restored  
8 marsh would be unsuitable as it would lack emergent vegetation and consist of open water that  
9 would be too deep to provide suitable roosting or foraging habitat. Approximately 567 acres of  
10 habitat would be converted to nontidal marsh within the first 10 years of Alternative 9  
11 implementation.
- 12 • *CM11 Natural Communities Enhancement and Management*: A variety of habitat management  
13 actions included in *CM11* that are designed to enhance wildlife values in restored or protected  
14 habitats could result in localized ground disturbances that could temporarily remove small  
15 amounts of modeled habitat. Ground-disturbing activities, such as removal of nonnative  
16 vegetation and road and other infrastructure maintenance activities, would be expected to have  
17 minor adverse effects on available habitat and would be expected to result in overall  
18 improvements to and maintenance of habitat values over the term of the BDCP. The potential for  
19 these activities to result in direct mortality of lesser sandhill crane would be minimized with the  
20 implementation of *AMM20 Greater Sandhill Crane*. *CM11* would also include the construction of  
21 recreational-related facilities including trails, interpretive signs, and picnic tables (BDCP  
22 Chapter 4, *Covered Activities and Associated Federal Actions*). The construction of trailhead  
23 facilities, signs, staging areas, picnic areas, bathrooms, etc. would be placed on existing,  
24 disturbed areas when and where possible. If new ground disturbance was necessary, sandhill  
25 crane habitat would be avoided, with the exception of a permanent loss of 4 acres of grassland  
26 foraging habitat (1 acre of which would be impacted within the first 10 years of Plan  
27 implementation).
- 28 • *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground  
29 water conveyance facilities and restoration infrastructure could result in ongoing but periodic  
30 disturbances that could affect lesser sandhill crane use of the surrounding habitat. Maintenance  
31 activities would include vegetation management, levee and structure repair, and re-grading of  
32 roads and permanent work areas. These effects, could be adverse as sandhill cranes are  
33 sensitive to disturbance. However, impacts would be reduced by AMMs, and conservation  
34 actions as described below.
- 35 • *Injury and Direct Mortality*: Construction-related activities would not be expected to result in  
36 direct mortality of lesser sandhill crane if they were present in the study area, because they  
37 would be expected to avoid contact with construction and other equipment. Potential effects  
38 would be avoided and minimized with the implementation of *AMM20 Greater Sandhill Crane*.  
39 Injury and mortality from electrical transmission facilities are described below under Impact  
40 BIO-73.

41 The following paragraphs summarize the combined effects discussed above and describe other  
42 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also  
43 included.

1 **Near-Term Timeframe**

2 Because the water conveyance facilities construction is being evaluated at the project level, the near-  
3 term BDCP conservation strategy has been evaluated to determine whether it would provide  
4 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the effects of  
5 construction would not be adverse under NEPA. Based on current design footprints, Alternative 9  
6 would remove 25 acres roosting and foraging habitat (temporary loss from CM1) in the study area  
7 in the near-term. In addition, 5,257 acres of foraging habitat would be removed or converted in the  
8 near-term (CM1, 1,664 acres; *CM2 Yolo Bypass Fisheries Enhancement*, *CM4 Tidal Natural*  
9 *Communities Restoration*, *CM8 Grassland Natural Community Restoration*, and *CM11 Natural*  
10 *Communities Enhancement and Management*—3,612 acres). Of these near-term acres of foraging  
11 habitat impacted, 3,906 acres would be medium- to very high-value habitat (CM1, 1,339 acres, CM2-  
12 11, 2,507 acres).

13 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected would  
14 be 1:1 protection and 1:1 restoration for loss of roost sites and 1:1 protection for loss of foraging  
15 habitat. Using these ratios would indicate that 25 acres of lesser sandhill crane roosting habitat  
16 should be restored/created and 25 acres should be protected to compensate for the CM1 losses of  
17 lesser sandhill crane roosting and foraging habitat. In addition, 1,339 acres of high- to very high-  
18 value foraging habitat should be protected to mitigate the CM1 losses of lesser sandhill crane  
19 medium- to very high-value foraging habitat. The near-term effects of other conservation actions  
20 would remove 2,507 acres of medium- to very high-value foraging habitat, and therefore require  
21 2,507 acres of protection of high- to very high-value foraging habitat using the same typical NEPA  
22 and CEQA ratios (1:1 restoration and 1:1 protection for the loss of roosting and foraging habitat; 1:1  
23 protection for the loss of foraging habitat).

24 The implementation of *AMM20 Greater Sandhill Crane* would require that no sandhill crane roost  
25 sites were directly impacted by CM1 covered activities (including transmission lines and their  
26 associated footprints). Therefore there would be no loss of crane roosting and foraging habitat as a  
27 result of water conveyance facility construction once the facilities were fully designed, which would  
28 avoid the CM1 impact on 411 acres of roosting and foraging habitat once the project design is final.  
29 Indirect effects of construction-related noise and visual disturbance are discussed below under  
30 Impact BIO-74.

31 The BDCP has committed to near-term goals of creating 500 acres of managed wetlands and  
32 protecting 15,600 acres of cultivated lands in the Plan Area (Table 3-4 in Chapter 3, *Description of*  
33 *Alternatives*). These conservation actions are associated with CM3 and CM10 and would occur in the  
34 same timeframe as the construction and early restoration losses.

35 The BDCP also includes the following objectives for the greater sandhill crane which would also  
36 benefit the lesser sandhill crane, as they utilize similar habitats and face similar threats within their  
37 winter use areas.

38 Up to 95 acres of roosting habitat would be created within 2 miles of existing permanent roost sites  
39 (Objective GSHC1.5). These roosts would consist of active cornfields that are flooded following  
40 harvest to support roosting cranes and also provide the highest-value foraging habitat for the  
41 species. Individual fields would be at least 40 acres could shift locations throughout the Greater  
42 Sandhill Crane Winter Use Area, but would be sited with consideration of the location of roosting  
43 habitat loss and would be in place prior to roosting habitat loss. Of the 500 acres of managed  
44 wetlands to be created for roosting habitat, 320 acres would be created in minimum patch sizes of

1 40 acres within the Greater Sandhill Crane Winter Use Area in CZs 3, 4, 5, or 6 (Objective GSHC1.3).  
2 Restoration sites would be identified with consideration of sea level rise and local seasonal flood  
3 events. These wetlands would be created within 2 miles of existing permanent roost sites and  
4 protected in association with other protected natural community types at a ratio of 2:1 upland to  
5 wetland habitat to provide buffers that will protect cranes from the types of disturbances that would  
6 otherwise result from adjacent roads and developed areas (e.g., roads, noise, visual disturbance,  
7 lighting). The remaining 180 acres of crane roosting habitat would be constructed within the Stone  
8 Lakes National Wildlife Refuge project boundary (BDCP Chapter 3, Figure 3.3-6) and would be  
9 designed to provide connectivity between the Stone Lakes and Cosumnes greater sandhill crane  
10 populations (Objective GSHC1.4). The large patch sizes of these wetland complexes would provide  
11 additional conservation to address the threats of vineyard conversion, urbanization to the east, and  
12 sea level rise to the west of greater sandhill crane wintering habitat.

13 At least 15,600 acres of cultivated lands that provide habitat for covered and other native wildlife  
14 species would be protected in the near-term time period (Objective CLNC1.1). Mitigation Measure  
15 *BIO-72, Compensate for the Loss of Medium- to Very High-Value Lesser Sandhill Crane Foraging*  
16 *Habitat*, would be available to guide the near-term protection of cultivated lands to ensure that the  
17 nearterm impacts of medium- to very high-value foraging habitat for lesser sandhill crane were  
18 compensated for with appropriate crop types and natural communities.

19 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
20 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
21 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
22 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
23 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
24 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
25 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

### 26 **Late Long-Term Timeframe**

27 The study area supports approximately 23,919 acres of roosting and foraging habitat and 240,475  
28 acres of foraging habitat for lesser sandhill crane. Alternative 9 as a whole would result in the  
29 permanent loss of and temporary effects on 66 acres of roosting and foraging habitat (less than 1%  
30 of the total habitat in the study area) and 13,779 acres of foraging habitat (6% of the total habitat in  
31 the study area) for the lesser sandhill crane during the term of the Plan. The foraging habitat lost by  
32 the late long-term timeframe would consist of 9,762 acres of medium- to very high-value foraging  
33 habitat. The locations of these losses are described above in the analyses of individual conservation  
34 measures. The implementation of *AMM20 Greater Sandhill Crane* would require that no roost sites  
35 were directly affected by water conveyance facilities including transmission lines and associated  
36 footprints. In addition, temporarily removed habitat would be restored within 1 year following  
37 construction. However, it would not necessarily be restored to its original topography and it could  
38 result in the conversion of cultivated lands to grasslands.

39 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*  
40 *Restoration* and *CM10 Nontidal Marsh Restoration* to restore or create at least 595 acres  
41 of greater Sandhill crane roost habitat (Objectives GSHC1.3, GSHC1.4, and GSHC1.5) and to protect at  
42 least 7,300 acres of high- to very high-value foraging habitat for greater Sandhill crane (Objective  
43 GSHC1.1). These croptypes would also provide high- to very high-value habitat for the lesser  
44 sandhill crane.

1 The BDCP also includes the following objectives for the greater sandhill crane which would also  
2 benefit the lesser sandhill crane, as they utilize similar habitats and face similar threats within their  
3 winter use areas.

4 Of the 500 acres of managed wetlands to be created for roosting habitat, 320 acres would be created  
5 in minimum patch sizes of 40 acres within the Greater Sandhill Crane Winter Use Area in CZs 3, 4, 5,  
6 or 6 (Objective GSHC1.3). Restoration sites would be identified with consideration of sea level rise  
7 and local seasonal flood events. These wetlands would be created within 2 miles of existing  
8 permanent roost sites and protected in association with other protected natural community types at  
9 a ratio of 2:1 upland to wetland habitat to provide buffers that will protect cranes from the types of  
10 disturbances that would otherwise result from adjacent roads and developed areas (e.g., roads,  
11 noise, visual disturbance, lighting). The remaining 180 acres of crane roosting habitat would be  
12 constructed within the Stone Lakes National Wildlife Refuge project boundary (BDCP Chapter 3,  
13 Figure 3.3-6) and would be designed to provide connectivity between the Stone Lakes and  
14 Cosumnes greater sandhill crane populations (Objective GSHC1.4). These wetlands would consist of  
15 two 90-acre wetland complexes each consisting of at least three wetlands and would be no more  
16 than 2 miles apart. The large patch sizes of these wetland complexes would provide additional  
17 conservation to address the threats of vineyard conversion, urbanization to the east, and sea level  
18 rise to the west of greater sandhill crane wintering habitat. Approximately 95 acres of roosting  
19 habitat would be created within 2 miles of existing permanent roost sites (Objective GSHC1.5).  
20 These roosts would consist of active cornfields that are flooded following harvest to support  
21 roosting cranes and also provide the highest-value foraging habitat for the species. Individual fields  
22 would be at least 40 acres could shift locations throughout the Greater Sandhill Crane Winter Use  
23 Area, but would be sited with consideration of the location of roosting habitat loss and would be in  
24 place prior to roosting habitat loss.

25 The BDCP has committed to protecting 7,300 acres of high- to very high-value greater sandhill crane  
26 foraging habitat by the late long-term timeframe with at least 80% maintained in very-high value  
27 types in any given year (Objective GSHC1.1). These acres of protected foraging habitat would be  
28 located within 2 miles of known roosting sites in CZs 3, 4, 5, and/or 6 and would consider sea level  
29 rise and local seasonal flood events, greater Sandhill crane population levels, and the location of  
30 foraging habitat loss. The patch size of these protected lands would be at least 160 acres (Objectives  
31 GSHC1.1 and GSHC1.2). Because agricultural habitat values change over time based largely on  
32 economically driven agricultural practices, protecting crane habitat would provide enhanced  
33 stability to agricultural habitat value within the crane use area that does not currently exist.  
34 Although lesser sandhill cranes are less traditional in their use of roost sites in the Delta, these  
35 objectives for the greater sandhill crane would also benefit the lesser sandhill crane.

36 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
37 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
38 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
39 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
40 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
41 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
42 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

43 **NEPA Effects:** The loss of lesser sandhill crane habitat and potential for direct mortality of this  
44 special status species under Alternative 9 would represent an adverse effect in the absence of other  
45 conservation actions. However, with habitat protection and restoration associated with *CM3 Natural*

1 *Communities Protection and Restoration* and *CM10 Nontidal Marsh Restoration*, guided by biological  
2 goals and objectives for the species and by *AMM1-AMM7*, *AMM20 Greater Sandhill Crane*, which  
3 would be in place throughout the construction period, and Mitigation Measure BIO-72, which would  
4 be available to compensate for loss of medium- to very high-value foraging habitat, the effects of  
5 habitat loss and potential mortality on lesser sandhill crane would not be adverse under NEPA.

6 ***CEQA Conclusion:***

7 ***Near-Term Timeframe***

8 Because the water conveyance facilities construction is being evaluated at the project level, the near-  
9 term BDCP conservation strategy has been evaluated to determine whether it would provide  
10 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the effects of  
11 construction would be less than significant under CEQA. Based on current design footprints,  
12 Alternative 9 would remove 25 acres roosting and foraging habitat (temporary loss from CM1) in  
13 the study area in the near-term. In addition, 5,257 acres of foraging habitat would be removed or  
14 converted in the near-term (CM1, 1,664 acres; *CM2 Yolo Bypass Fisheries Enhancement*, *CM4 Tidal*  
15 *Natural Communities Restoration*, *CM8 Grassland Natural Community Restoration*, and *CM11 Natural*  
16 *Communities Enhancement and Management*—3,612 acres). Of these near-term acres of foraging  
17 habitat impacted, 3,906 acres would be medium- to very high-value habitat (CM1, 1,339 acres, CM2-  
18 11, 2,507 acres).

19 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected would  
20 be 1:1 protection and 1:1 restoration for loss of roost sites and 1:1 protection for loss of foraging  
21 habitat. Using these ratios would indicate that 25 acres of lesser sandhill crane roosting habitat  
22 should be restored/created and 25 acres should be protected to compensate for the CM1 losses of  
23 lesser sandhill crane roosting and foraging habitat. In addition, 1,339 acres of high- to very high-  
24 value foraging habitat should be protected to mitigate the CM1 losses of lesser sandhill crane  
25 medium- to very high-value foraging habitat. The near-term effects of other conservation actions  
26 would remove 2,507 acres of medium- to very high-value foraging habitat, and therefore require  
27 2,507 acres of protection of high- to very high-value foraging habitat using the same typical NEPA  
28 and CEQA ratios (1:1 restoration and 1:1 protection for the loss of roosting and foraging habitat; 1:1  
29 protection for the loss of foraging habitat).

30 The implementation of *AMM20 Greater Sandhill Crane* would require that no sandhill crane roost  
31 sites were directly impacted by CM1 covered activities (including transmission lines and their  
32 associated footprints). Therefore there would be no loss of crane roosting and foraging habitat as a  
33 result of water conveyance facility construction once the facilities were fully designed, which would  
34 avoid the CM1 impact on 411 acres of roosting and foraging habitat once the project design is final.  
35 Indirect effects of construction-related noise and visual disturbance are discussed below under  
36 Impact BIO-74.

37 The BDCP has committed to near-term goals of creating 500 acres of managed wetlands and  
38 protecting 15,600 acres of cultivated lands in the Plan Area (Table 3-4 in Chapter 3). These  
39 conservation actions are associated with CM3 and CM10 and would occur in the same timeframe as  
40 the construction and early restoration losses.

41 The BDCP also includes the following objectives for the greater sandhill crane which would also  
42 benefit the lesser sandhill crane, as they utilize similar habitats and face similar threats within their  
43 winter use areas.

1 Up to 95 acres of roosting habitat would be created within 2 miles of existing permanent roost sites  
2 (Objective GSHC1.5). These roosts would consist of active cornfields that are flooded following  
3 harvest to support roosting cranes and also provide the highest-value foraging habitat for the  
4 species. Individual fields would be at least 40 acres could shift locations throughout the Greater  
5 Sandhill Crane Winter Use Area, but would be sited with consideration of the location of roosting  
6 habitat loss and would be in place prior to roosting habitat loss. Of the 500 acres of managed  
7 wetlands to be created for roosting habitat, 320 acres would be created in minimum patch sizes of  
8 40 acres within the Greater Sandhill Crane Winter Use Area in CZs 3, 4, 5, or 6 (Objective GSHC1.3).  
9 Restoration sites would be identified with consideration of sea level rise and local seasonal flood  
10 events. These wetlands would be created within 2 miles of existing permanent roost sites and  
11 protected in association with other protected natural community types at a ratio of 2:1 upland to  
12 wetland habitat to provide buffers that will protect cranes from the types of disturbances that would  
13 otherwise result from adjacent roads and developed areas (e.g., roads, noise, visual disturbance,  
14 lighting). The remaining 180 acres of crane roosting habitat would be constructed within the Stone  
15 Lakes National Wildlife Refuge project boundary (BDCP Chapter 3, Figure 3.3-6) and would be  
16 designed to provide connectivity between the Stone Lakes and Cosumnes greater sandhill crane  
17 populations (Objective GSHC1.4). The large patch sizes of these wetland complexes would provide  
18 additional conservation to address the threats of vineyard conversion, urbanization to the east, and  
19 sea level rise to the west of greater sandhill crane wintering habitat.

20 At least 15,600 acres of cultivated lands that provide habitat for covered and other native wildlife  
21 species would be protected in the near-term time period (Objective CLNC1.1). Mitigation Measure  
22 BIO-72 would be available to guide the near-term protection of cultivated lands to ensure that the  
23 nearterm impacts of medium- to very high-value foraging habitat for lesser sandhill crane were  
24 compensated for with appropriate crop types and natural communities.

25 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
26 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
27 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
28 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
29 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
30 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
31 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

### 32 **Late Long-Term Timeframe**

33 The study area supports approximately 23,919 acres of roosting and foraging habitat and 240,475  
34 acres of foraging habitat for lesser sandhill crane. Alternative 9 as a whole would result in the  
35 permanent loss of and temporary effects on 66 acres of roosting and foraging habitat (less than 1%  
36 of the total habitat in the study area) and 13,779 acres of foraging habitat (6% of the total habitat in  
37 the study area) for the lesser sandhill crane during the term of the Plan. The foraging habitat lost by  
38 the late long-term timeframe would consist of 9,762 acres of medium- to very high-value foraging  
39 habitat. The locations of these losses are described above in the analyses of individual conservation  
40 measures. The implementation of *AMM20 Greater Sandhill Crane* would require that no roost sites  
41 were directly affected by water conveyance facilities including transmission lines and associated  
42 footprints. In addition, temporarily removed habitat would be restored within 1 year following  
43 construction. However, it would not necessarily be restored to its original topography and it could  
44 result in the conversion of cultivated lands to grasslands.

1 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*  
2 *Restoration* and *CM10 Nontidal Marsh Restoration* to restore or create at least 595 acres  
3 of greater Sandhill crane roost habitat (Objectives GSHC1.3, GSHC1.4, and GSHC1.5) and to protect at  
4 least 7,300 acres of high- to very high-value foraging habitat for greater Sandhill crane (Objective  
5 GSHC1.1). These croptypes would also provide high- to very high-value habitat for the lesser  
6 sandhill crane.

7 The BDCP also includes the following objectives for the greater sandhill crane which would also  
8 benefit the lesser sandhill crane, as they utilize similar habitats and face similar threats within their  
9 winter use areas.

10 Of the 500 acres of managed wetlands to be created for roosting habitat, 320 acres would be created  
11 in minimum patch sizes of 40 acres within the Greater Sandhill Crane Winter Use Area in CZs 3, 4, 5,  
12 or 6 (Objective GSHC1.3). Restoration sites would be identified with consideration of sea level rise  
13 and local seasonal flood events. These wetlands would be created within 2 miles of existing  
14 permanent roost sites and protected in association with other protected natural community types at  
15 a ratio of 2:1 upland to wetland habitat to provide buffers that will protect cranes from the types of  
16 disturbances that would otherwise result from adjacent roads and developed areas (e.g., roads,  
17 noise, visual disturbance, lighting). The remaining 180 acres of crane roosting habitat would be  
18 constructed within the Stone Lakes National Wildlife Refuge project boundary (BDCP Chapter 3,  
19 Figure 3.3-6) and would be designed to provide connectivity between the Stone Lakes and  
20 Cosumnes greater sandhill crane populations (Objective GSHC1.4). These wetlands would consist of  
21 two 90-acre wetland complexes each consisting of at least three wetlands and would be no more  
22 than 2 miles apart. The large patch sizes of these wetland complexes would provide additional  
23 conservation to address the threats of vineyard conversion, urbanization to the east, and sea level  
24 rise to the west of greater sandhill crane wintering habitat. Approximately 95 acres of roosting  
25 habitat would be created within 2 miles of existing permanent roost sites (Objective GSHC1.5).  
26 These roosts would consist of active cornfields that are flooded following harvest to support  
27 roosting cranes and also provide the highest-value foraging habitat for the species. Individual fields  
28 would be at least 40 acres could shift locations throughout the Greater Sandhill Crane Winter Use  
29 Area, but would be sited with consideration of the location of roosting habitat loss and would be in  
30 place prior to roosting habitat loss.

31 The BDCP has committed to protecting 7,300 acres of high- to very high-value greater sandhill crane  
32 foraging habitat by the late long-term timeframe with at least 80% maintained in very-high value  
33 types in any given year (Objective GSHC1.1). These acres of protected foraging habitat would be  
34 located within 2 miles of known roosting sites in CZs 3, 4, 5, and/or 6 and would consider sea level  
35 rise and local seasonal flood events, greater Sandhill crane population levels, and the location of  
36 foraging habitat loss. The patch size of these protected lands would be at least 160 acres (Objectives  
37 GSHC1.1 and GSHC1.2). Because agricultural habitat values change over time based largely on  
38 economically driven agricultural practices, protecting crane habitat would provide enhanced  
39 stability to agricultural habitat value within the crane use area that does not currently exist.  
40 Although lesser sandhill cranes are less traditional in their use of roost sites in the Delta, these  
41 objectives for the greater sandhill crane would also benefit the lesser sandhill crane.

42 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
43 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
44 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
45 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *Reusable Tunnel Material*, and *Dredged*

1 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
2 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
3 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

4 Considering Alternative 9's protection and restoration provisions, in addition to Mitigation Measure  
5 BIO-72, which would compensate for the loss of medium- to very high-value foraging habitat at a  
6 ratio of 1:1, loss of habitat or direct mortality through implementation of Alternative 9 would not  
7 result in a substantial adverse effect through habitat modifications and would not substantially  
8 reduce the number or restrict the range of the species. Therefore, the alternative would have a less-  
9 than-significant impact on lesser sandhill crane.

#### 10 **Mitigation Measure BIO-72: Compensate for the loss of Medium- to Very High-Value** 11 **Lesser Sandhill Crane Foraging Habitat**

12 DWR must compensate for the loss of lesser sandhill crane medium- to very high-value foraging  
13 habitat at a ratio of 1:1 by protecting or managing high- to very high-value habitat in the Plan  
14 Area. Compensation must occur prior to or concurrent with the impacts to minimize the effects  
15 of habitat loss. The crop types and natural communities that are included in foraging value  
16 categories are listed in Table 12-9-32. Foraging habitat conservation must occur within 10  
17 kilometers of traditional sandhill crane roost sites and the location of protected habitat or  
18 conservation easements must be preapproved by CDFW.

#### 19 **Impact BIO-73: Effects on Lesser Sandhill Crane Associated with Electrical Transmission** 20 **Facilities**

21 Sandhill cranes are susceptible to collision with power lines and other structures during periods of  
22 inclement weather and low visibility (Avian Power Line Interaction Committee 1994, Brown and  
23 Drewien 1995, Manville 2005). New transmission lines installed in the study area would increase  
24 the risk for bird-power line strikes, which could result in injury or mortality of lesser sandhill  
25 cranes. Both permanent and temporary electrical transmission lines would be constructed to supply  
26 construction and operational power to BDCP facilities. Typically, higher-voltage (230-kilovolt [kV])  
27 lines vary in height from 90 to 110 feet, while "sub" transmission (69-kV) lines vary from 50 to 70  
28 feet (Avian Power Line Interaction Committee 2006). The Alternative 9 alignment would primarily  
29 use existing transmission and distribution lines and would require the installation of approximately  
30 42 miles of transmission line (3 miles of 60-kV line, 38 miles of 12-kV line, and 0.5 miles of 480-V  
31 line). These lines would occur in the vicinity of Walnut Grove and adjacent to fish screen and  
32 operable barrier structures throughout the CM1 footprint. Temporary lines would be removed after  
33 construction of the water conveyance facilities, within 10 years.

34 Existing transmission lines in the sandhill crane winter use area include a network of distribution  
35 lines that are between 11- and 22-kV. In addition, there are two 115-kV lines (one that overlaps with  
36 the winter use area between Antioch and I-5 east of Hood, and one that crosses the northern tip of  
37 the crane winter use area north of Clarksburg); and 69-kV lines that parallel Twin Cities Road,  
38 Herzog Road, Lambert Road, and the Southern Pacific Dredge Cut in the vicinity of Stone Lakes  
39 National Wildlife Refuge. At the south end of the winter use area, there are three 230-kV  
40 transmission lines that follow I-5, and then cut southwest through Holt, and two 500-kV lines cross  
41 the southwestern corner of the winter use area. This existing network of power lines in the study  
42 currently poses a risk for sandhill cranes, as both distribution and transmission lines cross over or

1 surround sandhill crane roost sites in the study area. New transmission lines would increase this  
2 risk and have an adverse effect on the species in the absence of other conservation actions.

3 The potential mortality of greater sandhill crane in the area of the proposed transmission lines  
4 under Alternative 9 was estimated using collision mortality rates by Brown and Drewien (1995) and  
5 an estimate of potential crossings along the proposed lines (methods are described in BDCP  
6 Appendix 5.J, Attachment 5J.C, *Analysis of Potential Bird Collisions at Proposed BDCP Powerlines*).  
7 Results indicate that in the absence of any line marking to increase visibility and reduce collision  
8 risk (i.e., without minimization measures), the average annual mortality of greater sandhill cranes at  
9 permanent lines would be up to 24 fatalities per year and would be 6 fatalities per year at  
10 temporary lines. Lesser sandhill cranes use the same roost sites as greater sandhill cranes. However,  
11 their numbers fluctuate greatly over the season as they are more mobile and use a broader  
12 landscape than greater sandhill cranes. Although the roost population sizes would fluctuate more  
13 for lesser sandhill cranes, one could expect that proportionally, the total number of potential  
14 fatalities for the lesser sandhill crane would be similar to those of the greater sandhill crane.

15 Marking transmission lines with devices that make the lines more visible to birds has been shown to  
16 dramatically reduce the incidence of bird mortality, including for sandhill cranes. Brown and  
17 Drewien (1995) estimated that marking devices in the Central Valley would reduce crane mortality  
18 by 66%. Using this assumption, by incorporating line-marking devices into the designs the annual  
19 mortality rate is estimated to decrease to 50 fatalities per year for the permanent lines and 44  
20 fatalities per year for the temporary lines.

21 The current proposed transmission line alignment under Alternative 9 is not fully designed, and line  
22 locations are not final. The implementation of *AMM20 Greater Sandhill Crane* would require that the  
23 final transmission line alignment would not result in a net increase in bird strike risk to greater  
24 sandhill cranes in the Plan Area. This performance standard would also protect lesser sandhill  
25 cranes from birdstrike impacts in the Plan Area and would be achieved by implementing any  
26 combination of the following: (1) siting new transmission lines in lower bird strike risk zones; (2)  
27 removing, relocating or undergrounding existing lines; (3) installing flight diverters on existing lines  
28 in the crane winter use area; and/or (4) for areas outside of the Stone Lakes National Wildlife  
29 Refuge project boundary, shifting locations of flooded areas that provide crane roosts to lower risk  
30 areas. This would be expected to reduce existing mortality and thus fully offset the overall  
31 population effects of new transmission lines. Designing the alignment to minimize risk and  
32 removing, relocating, or undergrounding existing lines would be given priority out of the above  
33 methods. With these measures and the proposed mitigation, and considering that the temporary  
34 lines would be removed within the first 10 years of Alternative 9 implementation, the risk of lesser  
35 sandhill crane mortality from transmission lines would be reduced substantially.

36 **NEPA Effects:** Sandhill cranes are known to be susceptible to collision with overhead wires. The  
37 existing network of power lines in the study area currently poses a risk for sandhill cranes. New  
38 transmission lines would increase the risk for bird-power line strikes, which could result in injury or  
39 mortality of lesser sandhill cranes. By incorporating line-marking devices on new transmission lines  
40 the estimated mortality rate for the greater sandhill crane would be 9 fatalities per year from  
41 permanent transmission lines and 2 fatalities per year from temporary transmission lines. Similar  
42 fatality rates would be expected for the lesser sandhill crane. The current proposed transmission  
43 line alignment under Alternative 9 is not fully designed, and line locations are not final. The  
44 implementation of *AMM20 Greater Sandhill Crane* would require that the final transmission line  
45 alignment avoided crane roost sites and achieved no net increase of greater sandhill crane strike

1 risk in the Plan Area. With *AMM20 Greater Sandhill Crane* and the proposed mitigation, and  
2 considering that the temporary lines would be removed within the first 10 years of Alternative 9  
3 implementation, the risk of mortality from collision with transmission lines would not result in an  
4 adverse effect on the lesser sandhill crane population.

5 **CEQA Conclusion:** Sandhill cranes are known to be susceptible to collision with overhead wires. The  
6 existing network of power lines in the study area currently poses a risk for sandhill cranes. New  
7 transmission lines would increase the risk for bird-power line strikes, which could result in injury or  
8 mortality of greater sandhill crane. By incorporating line-marking devices on new transmission lines  
9 the estimated mortality rate for the greater sandhill crane would be 9 fatalities per year from  
10 permanent transmission lines and 2 fatalities per year from temporary transmission lines. Similar  
11 fatality rates would be expected for the lesser sandhill crane. The current proposed transmission  
12 line alignment under Alternative 9 is not fully designed, and line locations are not final. The  
13 implementation of *AMM20 Greater Sandhill Crane* would require that the final transmission line  
14 alignment avoided crane roost sites and achieved no net increase of greater sandhill crane strike  
15 risk in the Plan Area. With *AMM20 Greater Sandhill Crane* and the proposed mitigation, and  
16 considering that the temporary lines would be removed within the first 10 years of Alternative 9  
17 implementation, the risk of mortality from collision with transmission lines would result in a less-  
18 than-significant impact on the lesser sandhill crane population.

#### 19 **Impact BIO-74: Indirect Effects of Plan Implementation on Lesser Sandhill Crane**

20 **Indirect construction-and operation-related effects:** Sandhill cranes are sensitive to disturbance.  
21 Noise and visual disturbances from the construction of water conveyance facilities and other  
22 conservation measures could reduce lesser sandhill crane use of modeled habitat adjacent to work  
23 areas. Indirect effects associated with construction include noise, dust, and visual disturbance  
24 caused by grading, filling, contouring, and other ground-disturbing operations outside the project  
25 footprint but within 1,300 feet of the construction edge. Furthermore, maintenance of the  
26 aboveground water conveyance facilities could result in ongoing but periodic postconstruction noise  
27 and visual disturbances that could affect lesser sandhill crane use of surrounding habitat. These  
28 effects could result from periodic vehicle use along the conveyance corridor, inspection and  
29 maintenance of aboveground facilities, and similar activities. These potential effects would be  
30 minimized with implementation of *AMM20 Greater Sandhill Crane* described in Appendix 3.C,  
31 *Avoidance and Minimization Measures*.

32 The BDCP includes an analysis of the indirect effects of noise and visual disturbance that would  
33 result from the construction of the Alternative 4 water conveyance facilities on greater sandhill  
34 crane (BDCP Appendix 5J.D, *Indirect Effects of the Construction of the BDCP Conveyance Facility on*  
35 *Sandhill Crane*). The same methods were employed to addresses the potential noise effects on  
36 cranes from Alternative 9 and to determine that as much as 1,217-5,108 acres of crane habitat could  
37 potentially be affected by general construction noise above baseline level (50–60 dBA). This would  
38 include 44 – 157 acres of temporary crane roosting habitat and 1,173 – 4,951 acres of crane foraging  
39 habitat. In addition, 0-40 acres of permanent crane roosting habitat, 38 – 688 acres of temporary  
40 crane roosting habitat, and 1,392 – 7,699 acres of crane foraging habitat could be affected by noise  
41 from pile driving that would be above baseline level (50–60dBA, Table 12-9-30 under Impact BIO-  
42 71).

43 The analysis was conducted based on the assumption that there would be direct line-of-sight from  
44 sandhill crane habitat areas to the construction site, and, therefore, provides a worst-case estimate

1 of effects. In many areas the existing levees would partially or completely block the line-of-sight and  
2 would function as effective noise barriers, substantially reducing noise transmission. However,  
3 there is insufficient data to assess the effects that increased noise levels would have on sandhill  
4 crane behavior. Similar acreages of lesser sandhill crane habitat would be expected to be indirectly  
5 affected. However, lesser sandhill cranes are less traditional in their winter roost sites and may be  
6 more likely to travel away from disturbed areas to roost and forage in more suitable habitat.

7 Evening and nighttime construction activities would require the use of extremely bright lights.  
8 Nighttime construction could also result in headlights flashing into roost sites when construction  
9 vehicles are turning onto or off of construction access routes. Proposed surge towers would require  
10 the use of safety lights that would alert low-flying aircraft to the presence of these structures  
11 because of their height. Little data is available on the effects of impact of artificial lighting on  
12 roosting birds. Direct light from automobile headlights has been observed to cause roosting cranes  
13 to flush and it is thought that they may avoid roosting in areas where lighting is bright (BDCP  
14 Chapter 5, *Effects Analysis*). If the birds were to roost in a brightly lit site, they may be vulnerable to  
15 sleep-wake cycle shifts and reproductive cycle shifts. Potential risks of visual impacts from lighting  
16 include a reduction in the cranes' quality of nocturnal rest, and effects on their "sense of photo-  
17 period which might cause them to shift their physiology towards earlier migration and breeding."  
18 (BDCP Chapter 5, *Effects Analysis*). Effects such as these could prove detrimental to the cranes'  
19 overall fitness and reproductive success (which could in turn have population-level impacts). A  
20 change in photo-period interpretation could also cause cranes to fly out earlier from roost sites to  
21 forage and might increase their risk of power line collisions if they were to leave roosts before dawn  
22 (BDCP Chapter 5, *Effects Analysis*).

23 The effects of noise and visual disturbance on lesser sandhill crane would be minimized through the  
24 implementation of AMM20 (Appendix 3.C, *Avoidance and Minimization Measures*). Activities within  
25 0.75 mile of crane roosting habitat would reduce construction noise during night time hours (from  
26 one hour before sunset to one hour after sunrise) such that construction noise levels do not exceed  
27 50 dBA  $L_{eq}$  (1 hour) at the nearest temporary or permanent roosts during periods when the roost  
28 sites are available (flooded). In addition, the area of crane foraging habitat that would be affected  
29 during the day (from one hour after sunrise to one hour before sunset) by construction noise  
30 exceeding 50 dBA  $L_{eq}$  (1 hour) would also be minimized. Unavoidable noise related effects would be  
31 compensated for by the enhancement of 0.1 acre of foraging habitat for every acre indirectly  
32 affected within the 50 dBA  $L_{eq}$  (1 hour) construction noise contour. With these measures in place,  
33 indirect effects of noise and visual disturbance from construction activities are not expected to  
34 reduce the lesser sandhill crane population in the study area.

35 The use of mechanical equipment during water conveyance facilities construction could cause the  
36 accidental release of petroleum or other contaminants that could affect lesser sandhill cranes in the  
37 surrounding habitat. The inadvertent discharge of sediment or excessive dust adjacent to lesser  
38 sandhill crane habitat could also affect the subspecies. AMM1–AMM7, including *AMM2 Construction*  
39 *Best Management Practices and Monitoring*, would minimize the likelihood of such spills and ensure  
40 that measures were in place to prevent runoff from the construction area and negative effects of  
41 dust on foraging habitat.

42 **Methylmercury Exposure:** Covered activities have the potential to exacerbate bioaccumulation of  
43 mercury in lesser sandhill crane. Marsh (tidal and nontidal) and floodplain restoration also have the  
44 potential to increase exposure to methylmercury. Mercury is transformed into the more bioavailable  
45 form of methylmercury in aquatic systems, especially areas subjected to regular wetting and drying

1 such as tidal marshes and flood plains (Alpers et al. 2008). Thus, BDCP restoration activities that  
2 create newly inundated areas could increase bioavailability of mercury (see BDCP Chapter 3,  
3 *Conservation Strategy*, for details of restoration). Increased methylmercury associated with natural  
4 community and floodplain restoration may indirectly affect lesser sandhill crane via uptake in lower  
5 trophic levels (BDCP Appendix 5.D, *Contaminants*). The potential mobilization or creation of  
6 methylmercury within the study area varies with site-specific conditions and would need to be  
7 assessed at the project level. *CM12 Methylmercury Management* includes provisions for project-  
8 specific Mercury Management Plans. Along with avoidance and minimization measures and adaptive  
9 management and monitoring, CM12 would be available to address the uncertainty of  
10 methylmercury levels in restored tidal marsh and potential impacts on lesser sandhill crane. The  
11 potential indirect effects of increased mercury exposure is likely low for lesser sandhill crane for the  
12 following reasons: 1) lesser sandhill cranes occur in the study area only during the nonbreeding  
13 months, 2) their primary foraging habitats in the study area are cultivated crops, and 3) the use of  
14 restored tidal wetlands by cranes is likely to be limited compared to seasonal managed wetlands.

15 **Selenium:** Selenium is an essential nutrient for avian species and has a beneficial effect in low  
16 doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009, Ohlendorf  
17 and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults, and can also  
18 result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz 2009). The  
19 effect of selenium toxicity differs widely between species and also between age and sex classes  
20 within a species. In addition, the effect of selenium on a species can be confounded by interactions  
21 with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith 2009).

22 The primary source of selenium bioaccumulation in birds is through their diet (Ackerman and  
23 Eagles-Smith 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the  
24 trophic level at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At  
25 Kesterson Reservoir in the San Joaquin Valley, selenium concentrations in invertebrates have been  
26 found to be two to six times the levels in rooted plants. Furthermore, bivalves sampled in the San  
27 Francisco Bay contained much higher selenium levels than crustaceans such as copepods (Stewart et  
28 al. 2004). Studies conducted at the Grasslands in Merced County recorded higher selenium levels in  
29 black-necked stilts which feed on aquatic invertebrates than in mallards and pintails, which are  
30 primarily herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which  
31 forage on bivalves) have much higher levels of selenium levels than shorebirds that prey on aquatic  
32 invertebrates (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high  
33 levels of selenium have a higher risk of selenium toxicity.

34 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations  
35 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to  
36 exacerbate bioaccumulation of selenium in avian species, including the lesser sandhill crane. Marsh  
37 (tidal and nontidal) and floodplain restoration have the potential to mobilize selenium, and  
38 therefore increase avian exposure from ingestion of prey items with elevated selenium levels. Thus,  
39 BDCP restoration activities that create newly inundated areas could increase bioavailability of  
40 selenium (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Changes in  
41 selenium concentrations were analyzed in Chapter 8, *Water Quality*, and it was determined that,  
42 relative to Existing Conditions and the No Action Alternative, CM1 would not result in substantial,  
43 long-term increases in selenium concentrations in water in the Delta under any alternative.  
44 However, it is difficult to determine whether the effects of potential increases in selenium

1 bioavailability associated with restoration-related conservation measures (CM4 and CM5) would  
2 lead to adverse effects on lesser sandhill crane.

3 Because of the uncertainty that exists at this programmatic level of review, there could be a  
4 substantial effect on lesser sandhill crane from increases in selenium associated with restoration  
5 activities. This effect would be addressed through the implementation of *AMM27 Selenium*  
6 *Management* (BDCP Appendix 3.C, *Avoidance and Minimization Measures*) which would provide  
7 specific tidal habitat restoration design elements to reduce the potential for bioaccumulation of  
8 selenium and its bioavailability in tidal habitats. Furthermore, the effectiveness of selenium  
9 management to reduce selenium concentrations and/or bioaccumulation would be evaluated  
10 separately for each restoration effort as part of design and implementation. This avoidance and  
11 minimization measure would be implemented as part of the tidal habitat restoration design  
12 schedule.

13 **NEPA Effects:** Crane habitat could potentially be affected by general construction noise (1,217-5,108  
14 acres) and pile driving (1,430-8,426 acres) above baseline level (50–60 dBA). However, lesser  
15 sandhill cranes are less traditional in their winter roost sites and may be more likely to travel away  
16 from disturbed areas to roost in more suitable habitat. Construction in certain areas would take  
17 place 7 days a week and 24 hours a day and evening and nighttime construction activities would  
18 require the use of extremely bright lights, which could adversely affect roosting cranes by impacting  
19 their sense of photo-period and by exposing them to predators. The effects of noise and visual  
20 disturbances would be reduced through the implementation of *AMM20 Greater Sandhill Crane*,  
21 which would include requirements (described above) to minimize the effects of noise and visual  
22 disturbance on sandhill cranes. With these measures in place, in addition to AMM1–AMM7, noise  
23 and visual disturbances, the potential for hazardous spills, increased dust and sedimentation, and  
24 operations and maintenance of the water conveyance facilities would not result in an adverse effect  
25 on the lesser sandhill crane. Tidal habitat restoration could result in increased exposure of lesser  
26 sandhill crane to selenium. This effect would be addressed through the implementation of *AMM27*  
27 *Selenium Management*, which would provide specific tidal habitat restoration design elements to  
28 reduce the potential for bioaccumulation of selenium and its bioavailability in tidal habitats. With  
29 these measures in place, the effects of noise and visual disturbance, potential spills of hazardous  
30 materials, and increased exposure to selenium would not have an adverse effect on lesser sandhill  
31 crane. The implementation of tidal natural communities restoration or floodplain restoration could  
32 result in increased exposure of lesser sandhill crane to methylmercury. The potential indirect effects  
33 of increased mercury exposure is likely low for lesser sandhill crane. However, it is unknown what  
34 concentrations of methylmercury are harmful to the species, and the potential for increased  
35 exposure varies substantially within the study area. Site-specific restoration plans that address the  
36 creation and mobilization of mercury, as well as monitoring and adaptive management as described  
37 in *CM12 Methylmercury Management*, would be available to address the uncertainty of  
38 methylmercury levels in restored tidal marsh and potential impacts on lesser sandhill crane. The  
39 site-specific planning phase of marsh restoration would be the appropriate place to assess the  
40 potential for risk of methylmercury exposure for lesser sandhill crane, once site specific sampling  
41 and other information could be developed.

42 **CEQA Conclusion:** Crane habitat could potentially be affected by general construction noise (1,217-  
43 5,108 acres) and pile driving (1,430-8,426 acres) above baseline level (50–60 dBA). However, lesser  
44 sandhill cranes are less traditional in their winter roost sites and may be more likely to travel away  
45 from disturbed areas to roost in more suitable habitat. Construction in certain areas would take

1 place 7 days a week and 24 hours a day and evening and nighttime construction activities would  
2 require the use of extremely bright lights, which could adversely affect roosting cranes by impacting  
3 their sense of photo-period and by exposing them to predators. The effects of noise and visual  
4 disturbances would be reduced through the implementation of *AMM20 Greater Sandhill Crane* which  
5 would include requirements (described above) to minimize the effects of noise and visual  
6 disturbance on sandhill cranes. The implementation of tidal natural communities restoration or  
7 floodplain restoration could result in increased exposure of lesser sandhill crane to methylmercury.  
8 The potential indirect effects of increased mercury exposure is likely low for lesser sandhill crane.  
9 However, it is unknown what concentrations of methylmercury are harmful to the species, and the  
10 potential for increased exposure varies substantially within the study area. Site-specific restoration  
11 plans that address the creation and mobilization of mercury, as well as monitoring and adaptive  
12 management as described in *CM12 Methylmercury Management*, would be available to address the  
13 uncertainty of methylmercury levels in restored tidal marsh and potential impacts on lesser sandhill  
14 crane. Tidal habitat restoration could result in increased exposure of lesser sandhill crane to  
15 selenium. This effect would be addressed through the implementation of *AMM27 Selenium*  
16 *Management*, which would provide specific tidal habitat restoration design elements to reduce the  
17 potential for bioaccumulation of selenium and its bioavailability in tidal habitats. With *AMM1-*  
18 *AMM7* and *AMM27 Selenium Management* in place, in addition to *CM12 Methylmercury Management*,  
19 indirect effects of Alternative 9 implementation would have a less-than-significant impact on lesser  
20 sandhill crane.

#### 21 **Least Bell's Vireo and Yellow Warbler**

22 Least Bell's vireo and yellow warbler modeled habitat identifies suitable nesting and migratory  
23 habitat as those plant alliances from the valley/foothill riparian modeled habitat that contain a  
24 dense shrub component, including all willow-dominated alliances.

25 Construction and restoration associated with Alternative 9 conservation measures would result in  
26 both temporary and permanent losses of least Bell's vireo and yellow warbler modeled habitat as  
27 indicated in Table 12-9-33. Full implementation of Alternative 9 would also include the following  
28 conservation actions over the term of the BDCP to benefit least Bell's vireo and yellow warbler  
29 (BDCP Chapter 3, Section 3.3, *Biological Goals and Objectives*).

- 30 ● Restore or create at least 5,000 acres of valley/foothill riparian natural community with at least  
31 3,000 acres occurring on restored seasonally inundated floodplain (Objective VFRNC1.1,  
32 associated with CM7).
- 33 ● Protect at least 750 acres of existing valley/foothill riparian natural community in CZ 7 by year  
34 10 (Objective VFRNC1.2, associated with CM7).
- 35 ● Maintain and enhance structural heterogeneity (Objective VFRNC2.1, associated with CM7).
- 36 ● Maintain at least 1,000 acres of early- to mid-successional vegetation (Objective VFRNC2.2,  
37 associated with CM7).

38 As explained below, with the restoration and protection of these amounts of habitat, in addition to  
39 natural community enhancement and management commitments and implementation of *AMM1-*  
40 *AMM7*, *AMM22 Suisun Song Sparrow*, *Yellow-Breasted Chat*, *Least Bell's Vireo*, *Western Yellow-Billed*  
41 *Cuckoo*, and Mitigation Measure BIO-75, impacts on least Bell's vireo and yellow warbler would not  
42 be adverse for NEPA purposes and would be less than significant for CEQA purposes.

1 **Table 12-9-33. Changes in Least Bell’s Vireo and Yellow Warbler Modeled Habitat Associated with**  
 2 **Alternative 9 (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	Migratory and breeding	49	49	233	233	NA	NA
<b>Total Impacts CM1</b>		<b>49</b>	<b>49</b>	<b>233</b>	<b>233</b>	<b>NA</b>	<b>NA</b>
CM2-CM18	Migratory and breeding	382	656	88	109	48-85	148
<b>Total Impacts CM2-CM18</b>		<b>382</b>	<b>656</b>	<b>88</b>	<b>109</b>	<b>48-85</b>	<b>148</b>
<b>TOTAL IMPACTS</b>		<b>431</b>	<b>705</b>	<b>321</b>	<b>342</b>	<b>48-85</b>	<b>148</b>

<sup>a</sup> See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-75: Loss or Conversion of Habitat for and Direct Mortality of Least Bell’s Vireo**  
 5 **and Yellow Warbler**

6 Alternative 9 conservation measures would result in the combined permanent and temporary loss  
 7 of up to 1,047 acres of modeled habitat (705 acres of permanent loss, 342 acres of temporary loss)  
 8 for least Bell’s vireo and yellow warbler (Table 12-9-33). Conservation measures that would result  
 9 in these losses are conveyance facilities and transmission line construction, and establishment and  
 10 use of borrow and spoil areas (CM1), Fremont Weir/Yolo Bypass fisheries improvements (CM2),  
 11 tidal natural communities restoration (CM4), and seasonally inundated floodplain restoration  
 12 (CM5). Habitat enhancement and management activities (CM11) which include ground disturbance  
 13 or removal of nonnative vegetation, could result in local adverse habitat effects. In addition,  
 14 maintenance activities associated with the long-term operation of the water conveyance facilities  
 15 and other BDCP physical facilities could degrade or eliminate least Bell’s vireo and yellow warbler  
 16 habitat. Each of these individual activities is described below. A summary statement of the combined  
 17 impacts and NEPA effects and a CEQA conclusion follow the individual conservation measure  
 18 discussions.

- 19 • *CM1 Water Facilities and Operation:* Construction of Alternative 9 conveyance facilities would  
 20 result in the combined permanent and temporary loss of up to 282 acres of modeled least Bell’s  
 21 vireo and yellow warbler habitat (Table 12-9-33). Of the 282 acres of modeled habitat that  
 22 would be removed for the construction of the conveyance facilities, 49 acres would be a  
 23 permanent loss and 233 acres would be a temporary loss of habitat. Most of the permanent loss  
 24 would occur as wider and deeper channels are dredged in Middle River and Victoria Canal, and

1 as operable barriers and new Sacramento River diversions are constructed in various  
2 waterways across the Delta. Temporary losses of riparian community would occur primarily  
3 along Middle River between Victoria Canal and Mildred Island, where large dredging work areas  
4 and operable barrier work areas would be placed. Some of this vegetation may be temporarily  
5 removed as dredging progresses, while other areas could remain in place but be temporarily  
6 affected by sedimentation and equipment movement associated with dredging. There are no  
7 occurrences of least Bell's vireo or yellow warbler that intersect with the CM1 footprint.  
8 However, this loss would have the potential to displace individuals, if present, and remove the  
9 functions and value of modeled habitat for nesting, protection, or foraging. Refer to the  
10 Terrestrial Biology Map Book for a detailed view of Alternative 9 construction locations. Impacts  
11 from CM1 would occur within the first 10 years of Alternative 9 implementation.

- 12 ● *CM2 Yolo Bypass Fisheries Enhancement*: Construction of Yolo Bypass fisheries enhancements  
13 would permanently remove approximately 83 acres and temporarily remove 88 acres of  
14 modeled least Bell's vireo and yellow warbler habitat in the Yolo Bypass in CZ 2. The loss is  
15 expected to occur during the first 10 years of Alternative 9 implementation.
- 16 ● *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and  
17 inundation would permanently remove an estimated 545 acres of modeled least Bell's vireo and  
18 yellow warbler habitat.
- 19 ● *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore  
20 seasonally inundated floodplain would permanently remove approximately 28 acres and  
21 temporarily remove 21 acres of modeled least Bell's vireo and yellow warbler habitat. Based on  
22 the riparian habitat restoration assumptions, a minimum of 3,000 acres of valley/foothill  
23 riparian habitat would be restored as a component of seasonally inundated floodplain  
24 restoration actions.

25 The actual number of acres of valley/foothill riparian habitat that CM4 and CM5 would restore  
26 may differ from these estimates, depending on how closely the actual outcome of tidal habitat  
27 restoration approximates the assumed outcome. However, riparian restoration from CM4 and  
28 CM5 would increase the extent of least Bell's vireo and yellow warbler habitat within the study  
29 area once the restored riparian vegetation has developed habitat functions for these species.

- 30 ● *CM6 Channel Margin Enhancement*: Channel margin habitat enhancement could result in  
31 removal of small amounts of valley/foothill riparian habitat along 20 miles of river and sloughs.  
32 The extent of this loss cannot be quantified at this time, but the majority of the enhancement  
33 activity would occur along waterway margins where riparian habitat stringers exist, including  
34 levees and channel banks. The improvements would occur within the study area on sections of  
35 the Sacramento, San Joaquin and Mokelumne Rivers, and along Steamboat and Sutter Sloughs.
- 36 ● *CM11 Natural Communities Enhancement and Management*: Habitat protection and management  
37 activities that could be implemented in protected least Bell's vireo and yellow warbler habitats  
38 are expected to maintain and improve the functions of the habitat over the term of the BDCP.  
39 Least Bell's vireo and yellow warbler would be expected to benefit from the increase in  
40 protected habitat, which would maintain conditions favorable for future species establishment  
41 in the study area. If least Bell's vireo and yellow warbler established breeding populations in  
42 restored riparian habitats in the study area, occupied habitat would be monitored to determine  
43 if there were a need to implement controls on brood parasites (brown-headed cowbird) or nest  
44 predators. If implemented, these actions would be expected to benefit the least Bell's vireo and

1 yellow warbler by removing a potential stressor that could, if not addressed, adversely affect the  
2 stability of newly established populations.

3 Habitat management- and enhancement-related activities could disturb least Bell's vireo and  
4 yellow warbler nests. If either species were to nest in the vicinity of a worksite, equipment  
5 operation could destroy nests, and noise and visual disturbances could lead to their  
6 abandonment, resulting in mortality of eggs and nestlings. The potential for these activities to  
7 result in direct mortality of least Bell's vireo or yellow warbler would be minimized with the  
8 implementation of *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western*  
9 *Yellow-Billed Cuckoo* and Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird*  
10 *Surveys and Avoid Disturbance of Nesting Birds*.

- 11 ● Operations and Maintenance: Postconstruction operation and maintenance of the above-ground  
12 water conveyance facilities and restoration infrastructure could result in ongoing but periodic  
13 disturbances that could affect least Bell's vireo and yellow warbler use of the surrounding  
14 habitat. Maintenance activities would include vegetation management, levee and structure  
15 repair, and re-grading of roads and permanent work areas. These effects, however, would be  
16 reduced by AMMs and conservation actions as described below.
- 17 ● Injury and Direct Mortality: Although least Bell's vireo nesting has not been confirmed in the  
18 study area, recent occurrences in the Yolo Bypass and at the San Joaquin River National Wildlife  
19 Refuge suggest that the reestablishment of a breeding population is a possibility over the  
20 duration of the BDCP. Construction-related activities would not be expected to result in direct  
21 mortality of least Bell's vireo or yellow warbler because adults and fledged young would be  
22 expected to avoid contact with construction and other equipment. However, if either species  
23 were to nest in the construction area, equipment operation, noise and visual disturbances could  
24 destroy nests or lead to their abandonment, resulting in mortality of eggs and nestlings. These  
25 effects on least Bell's vireo would be avoided and minimized with the implementation of *AMM22*  
26 *Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo*. In  
27 addition, Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid*  
28 *Disturbance of Nesting Birds*, would be available to address effects on nesting yellow warblers.
- 29 ● Temporarily affected areas would be restored as riparian habitat within 1 year following  
30 completion of construction activities. Although the effects are considered temporary, the  
31 restored riparian habitat would require a period of time for ecological succession to occur and  
32 for restored riparian habitat to functionally replace habitat that has been affected. However,  
33 restored riparian vegetation can have the habitat structure to support breeding vireos within 3  
34 to 5 years, particularly if the restored vegetation is adjacent to established riparian areas (Kus  
35 2002), and similar habitat would be suitable for yellow warbler. The majority of the riparian  
36 vegetation to be temporarily removed is early- to mid-successional; therefore, the replaced  
37 riparian vegetation would be expected to have structural components comparable to the  
38 temporarily removed vegetation within the first 5 to 10 years after the initial restoration  
39 activities are complete.

40 The following paragraphs summarize the combined effects discussed above and describe other  
41 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also  
42 included.

1 **Near-Term Timeframe**

2 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
3 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
4 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
5 effects of construction would not be adverse under NEPA. Alternative 9 would remove 752 acres of  
6 modeled habitat for least Bell's vireo and yellow warbler in the study area in the near-term. These  
7 effects would result from the construction of the water conveyance facilities (CM1, 282 acres of  
8 habitat), and implementing other conservation measures (Yolo Bypass fisheries improvements  
9 [CM2] tidal restoration [CM4], seasonally inundated floodplain restoration [CM5]—470 acres of  
10 habitat).

11 Typical NEPA and CEQA project-level mitigation ratios for those natural communities that would be  
12 affected and that are identified in the biological goals and objectives for least Bell's vireo in Chapter  
13 3 of the BDCP would be 1:1 for restoration/creation and 1:1 protection of dense shrubby  
14 successional valley/foothill riparian habitat. Using these ratios would indicate that 282 acres of  
15 valley/foothill riparian habitat should be restored/created and 282 acres should be protected to  
16 compensate for the CM1 losses of least Bell's vireo and yellow warbler habitat. The near-term effects  
17 of other conservation actions would remove 470 acres of modeled habitat, and therefore require  
18 470 acres of restoration and 470 acres of protection of dense shrubby valley/foothill riparian using  
19 the same typical NEPA and CEQA ratios (1:1 for restoration and 1:1 for protection).

20 The BDCP has committed to near-term goals of protecting 750 acres and restoring 800 acres of the  
21 valley/foothill riparian natural community in the Plan Area (Table 3-4 in Chapter 3, *Description of*  
22 *Alternatives*). These conservation actions are associated with CM3 and CM7 and would occur in the  
23 same timeframe as the construction and early restoration losses, thereby avoiding adverse effects of  
24 habitat loss on least Bell's vireo and yellow warbler. The majority of the riparian restoration acres  
25 would occur in CZ 7 as part of a reserve system with extensive wide bands or large patches of  
26 valley/foothill riparian natural community (Objectives VFRNC1.1 and VFRNC1.2, BDCP Chapter 3,  
27 *Conservation Strategy*). This restoration would provide the large contiguous patches needed for  
28 suitable least Bell's vireo and yellow warbler breeding habitat. Goals and objectives in the Plan for  
29 riparian restoration also include the restoration, maintenance and enhancement of structural  
30 heterogeneity with adequate vertical and horizontal overlap among vegetation components and  
31 over adjacent riverine channels, freshwater emergent wetlands, and grasslands (Objective  
32 VFRNC2.1). These Plan objectives represent performance standards for considering the  
33 effectiveness of CM7 restoration and CM3 protection actions. The acres of protection contained in  
34 the near-term Plan goals and the additional detail in the biological objectives for least Bell's vireo  
35 satisfy the typical mitigation ratios that would be applied to the project-level effects of CM1, as well  
36 as mitigate the near-term effects of the other conservation measures. The restored riparian habitat  
37 could require 5 years to several decades, for ecological succession to occur and for restored riparian  
38 habitat to functionally replace habitat that has been affected. However, because the modeled habitat  
39 impacted largely consists of small patches of blackberry, willow, and riparian scrub, and because  
40 least Bell's vireo and yellow warbler are not known to be established breeders in the study area,  
41 BDCP actions would not be expected to have an adverse population-level effect on either species.

42 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*  
43 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*  
44 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
45 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*

1 *Material, AMM7 Barge Operations Plan, and AMM22 Suisun Song Sparrow, Yellow-Breasted Chat,*  
2 *Least Bell's Vireo, Western Yellow-Billed Cuckoo.* All of these AMMs include elements that would  
3 avoid or minimize the risk of affecting individuals and species habitats adjacent to work areas and  
4 storage sites. The AMMs are described in detail in BDCP Appendix 3.C, *Avoidance and Minimization*  
5 *Measures.* The yellow warbler is not a species that is covered under the BDCP. Although  
6 preconstruction surveys for least Bell's vireo may also detect yellow warblers (if they were to nest  
7 in the study area over the course of the BDCP), in order to have a less than adverse effect on  
8 individuals, preconstruction surveys for noncovered avian species would be required to ensure that  
9 yellow warbler nests were detected and avoided. Mitigation Measure BIO-75 would be available to  
10 address adverse effects on nesting yellow warblers.

### 11 **Late Long-Term Timeframe**

12 The habitat model indicates that the study area supports approximately 14,850 acres of modeled  
13 habitat for least Bell's vireo and yellow warbler. Alternative 9 as a whole would result in the  
14 permanent loss of and temporary effects on 1,047 acres of habitat for these species during the term  
15 of the Plan (7% of the total habitat in the study area). These losses would occur from the  
16 construction of the water conveyance facilities (CM1) and from *CM2 Yolo Bypass Fisheries*  
17 *Enhancement, CM4 Tidal Natural Communities Restoration, and CM5 Seasonally Inundated Floodplain*  
18 *Restoration.* The locations of these losses would be in fragmented riparian habitat throughout the  
19 study area.

20 The Plan includes conservation commitments through *CM7 Riparian Natural Community Restoration*  
21 and *CM3 Natural Communities Protection and Restoration* to restore or create at least 5,000 acres  
22 and protect at least 750 acres of valley/foothill riparian woodland. Of the 5,000 acres of restored  
23 riparian natural communities, a minimum of 3,000 acres of valley/foothill riparian would be  
24 restored within the seasonally inundated floodplain, and 1,000 acres would be managed as dense  
25 early to mid-successional riparian forest (Objectives VFRNC1.1 and VFRNC1.2). Goals and objectives  
26 in the Plan for riparian restoration also include the maintenance and enhancement of structural  
27 heterogeneity (Objective VFRNC2.1) which would provide suitable nesting and migratory habitat for  
28 the least Bell's vireo and yellow warbler.

29 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*  
30 *Plant Species*) estimates that the restoration and protection actions discussed above could result in  
31 the restoration of 1,000 acres and the protection of 593 acres of habitat for the least Bell's vireo,  
32 which would also be suitable habitat for the yellow warbler.

33 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*  
34 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*  
35 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
36 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
37 *Material, AMM7 Barge Operations Plan, and AMM22 Suisun Song Sparrow, Yellow-Breasted Chat,*  
38 *Least Bell's Vireo, Western Yellow-Billed Cuckoo.* All of these AMMs include elements that would  
39 avoid or minimize the risk of affecting individuals and species habitats adjacent to work areas and  
40 storage sites. The AMMs are described in detail in BDCP Appendix 3.C, *Avoidance and Minimization*  
41 *Measures.*

42 **NEPA Effects:** The loss of least Bell's vireo and yellow warbler habitat and potential direct mortality  
43 of these special-status species under Alternative 9 would represent an adverse effect in the absence

1 of other conservation actions. However, these species are not established breeders in the study area  
2 and impacts would likely be limited to loss of migratory habitat. In addition, with habitat protection  
3 and restoration associated with CM3 and CM7, guided by biological goals and objectives and by  
4 *AMM1 Worker Awareness Training, AMM2 Construction Best Management Practices and Monitoring,*  
5 *AMM3 Stormwater Pollution Prevention Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill*  
6 *Prevention, Containment, and Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable*  
7 *Tunnel Material, and Dredged Material, AMM7 Barge Operations Plan, and AMM22 Suisun Song*  
8 *Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo, which would be in*  
9 *place throughout the construction period, the effects of habitat loss and potential mortality on least*  
10 *Bell's vireo, and the effect of habitat loss on yellow warbler under Alternative 9 would not be*  
11 *adverse. The yellow warbler is not a species that is covered under the BDCP and potential mortality*  
12 *would be an adverse effect without preconstruction surveys to ensure that nests are detected and*  
13 *avoided. Mitigation Measure BIO-75 would be available to address this effect.*

14 **CEQA Conclusion:**

15 **Near-Term Timeframe**

16 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
17 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
18 provide sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that  
19 the impacts of construction would be less than significant under CEQA. Alternative 9 would remove  
20 752 acres of modeled habitat for least Bell's vireo and yellow warbler in the study area in the near-  
21 term. These effects would result from the construction of the water conveyance facilities (CM1, 282  
22 acres of habitat), and implementing other conservation measures (Yolo Bypass fisheries  
23 improvements [CM2] tidal restoration [CM4], seasonally inundated floodplain restoration [CM5]—  
24 470 acres of habitat).

25 Typical NEPA and CEQA project-level mitigation ratios for those natural communities that would be  
26 affected and that are identified in the biological goals and objectives for least Bell's vireo in Chapter  
27 3 of the BDCP would be 1:1 for restoration/creation and 1:1 protection of dense shrubby  
28 successional valley/foothill riparian habitat. Using these ratios would indicate that 282 acres of  
29 valley/foothill riparian habitat should be restored/created and 282 acres should be protected to  
30 compensate for the CM1 losses of least Bell's vireo and yellow warbler habitat. The near-term effects  
31 of other conservation actions would remove 470 acres of modeled habitat, and therefore require  
32 470 acres of restoration and 470 acres of protection of dense shrubby valley/foothill riparian using  
33 the same typical NEPA and CEQA ratios (1:1 for restoration and 1:1 for protection).

34 The BDCP has committed to near-term goals of protecting 750 acres and restoring 800 acres of the  
35 valley/foothill riparian natural community in the Plan Area (Table 3-4 in Chapter 3, *Description of*  
36 *Alternatives*). These conservation actions are associated with CM3 and CM7 and would occur in the  
37 same timeframe as the construction and early restoration losses, thereby avoiding adverse effects of  
38 habitat loss on least Bell's vireo and yellow warbler. The majority of the riparian restoration acres  
39 would occur in CZ 7 as part of a reserve system with extensive wide bands or large patches of  
40 valley/foothill riparian natural community (Objectives VFRNC1.1 and VFRNC1.2, BDCP Chapter 3,  
41 *Conservation Strategy*). This restoration would provide the large contiguous patches needed for  
42 suitable least Bell's vireo and yellow warbler breeding habitat. Goals and objectives in the Plan for  
43 riparian restoration also include the restoration, maintenance and enhancement of structural  
44 heterogeneity with adequate vertical and horizontal overlap among vegetation components and

1 over adjacent riverine channels, freshwater emergent wetlands, and grasslands (Objective  
2 VFRNC2.1). These Plan objectives represent performance standards for considering the  
3 effectiveness of CM7 restoration and CM3 protection actions. biological goals and objectives would  
4 inform the near-term protection and restoration efforts and represent performance standards for  
5 considering the effectiveness of restoration actions. The acres of protection contained in the near-  
6 term Plan goals and the additional detail in the biological objectives for least Bell's vireo satisfy the  
7 typical mitigation ratios that would be applied to the project-level effects of CM1, as well as mitigate  
8 the near-term effects of the other conservation measures. The restored riparian habitat could  
9 require 5 years to several decades, for ecological succession to occur and for restored riparian  
10 habitat to functionally replace habitat that has been affected. However, because the modeled habitat  
11 impacted largely consists of small patches of blackberry, willow, and riparian scrub, and because  
12 least Bell's vireo and yellow warbler are not known to be established breeders in the study area,  
13 BDCP actions would not be expected to have an adverse population-level effect on either species.

14 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
15 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
16 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
17 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
18 *Material*, *AMM7 Barge Operations Plan*, and *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat,*  
19 *Least Bell's Vireo, Western Yellow-Billed Cuckoo*. All of these AMMs include elements that would  
20 avoid or minimize the risk of affecting individuals and species habitats adjacent to work areas and  
21 storage sites. The AMMs are described in detail in BDCP Appendix 3.C, *Avoidance and Minimization*  
22 *Measures*. The yellow warbler is not a species that is covered under the BDCP. Although  
23 preconstruction surveys for least Bell's vireo may also detect yellow warblers (if they were to nest  
24 in the Plan Area over the course of the BDCP), in order to have a less than adverse effect on  
25 individuals, preconstruction surveys for noncovered avian species would be required to ensure that  
26 yellow warbler nests are detected and avoided. Mitigation Measure BIO-75 would reduce the  
27 potential impact on nesting yellow warblers to a less-than-significant impact, should they become  
28 established in the Plan Area.

### 29 **Late Long-Term Timeframe**

30 The habitat model indicates that the study area supports approximately 14,850 acres of modeled  
31 habitat for least Bell's vireo and yellow warbler. Alternative 9 as a whole would result in the  
32 permanent loss of and temporary effects on 1,047 acres of habitat for these species during the term  
33 of the Plan (7% of the total habitat in the study area). These losses would occur from the  
34 construction of the water conveyance facilities (CM1) and from *CM2 Yolo Bypass Fisheries*  
35 *Enhancement*, *CM4 Tidal Natural Communities Restoration*, and *CM5 Seasonally Inundated Floodplain*  
36 *Restoration*. The locations of these losses would be in fragmented riparian habitat throughout the  
37 study area.

38 The Plan includes conservation commitments through *CM7 Riparian Natural Community Restoration*  
39 and *CM3 Natural Communities Protection and Restoration* to restore or create at least 5,000 acres  
40 and protect at least 750 acres of valley/foothill riparian woodland. Of the 5,000 acres of restored  
41 riparian natural communities, a minimum of 3,000 acres of valley/foothill riparian would be  
42 restored within the seasonally inundated floodplain, and 1,000 acres would be managed as dense  
43 early to mid-successional riparian forest (Objectives VFRNC1.1 and VFRNC1.2). Goals and objectives  
44 in the Plan for riparian restoration also include the maintenance and enhancement of structural

1 heterogeneity (Objective VFRNC2.1) which would provide suitable nesting and migratory habitat for  
2 the least Bell's vireo and yellow warbler. The restored riparian habitat could require 5 years to  
3 several decades, for ecological succession to occur and for restored riparian habitat to functionally  
4 replace habitat that has been affected. Therefore, there would be a time-lag before the restored  
5 habitat would benefit either species. However, neither species are established breeders in the study  
6 area and impacts would likely be limited to loss of migratory habitat for least Bell's vireo and yellow  
7 warbler.

8 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*  
9 *Plant Species*) estimates that the restoration and protection actions discussed above could result in  
10 the restoration of 1,000 acres and the protection of 593 acres of habitat for the least Bell's vireo,  
11 which would also be suitable habitat for the yellow warbler.

12 The loss of least Bell's vireo and yellow warbler habitat and potential direct mortality of these  
13 special-status species under Alternative 9 would represent an adverse effect in the absence of other  
14 conservation actions. However, neither species is an established breeder in the study area and  
15 impacts would likely be limited to loss of migratory habitat for least Bell's vireo and yellow warbler.  
16 In addition, with habitat protection and restoration associated with CM3 and CM7, guided by  
17 biological goals and objectives and by *AMM1 Worker Awareness Training, AMM2 Construction Best*  
18 *Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention Plan, AMM4 Erosion*  
19 *and Sediment Control Plan, AMM5 Spill Prevention, Containment, and Countermeasure Plan, AMM6*  
20 *Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged Material, AMM7 Barge*  
21 *Operations Plan, and AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western*  
22 *Yellow-Billed Cuckoo*, which would be in place throughout the construction period, the impact of  
23 habitat loss and potential mortality on least Bell's vireo and the effect of habitat loss on yellow  
24 warbler under Alternative 9 would be less than significant. The yellow warbler is not a species that  
25 is covered under the BDCP. Although preconstruction surveys for least Bell's vireo may also detect  
26 nesting yellow warblers, in order for the BDCP to have a less-than-significant impact on individuals,  
27 preconstruction surveys for noncovered avian species would be required to ensure that yellow  
28 warbler nests are detected and avoided. Implementation of Mitigation Measure BIO-75 would  
29 reduce this potential impact on nesting yellow warblers, if present in the study area, to a less-than-  
30 significant level.

31 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**  
32 **Disturbance of Nesting Birds**

33 To reduce impacts on nesting birds, DWR will implement the measures listed below.

- 34 ● To the maximum extent feasible, vegetation (trees, shrubs, ruderal areas) removal and  
35 trimming will be scheduled during the nonbreeding season of birds (September 1–January  
36 31). If vegetation removal cannot be removed in accordance with this timeframe,  
37 preconstruction/preactivity surveys for nesting birds and additional protective measures  
38 will be implemented as described below.
- 39 ● A qualified wildlife biologist with knowledge of the relevant species will conduct nesting  
40 surveys before the start of construction. A minimum of three separate surveys will be  
41 conducted within 30 days prior to construction, with the last survey within 3 days prior to  
42 construction. Surveys will include a search of all suitable nesting habitat (trees, shrubs,  
43 ruderal areas, field crops) in the construction area. In addition, a 500-foot area around the

1 project area will be surveyed for nesting raptors, and a 250-foot buffer area will be surveyed  
2 for other nesting birds. If no active nests are detected during these surveys, no additional  
3 measures are required.

- 4 ● If active nests are found in the survey area, no-disturbance buffers will be established  
5 around the nest sites to avoid disturbance or destruction of the nest site until the end of the  
6 breeding season (approximately September 1) or until a qualified wildlife biologist  
7 determines that the young have fledged and moved out of the project area (this date varies  
8 by species). A qualified wildlife biologist will monitor construction activities in the vicinity  
9 of the nests to ensure that construction activities do not affect nest success. The extent of the  
10 buffers will be determined by the biologists in coordination with USFWS and CDFW and will  
11 depend on the level of noise or construction disturbance, line-of-sight between the nest and  
12 the disturbance, ambient levels of noise and other disturbances, and other topographical or  
13 artificial barriers. Suitable buffer distances may vary between species.

#### 14 **Impact BIO-76: Fragmentation of Least Bell's Vireo and Yellow Warbler Habitat**

15 Grading, filling, contouring, and other initial ground-disturbing operations may temporarily  
16 fragment modeled least Bell's vireo and yellow warbler habitat. This could temporarily reduce the  
17 affected habitat's extent and functions. Because there are only two recent occurrences of least Bell's  
18 vireo within the Plan Area, and no occurrences of yellow warbler breeding in the Plan Area, future  
19 occupancy would likely consist of only a small number of individuals, and any such habitat  
20 fragmentation is expected to have no or minimal effect on the species.

21 **NEPA Effects:** Because there are only two recent occurrences of least Bell's vireo within the Plan  
22 Area, and no occurrences of yellow warbler breeding in the Plan Area, habitat fragmentation  
23 resulting from ground-disturbing operations would not have an adverse effect on least Bell's vireo  
24 or yellow warbler.

25 **CEQA Conclusion:** Because there are only two recent occurrences of least Bell's vireo within the Plan  
26 Area, and no occurrences of yellow warbler breeding in the Plan Area, habitat fragmentation  
27 resulting from ground-disturbing operations would have a less-than-significant impact on least  
28 Bell's vireo or yellow warbler.

#### 29 **Impact BIO-77: Effects on Least Bell's Vireo and Yellow Warbler Associated with Electrical** 30 **Transmission Facilities**

31 New transmission lines would increase the risk for bird-power line strikes, which could result in  
32 injury or mortality of least Bell's vireo and yellow warbler. While both species could recolonize the  
33 study area during the permit term, recolonization would be expected to result primarily in response  
34 to BDCP riparian restoration, which would occur largely in CZ 7, which does not overlap with the  
35 proposed footprint for new transmission lines. The lack of occurrences in the study area, the lack of  
36 current and future higher value habitat patches in the vicinity of the proposed transmission lines,  
37 and the behavior and habitat requirements of least Bell's vireo and yellow warbler make collision  
38 with the proposed transmission lines highly unlikely.

39 **NEPA Effects:** Installation and presence of new transmission lines would not result in an adverse  
40 effect on least Bell's vireo or yellow warbler because the probability of bird-powerline strikes is  
41 unlikely due to the lack of occurrences in the study area, the lack of current and future higher value

1 habitat patches in the vicinity of the proposed transmission lines, and the behavior and habitat  
2 requirements of these species.

3 **CEQA Conclusion:** Installation and presence of new transmission lines would result in a less-than-  
4 significant impact on least Bell's vireo or yellow warbler because the probability of bird-powerline  
5 strikes is unlikely due to the lack of occurrences in the study area, the lack of current and future  
6 higher value habitat patches in the vicinity of the proposed transmission lines, and the behavior and  
7 habitat requirements of these species.

8 **Impact BIO-78: Indirect Effects of Plan Implementation on Least Bell's Vireo and Yellow**  
9 **Warbler**

10 **Indirect construction- and operation-related effects:** If least Bell's vireo or yellow warbler were  
11 to nest in or adjacent to work areas, construction and subsequent maintenance-related noise and  
12 visual disturbances could mask calls, disrupt foraging and nesting behaviors, and reduce the  
13 functions of suitable nesting habitat for these species. Construction noise above background noise  
14 levels (greater than 50 dBA) could extend 1,900 to 5,250 feet from the edge of construction  
15 activities (BDCP Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of the BDCP*  
16 *Conveyance Facility on Sandhill Crane*, Table 4), although there are no available data to determine  
17 the extent to which these noise levels could affect least Bell's vireo or yellow warbler. *AMM22 Suisun*  
18 *Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo* would reduce  
19 the potential for adverse effects of construction-related activities on survival and productivity of  
20 nesting least Bell's vireo and a 500 foot no-disturbance buffer would be established around the  
21 active nest. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid*  
22 *Disturbance of Nesting Birds*, would be available to reduce the potential for adverse effects of  
23 construction-related activities on nesting yellow warbler. The use of mechanical equipment during  
24 water conveyance facilities construction could cause the accidental release of petroleum or other  
25 contaminants that could affect least Bell's vireo and yellow warbler in the surrounding habitat. The  
26 inadvertent discharge of sediment or excessive dust adjacent to suitable habitat could also have an  
27 adverse effect on these species. *AMM2 Construction Best Management Practices and Monitoring*  
28 would minimize the likelihood of such spills and ensure that measures are in place to prevent runoff  
29 from the construction area and negative effects of dust on active nests.

30 **Methylmercury Exposure:** Covered activities have the potential to exacerbate bioaccumulation of  
31 mercury in avian species, including the least Bell's vireo and yellow warbler. Marsh (tidal and  
32 nontidal) and floodplain restoration have the potential to increase exposure to methylmercury.  
33 Mercury is transformed into the more bioavailable form of methylmercury in aquatic systems,  
34 especially areas subjected to regular wetting and drying such as tidal marshes and flood plains  
35 (Alpers et al. 2008). Thus, BDCP restoration activities that create newly inundated areas could  
36 increase bioavailability of mercury (see BDCP Chapter 3, *Conservation Strategy*, for details of  
37 restoration). Species sensitivity to methylmercury differs widely and there is a large amount of  
38 uncertainty with respect to species-specific effects. Increased methylmercury associated with  
39 natural community and floodplain restoration could indirectly affect least Bell's vireo and yellow  
40 warbler, via uptake in lower trophic levels (as described in the BDCP, Appendix 5.D, *Contaminants*).

41 In addition, the potential mobilization or creation of methylmercury within the Plan Area varies  
42 with site-specific conditions and would need to be assessed at the project level. *CM12 Methylmercury*  
43 *Management* contains provisions for project-specific Mercury Management Plans. Site-specific  
44 restoration plans that address the creation and mobilization of mercury, as well as monitoring and

1 adaptive management as described in CM12 would be available to address the uncertainty of  
2 methylmercury levels in restored tidal marsh and potential impacts on least Bell's vireo and yellow  
3 warbler.

4 **NEPA Effects:** Impacts of noise, the potential for hazardous spills, increased dust and sedimentation,  
5 and operations and maintenance of the water conveyance facilities on least Bell's vireo would not be  
6 adverse with the implementation of AMM1-AMM7, and AMM22 *Suisun Song Sparrow, Yellow-*  
7 *Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo*. Mitigation Measure BIO-75, *Conduct*  
8 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to  
9 address adverse effects on nesting yellow warblers. The implementation of tidal natural  
10 communities restoration or floodplain restoration could result in increased exposure of least Bell's  
11 vireo or yellow warbler to methylmercury, should they begin to nest in the study area. However, it is  
12 unknown what concentrations of methylmercury are harmful to these species. Site-specific  
13 restoration plans that address the creation and mobilization of mercury, as well as monitoring and  
14 adaptive management as described in *CM12 Methylmercury Management*, would be available to  
15 address the uncertainty of methylmercury levels in restored tidal marsh and potential adverse  
16 effects of methylmercury on least Bell's vireo and yellow warbler.

17 **CEQA Conclusion:** Noise, the potential for hazardous spills, increased dust and sedimentation, and  
18 operations and maintenance of the water conveyance facilities would have a less-than-significant  
19 impact on least Bell's vireo and yellow warbler with the implementation of AMM2 *Construction Best*  
20 *Management Practices and Monitoring, AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least*  
21 *Bell's Vireo, Western Yellow-Billed Cuckoo*, and Mitigation Measure BIO-75, *Conduct Preconstruction*  
22 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*. The implementation of tidal natural  
23 communities restoration or floodplain restoration could result in increased exposure of least Bell's  
24 vireo or yellow warbler to methylmercury, should they begin to nest in the study area. However, it is  
25 unknown what concentrations of methylmercury are harmful to these species. Sites-specific  
26 restoration plans that address the creation and mobilization of mercury, as well as monitoring and  
27 adaptive management as described in *CM12 Methylmercury Management*, would be available to  
28 address the uncertainty of methylmercury levels in restored tidal marsh and potential significant  
29 impacts on least Bell's vireo and yellow warbler.

30 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**  
31 **Disturbance of Nesting Birds**

32 See Mitigation Measure BIO-75 under Impact BIO-75.

33 **Impact BIO-79: Periodic Effects of Inundation of Least Bell's Vireo and Yellow Warbler**  
34 **Habitat as a Result of Implementation of Conservation Components**

35 Flooding of the Yolo Bypass from Fremont Weir operations (CM2) would increase the frequency and  
36 duration of inundation of approximately 48-85 acres of modeled least Bell's vireo and yellow  
37 warbler habitat in CZ 2. No adverse effects of increased inundation frequency on least Bell's vireo,  
38 yellow warbler, or their habitat would be expected, because riparian vegetation supporting habitat  
39 has persisted under the existing Yolo Bypass flooding regime and changes to frequency and  
40 inundation would be within the tolerance of these vegetation types.

41 Based on hypothetical floodplain restoration for *CM5 Seasonally Inundated Floodplain Restoration*,  
42 construction of setback levees could result in periodic inundation of up to 148 acres of modeled

1 least Bell's vireo and yellow warbler habitat in CZ 7. Inundation of restored floodplains would not be  
2 expected to affect least Bell's vireo, yellow warbler, or their habitat because the breeding period is  
3 outside the period when floodplains would likely be inundated. Additionally, periodic inundation of  
4 floodplains would be expected to restore a more natural flood regime in support of riparian  
5 vegetation types that support least Bell's vireo and yellow warbler habitat. The overall effect of  
6 seasonal inundation in existing riparian natural communities would be beneficial, because,  
7 historically, flooding was the main natural disturbance regulating ecological processes in riparian  
8 areas, and flooding promotes the germination and establishment of many native riparian plants.

9 **NEPA Effects:** Implementation of CM2 and CM5 would result in periodic inundation of 48–85 acres  
10 (CM2) and 148 acres (CM5) of modeled habitat for least Bell's vireo and yellow warbler. However,  
11 periodic inundation would not result in an adverse effect on least Bell's vireo or yellow warbler  
12 because inundation would occur primarily during the nonbreeding season and would promote a  
13 more natural flood regime in support of habitat for these species.

14 **CEQA Conclusion:** Implementation of CM2 and CM5 would result in periodic inundation of 48–85  
15 acres (CM2) and 148 acres (CM5) of modeled habitat for least Bell's vireo and yellow warbler.  
16 However, periodic inundation would have a less-than-significant impact on least Bell's vireo or  
17 yellow warbler because inundation would occur during the nonbreeding season. Flooding promotes  
18 the germination and establishment of many native riparian plants. Therefore, the overall impact of  
19 seasonal inundation in existing riparian natural communities would be beneficial for least Bell's  
20 vireo and yellow warbler.

### 21 **Suisun Song Sparrow and Saltmarsh Common Yellowthroat**

22 This section describes the effects of Alternative 9, including water conveyance facilities construction  
23 and implementation of other conservation components, on Suisun song sparrow and saltmarsh  
24 common yellowthroat. The habitat model used to assess effects on Suisun song sparrow and  
25 saltmarsh common yellowthroat is based on primary breeding habitat and secondary habitat.  
26 Suisun song sparrow primary breeding habitat consists of all *Salicornia*-dominated tidal brackish  
27 emergent wetland and all *Typha*-, *Scirpus*-, and *Juncus*-dominated tidal freshwater emergent wetland  
28 in the Plan Area west of Sherman Island, with the exception that *Scirpus acutus* and *S. californicus*  
29 plant communities (low marsh) and all of the plant communities listed below that occur in managed  
30 wetlands were classified as secondary habitat. Upland transitional zones, providing refugia during  
31 high tides, within 150 feet of the wetland edge were also included as secondary habitat. Secondary  
32 habitats generally provide only a few ecological functions such as foraging (low marsh and managed  
33 wetlands) or extreme high tide refuge (upland transition zones), while primary habitats provide  
34 multiple functions, including breeding, effective predator cover, and valuable forage.

35 Construction and restoration associated with Alternative 9 conservation measures would result in  
36 both temporary and permanent losses of Suisun song sparrow and saltmarsh common yellowthroat  
37 modeled habitat as indicated in Table 12-9-34. The majority of the losses would take place over an  
38 extended period of time as tidal marsh is restored in the study area. Full implementation of  
39 Alternative 9 also include the following conservation actions over the term of the BDCP to benefit  
40 the Suisun song sparrow and the saltmarsh common yellowthroat (BDCP Chapter 3, Section 3.3,  
41 *Biological Goals and Objectives*).

- 42 ● Restore or create at least 6,000 acres of tidal brackish emergent wetland in CZ 11, including at  
43 least 1,500 acres of middle and high marsh (Objectives TBEWNC1.1, TBEWNC1.2).

- Protect and enhance at least 8,100 acres of managed wetland, at least 1,500 acres of which are in the Grizzly Island Marsh Complex (Objective MWNC1.1)
- Protect at least 200 feet of adjacent grasslands beyond the sea level rise accommodation area (Objective GNC1.4)

As explained below, with the restoration and protection of these amounts of habitat, in addition to natural community enhancement and management commitments (including *CM12 Methylmercury Management*) and implementation of *AMM1–AMM7*, *AMM22 Suisun Song Sparrow*, *Yellow-Breasted Chat*, *Least Bell’s Vireo*, *Western Yellow-Billed Cuckoo*, and mitigation to minimize potential effects, impacts on Suisun song sparrow and saltmarsh common yellowthroat would not be adverse for NEPA purposes and would be less than significant for CEQA purposes.

**Table 12-9-34. Changes in Suisun Song Sparrow Saltmarsh Common Yellowthroat Modeled Habitat Associated with Alternative 9 (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	Primary	0	0	0	0	NA	NA
	Secondary	0	0	0	0	NA	NA
<b>Total Impacts CM1</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>NA</b>	<b>NA</b>
CM2–CM18	Primary	54	55	0	0	0	0
	Secondary	1,098	3,633	0	0	0	0
<b>Total Impacts CM2–CM18</b>		<b>1,152</b>	<b>3,633</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>TOTAL IMPACTS</b>		<b>1,152</b>	<b>3,688</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

<sup>a</sup> See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only.

NT = near-term

LLT = late long-term

NA = not applicable

**Impact BIO-80: Loss or Conversion of Habitat for and Direct Mortality of Suisun Song Sparrow and Saltmarsh Common Yellowthroat**

Alternative 9 conservation measures would result in would result in the permanent loss of up to 3,688 acres of Suisun song sparrow and saltmarsh common yellowthroat habitat, which would include the conversion of 55 acres of primary habitat to secondary low marsh, and the conversion of 123 acres of secondary habitat to middle or high marsh (Table 12-9-34). The only conservation measure that would affect modeled habitat for Suisun song sparrow and saltmarsh common yellowthroat is *CM4 Tidal Natural Communities Restoration*. Habitat enhancement and management activities (CM11), which include ground disturbance or removal of nonnative vegetation, could also result in local adverse habitat effects. Each of these individual activities is described below. A

1 summary statement of the combined impacts and NEPA effects and a CEQA conclusion follows the  
2 individual conservation measure discussions.

- 3 • *CM4 Tidal Natural Communities Restoration*: Site preparation and inundation would  
4 permanently remove approximately 3,510 acres of modeled secondary Suisun song sparrow and  
5 saltmarsh common yellowthroat habitat from CZ 11 (Table 12-9-34). In addition, 55 acres of  
6 primary habitat would be converted to secondary low marsh, and 123 acres of secondary  
7 habitat would be converted to middle or high marsh. Most areas proposed for removal would be  
8 managed wetlands that serve as relatively marginal habitat for Suisun song sparrow and  
9 saltmarsh common yellowthroat, which primarily use brackish tidal wetlands. Approximately  
10 2% of primary habitat for these species would be converted to foraging habitat. Full  
11 implementation of CM4 would restore or create at least 6,000 acres of tidal brackish emergent  
12 wetland natural community in CZ 11, which would be expected to support Suisun song sparrow  
13 and saltmarsh common yellowthroat habitat. It is expected that restoring tidal wetland  
14 communities that are self-sustaining and not reliant on ongoing management actions necessary  
15 to maintain the existing managed wetland habitats would better ensure the long-term viability  
16 of these populations. Furthermore, effects of tidal habitat restoration on sparrow and  
17 yellowthroat abundance and distribution would be monitored, and the restoration of tidal  
18 habitat would be sequenced and located in a manner that minimizes effects on occupied habitats  
19 until functional habitats were restored (see BDCP Chapter 3, Section 3.4.5, *CM4 Tidal Natural*  
20 *Communities Restoration*, and Section 3.6, *Adaptive Management and Monitoring Program*).
- 21 • *CM11 Natural Communities Enhancement and Management*: Control of nonnative Suisun song  
22 sparrow and saltmarsh common yellowthroat predators, if deemed necessary, would be  
23 expected to reduce predation loss of nests and, consequently, increase and maintain the  
24 abundance of Suisun song sparrow and saltmarsh common yellowthroat in restored tidal  
25 habitats over the term of the BDCP. Habitat management- and enhancement-related activities  
26 could disturb Suisun song sparrow or saltmarsh common yellowthroat nests if they are located  
27 near work sites. The potential for these activities to have an adverse effect on Suisun song  
28 sparrow would be avoided and minimized through *AMM22 Suisun Song Sparrow, Yellow-*  
29 *Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo*. In addition, Mitigation Measure  
30 *BIO-75, Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*,  
31 would be available to address these effects on saltmarsh common yellowthroat. A variety of  
32 *CM11 Natural Communities Enhancement and Management* habitat management actions that are  
33 designed to enhance wildlife values in restored and protected tidal wetland habitats may result  
34 in localized ground disturbances that could temporarily remove small amounts of Suisun song  
35 sparrow and saltmarsh common yellowthroat habitat in CZ 11. Ground-disturbing activities,  
36 such as removal of nonnative vegetation and road and other infrastructure maintenance  
37 activities, are expected to have minor adverse effects on available species' habitat.
- 38 • *Operations and Maintenance*: Postconstruction operation and maintenance of the restoration  
39 infrastructure could result in ongoing but periodic disturbances that could affect Suisun song  
40 sparrow and saltmarsh common yellowthroat use of the surrounding habitat in Suisun.  
41 Maintenance activities could include vegetation management, and levee repair. These effects,  
42 however, would be reduced by AMMs and conservation actions as described below.
- 43 • Construction-related activities could result in nest destruction or disturbance resulting in  
44 mortality of eggs and nestlings if restoration activities took place within the nesting period for  
45 these species. *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western*

1            *Yellow-Billed Cuckoo* would minimize these potential effects on Suisun song sparrow. Mitigation  
2            Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting*  
3            *Birds*, would be available to address these effects on saltmarsh common yellowthroat. Grading,  
4            filling, contouring, and other initial ground-disturbing operations during restoration activities  
5            could temporarily fragment existing modeled tidal brackish emergent wetland habitat for  
6            Suisun song sparrow and saltmarsh common yellowthroat which could temporarily reduce the  
7            extent and functions of the affected habitat. These temporary effects would be minimized  
8            through sequencing of restoration activities and through *AMM22 Suisun Song Sparrow, Yellow-*  
9            *Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo* and Mitigation Measure BIO-75.

10           The following paragraphs summarize the combined effects discussed above and describe other  
11           BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also  
12           included.

### 13           ***Near-Term Timeframe***

14           Under Alternative 9, there would be no impacts resulting from the construction of the water  
15           conveyance facilities (CM1). However, there would be a permanent loss of 1,040 acres of modeled  
16           secondary habitat for Suisun song sparrow and saltmarsh common yellowthroat in the study area in  
17           the near-term. In addition, 54 acres of primary habitat would be converted to secondary foraging  
18           habitat, and 58 acres of secondary habitat would be converted to mid to high marsh, which would  
19           provide primary nesting habitat for these species. Although there would be a temporal lag in these  
20           conversions, there would be no net loss of primary habitat in the near-term. These effects would  
21           result from implementing *CM4 Tidal Natural Communities Restoration* and would all occur in Suisun  
22           Marsh in CZ 11.

23           The typical NEPA and CEQA project-level mitigation ratio for those natural communities that would  
24           be affected and that are identified in the biological goals and objectives for Suisun song sparrow in  
25           Chapter 3 of the BDCP would be 1:1 for restoration/creation of tidal brackish emergent habitat.  
26           Using this ratio would indicate that 1,152 acres of tidal brackish emergent wetland should be  
27           restored/created to compensate for the near-term losses of Suisun song sparrow and saltmarsh  
28           common yellowthroat habitat.

29           The BDCP has committed to near-term goals of restoring 8,850 acres of tidal brackish emergent  
30           wetland and 4,800 acres of managed wetland in the Plan Area. These conservation actions are  
31           associated with CM4 and CM3 and would occur in the same timeframe as the construction and early  
32           restoration losses, thereby avoiding adverse effects of habitat loss on Suisun song sparrow and  
33           saltmarsh common yellowthroat. The tidal brackish emergent wetland would be restored in CZ 11  
34           among the Western Suisun/Hill Slough Marsh Complex, the Suisun Slough/Cutoff Slough Marsh  
35           Complex, and the Nurse Slough/Denverton Marsh complex (Objective TBEWNC1.1, BDCP Chapter 3,  
36           *Conservation Strategy*) and would be restored in a way that creates topographic heterogeneity and  
37           in areas that increase connectivity among protected lands (Objective TBEWNC1.4). Portions of the  
38           4,800 acres of managed wetland would benefit both the Suisun song sparrow and the saltmarsh  
39           common yellowthroat through the enhancement of degraded areas to provide dense native  
40           vegetation, which is required for nesting sites, song perches, and refuge from predators. Tidal  
41           wetlands would be restored in a mosaic of large, interconnected and biologically diverse patches.  
42           Larger and more interconnected patches of suitable habitat would be expected to reduce the effects  
43           of habitat fragmentation that currently exist in Suisun marsh in CZ 11. Nonnative predators would  
44           be controlled as needed to reduce nest predation and to help maintain species abundance (CM11).

1 Restoration would be sequenced over the term of the Plan and occur in a manner that would  
2 minimize any temporary, initial loss and fragmentation of habitat. The acres of restoration and  
3 protection contained in the near-term Plan goals, and the incorporation of the additional measures  
4 in the biological goals and objectives (BDCP Chapter 3) would be sufficient to mitigate the near-term  
5 effects of tidal restoration.

6 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
7 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
8 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
9 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
10 *Material*, *AMM7 Barge Operations Plan*, and *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat,*  
11 *Least Bell's Vireo, Western Yellow-Billed Cuckoo*. All of these AMMs include elements that would  
12 avoid or minimize the risk of affecting individuals and species habitats adjacent to work areas. The  
13 AMMs are described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*. The  
14 saltmarsh common yellowthroat is not a species that is covered under the BDCP. Although  
15 preconstruction surveys for Suisun song sparrow would likely also detect nesting saltmarsh  
16 common yellowthroat, in order to avoid adverse effects on individuals, preconstruction surveys for  
17 noncovered avian species would be required to ensure that saltmarsh common yellowthroat nests  
18 are detected and avoided. Mitigation Measure BIO-75 would be available to address the adverse  
19 effect of construction activities on nesting saltmarsh common yellowthroat.

#### 20 **Late Long-Term Timeframe**

21 The habitat model indicates that the study area supports approximately 3,722 acres of primary and  
22 23,986 acres of secondary habitat for Suisun song sparrow and saltmarsh common yellowthroat.  
23 Alternative 9 as a whole would result in the permanent loss of 3,688 acres of habitat (15% of the  
24 total habitat in the study area) from the implementation of *CM4 Tidal Natural Communities*  
25 *Restoration*. Within this habitat loss, 55 acres of primary habitat would be converted to secondary  
26 foraging habitat, and 123 acres of secondary habitat would be converted to primary habitat.

27 The Plan includes a commitment through *CM4 Tidal Natural Communities Restoration* to restore or  
28 create at least 6,000 acres of tidal brackish emergent wetland in CZ 11 (Objective TBEWNC1.1)  
29 These tidal wetlands would be restored as a mosaic of large, interconnected and biologically diverse  
30 patches, and at least 1,500 acres of restored marsh would consist of middle-and high-marsh  
31 vegetation with dense, tall stands of pickleweed and bulrush cover, serving as primary habitat for  
32 Suisun song sparrow and saltmarsh common yellowthroat (Objective TBEWNC1.2). In addition,  
33 grasslands adjacent to restored tidal brackish emergent wetlands would be protected or restored, to  
34 provide at least 200 feet of adjacent grasslands beyond the sea level rise accommodation. This  
35 adjacent upland habitat would provide high tide refugia during high tide events, after sea-level rise  
36 has converted the lower-level grasslands to tidal natural communities. Tidal wetlands would be  
37 restored in a mosaic of large, interconnected and biologically diverse patches. Larger and more  
38 interconnected patches of suitable habitat would be expected to reduce the effects of habitat  
39 fragmentation that currently exist in Suisun marsh in CZ 11. Nonnative predators would be  
40 controlled as needed to reduce nest predation and to help maintain species abundance (CM11).  
41 Restoration would be sequenced over the term of the Plan and occur in a manner that would  
42 minimize any temporary, initial loss and fragmentation of habitat.

43 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*  
44 *Plant Species*) estimates that the restoration and protection actions discussed above could result in

1 the restoration of 1,500 acres of primary habitat and 4,500 acres of secondary habitat in addition to  
2 the protection of 384 acres of secondary habitat for Suisun song sparrow, which would also benefit  
3 the saltmarsh common yellowthroat.

4 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*  
5 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*  
6 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
7 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
8 *Material, AMM7 Barge Operations Plan, and AMM22 Suisun Song Sparrow, Yellow-Breasted Chat,*  
9 *Least Bell's Vireo, Western Yellow-Billed Cuckoo.* All of these AMMs include elements that would  
10 avoid or minimize the risk of affecting individuals and species habitats adjacent to work areas and  
11 storage sites. The AMMs are described in detail in BDCP Appendix 3.C, *Avoidance and Minimization*  
12 *Measures.*

13 **NEPA Effects:** The loss of Suisun song sparrow and saltmarsh common yellowthroat habitat and  
14 potential direct mortality of these special-status species under Alternative 9 would represent an  
15 adverse effect in the absence of other conservation actions. However, with habitat protection and  
16 restoration associated with CM4, with the management and enhancement actions (CM11), and with  
17 the incorporation of the additional measures in the biological goals and objectives, guided by  
18 AMM1-AMM7 and AMM22 *Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western*  
19 *Yellow-Billed Cuckoo,* which would be in place throughout the construction period, the effects of  
20 habitat loss and potential mortality on Suisun song sparrow would not be adverse, and the effects of  
21 habitat loss and conversion on saltmarsh common yellowthroat would not be adverse under  
22 Alternative 9. The saltmarsh common yellowthroat is not a species that is covered under the BDCP.  
23 Although preconstruction surveys for Suisun song sparrow would likely also detect nesting  
24 saltmarsh common yellowthroat, in order for the BDCP to avoid adverse effects on individuals,  
25 preconstruction surveys for noncovered avian species would be required to ensure that saltmarsh  
26 common yellowthroat nests are detected and avoided. Mitigation Measure BIO-75 would be  
27 available to address this effect.

28 **CEQA Conclusion:**

29 ***Near-Term Timeframe***

30 Under Alternative 9, there would be no impacts resulting from the construction of the water  
31 conveyance facilities (CM1). However, there would be a permanent loss of 1,040 acres of modeled  
32 secondary habitat for Suisun song sparrow and saltmarsh common yellowthroat in the study area in  
33 the near-term. In addition, 54 acres of primary habitat would be converted to secondary foraging  
34 habitat, and 123 acres of secondary habitat would be converted to mid to high marsh, which would  
35 provide primary nesting habitat for these species. Although there would be a temporal lag in these  
36 conversions, there would be no net loss of primary habitat in the near-term. These effects would  
37 result from implementing *CM4 Tidal Natural Communities Restoration* and would all occur in Suisun  
38 Marsh in CZ 11.

39 The typical NEPA and CEQA project-level mitigation ratio for those natural communities that would  
40 be affected and that are identified in the biological goals and objectives for Suisun song sparrow in  
41 Chapter 3 of the BDCP would be 1:1 for restoration/creation of tidal brackish emergent habitat.  
42 Using this ratio would indicate that 1,152 acres of tidal brackish emergent wetland should be

1 restored/created to mitigate the near-term losses of Suisun song sparrow and saltmarsh common  
2 yellowthroat habitat.

3 The BDCP has committed to near-term goals of restoring 8,850 acres of tidal brackish emergent  
4 wetland and 4,800 acres of managed wetland in the Plan Area. These conservation actions are  
5 associated with CM4 and CM3 and would occur in the same timeframe as the construction and early  
6 restoration losses, thereby avoiding adverse effects of habitat loss on Suisun song sparrow and  
7 saltmarsh common yellowthroat. The tidal brackish emergent wetland would be restored in CZ 11  
8 among the Western Suisun/Hill Slough Marsh Complex, the Suisun Slough/Cutoff Slough Marsh  
9 Complex, and the Nurse Slough/Denverton Marsh complex (Objective TBEWNC1.1, BDCP Chapter 3,  
10 *Conservation Strategy*) and would be restored in a way that creates topographic heterogeneity and  
11 in areas that increase connectivity among protected lands (Objective TBEWNC1.4). Portions of the  
12 4,800 acres of managed wetland would benefit both the Suisun song sparrow and the saltmarsh  
13 common yellowthroat through the enhancement of degraded areas to provide dense native  
14 vegetation, which is required for nesting sites, song perches, and refuge from predators. Tidal  
15 wetlands would be restored in a mosaic of large, interconnected and biologically diverse patches.  
16 Larger and more interconnected patches of suitable habitat would be expected to reduce the effects  
17 of habitat fragmentation that currently exist in Suisun marsh in CZ 11. Nonnative predators would  
18 be controlled as needed to reduce nest predation and to help maintain species abundance (CM11).  
19 Restoration would be sequenced over the term of the Plan and occur in a manner that would  
20 minimize any temporary, initial loss and fragmentation of habitat. The acres of restoration and  
21 protection contained in the near-term Plan goals, and the incorporation of the additional measures  
22 in the biological goals and objectives (BDCP Chapter 3) would be sufficient to mitigate the near-term  
23 effects of tidal restoration.

24 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
25 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
26 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
27 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
28 *Material*, *AMM7 Barge Operations Plan*, and *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat,*  
29 *Least Bell's Vireo, Western Yellow-Billed Cuckoo*. All of these AMMs include elements that would  
30 avoid or minimize the risk of affecting individuals and species habitats adjacent to work areas. The  
31 AMMs are described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*. The  
32 saltmarsh common yellowthroat is not a species that is covered under the BDCP. Although  
33 preconstruction surveys for Suisun song sparrow would likely also detect nesting saltmarsh  
34 common yellowthroat, in order to avoid adverse effects on individuals, preconstruction surveys for  
35 noncovered avian species would be required to ensure that saltmarsh common yellowthroat nests  
36 are detected and avoided. Implementation of Mitigation Measure BIO-75 would reduce the impact of  
37 construction activities on nesting saltmarsh common yellowthroat to a less-than-significant level.

38 Because the number of acres required to meet the typical mitigation ratio described above would be  
39 only 3,590 acres of restored/created tidal natural communities, the 6,000 acres of tidal brackish and  
40 tidal freshwater emergent wetland restoration and the 4,100 acres of managed wetland protection  
41 and enhancement contained in the near-term Plan goals, and the additional detail in the biological  
42 objectives for Suisun song sparrow, are more than sufficient to support the conclusion that the near-  
43 term impacts of habitat loss and direct mortality of Suisun song sparrow or saltmarsh common  
44 yellowthroat under Alternative 9 would be less than significant under CEQA.

1 **Late Long-Term Timeframe**

2 The habitat model indicates that the study area supports approximately 3,722 acres of primary and  
3 23,986 acres of secondary habitat for Suisun song sparrow and saltmarsh common yellowthroat.  
4 Alternative 9 as a whole would result in the permanent loss of 3,688 acres of habitat (15% of the  
5 total habitat in the study area) from the implementation of *CM4 Tidal Natural Communities*  
6 *Restoration*. Within this habitat loss, 55 acres of primary habitat would be converted to secondary  
7 foraging habitat, and 123 acres of secondary habitat would be converted to primary habitat.

8 The Plan includes a commitment through *CM4 Tidal Natural Communities Restoration* to restore or  
9 create at least 6,000 acres of tidal brackish emergent wetland in CZ 11 (Objective TBEWNC1.1)  
10 These tidal wetlands would be restored as a mosaic of large, interconnected and biologically diverse  
11 patches, and at least 1,500 acres of restored marsh would consist of middle-and high-marsh  
12 vegetation with dense, tall stands of pickleweed and bulrush cover, serving as primary habitat for  
13 Suisun song sparrow and saltmarsh common yellowthroat (Objective TBEWNC1.2). In addition,  
14 grasslands adjacent to restored tidal brackish emergent wetlands would be protected or restored, to  
15 provide at least 200 feet of adjacent grasslands beyond the sea level rise accommodation. This  
16 adjacent upland habitat would provide high tide refugia during high tide events, after sea-level rise  
17 has converted the lower-level grasslands to tidal natural communities. Tidal wetlands would be  
18 restored in a mosaic of large, interconnected and biologically diverse patches. Larger and more  
19 interconnected patches of suitable habitat would be expected to reduce the effects of habitat  
20 fragmentation that currently exist in Suisun marsh in CZ 11. Nonnative predators would be  
21 controlled as needed to reduce nest predation and to help maintain species abundance (CM11).  
22 Restoration would be sequenced over the term of the Plan and occur in a manner that would  
23 minimize any temporary, initial loss and fragmentation of habitat.

24 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*  
25 *Plant Species*) estimates that the restoration and protection actions discussed above could result in  
26 the restoration of 1,500 acres of primary habitat and 4,500 acres of secondary habitat in addition to  
27 the protection of 384 acres of secondary habitat for Suisun song sparrow, which would also benefit  
28 the saltmarsh common yellowthroat.

29 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
30 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
31 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
32 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
33 *Material*, *AMM7 Barge Operations Plan*, and *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat,*  
34 *Least Bell's Vireo, Western Yellow-Billed Cuckoo*. All of these AMMs include elements that would  
35 avoid or minimize the risk of affecting individuals and species habitats adjacent to work areas and  
36 storage sites. The AMMs are described in detail in BDCP Appendix 3.C, *Avoidance and Minimization*  
37 *Measures*. The saltmarsh common yellowthroat is not a covered species under the BDCP. Although  
38 preconstruction surveys for Suisun song sparrow may detect nesting saltmarsh common  
39 yellowthroat, in order for the BDCP to have a less-than-significant impact on individuals,  
40 preconstruction surveys for noncovered avian species would be required to ensure that saltmarsh  
41 common yellowthroat nests are detected and avoided. Implementation of Mitigation Measure BIO-  
42 75 would reduce this potential impact on nesting saltmarsh common yellowthroat to a less-than-  
43 significant level.

1 Considering Alternative 9's restoration provisions, which would replace low-value secondary  
2 habitat with high-value tidal brackish emergent habitat, including both foraging and primary  
3 habitat, and provide upland refugia for Suisun song sparrow and saltmarsh common yellowthroat,  
4 the acreages of restoration would be sufficient to mitigate habitats lost to construction and  
5 restoration activities. Loss of habitat or direct mortality through implementation of Alternative 9,  
6 with the implementation of AMM1-AMM7, AMM22, and Mitigation Measure BIO-75, AMM1-AMM7  
7 *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would not  
8 result in a substantial adverse effect through habitat modifications and would not substantially  
9 reduce the number or restrict the range of the species. Therefore, the loss of habitat or potential  
10 mortality under this alternative would have a less-than-significant impact on Suisun song sparrow  
11 and saltmarsh common yellowthroat.

12 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**  
13 **Disturbance of Nesting Birds**

14 See Mitigation Measure BIO-75 under Impact BIO-75.

15 **Impact BIO-81: Indirect Effects of Plan Implementation on Suisun Song Sparrow and**  
16 **Saltmarsh Common Yellowthroat**

17 **Indirect construction-related effects:** If Suisun song sparrow or saltmarsh common yellowthroat  
18 were to nest in or adjacent to work areas, construction and subsequent maintenance-related noise  
19 and visual disturbances could mask calls, disrupt foraging and nesting behaviors, and reduce the  
20 functions of suitable nesting habitat for these species. Suisun song sparrow and saltmarsh common  
21 yellowthroat habitat adjacent to restoration work areas could be affected by such disturbances,  
22 which could temporarily result in diminished use of habitat. Construction noise above background  
23 noise levels (greater than 50 dBA) could extend 1,900 to 5,250 feet from the edge of construction  
24 activities (BDCP Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of the BDCP*  
25 *Conveyance Facility on Sandhill Crane*, Table 4), although there are no available data to determine  
26 the extent to which these noise levels could affect either species. If construction occurred during the  
27 nesting season, these indirect effects could result in the loss or abandonment of nests and mortality  
28 of any eggs and/or nestlings. AMM22 *Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo,*  
29 *Western Yellow-Billed Cuckoo* and Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird*  
30 *Surveys and Avoid Disturbance of Nesting Birds*, would avoid the potential for adverse effects of  
31 construction-related activities on survival and productivity of Suisun song sparrow and saltmarsh  
32 common yellowthroat by requiring preconstruction surveys and, if nests are present, the  
33 establishment of a no-disturbance buffer within 250 feet of a nest site. The use of mechanical  
34 equipment during water conveyance facilities construction could cause the accidental release of  
35 petroleum or other contaminants that could affect species in the surrounding habitat. The  
36 inadvertent discharge of sediment or excessive dust adjacent to suitable habitat could also have an  
37 adverse effect on Suisun song sparrow and saltmarsh common yellowthroat. AMM2 *Construction*  
38 *Best Management Practices and Monitoring* would minimize the likelihood of such spills and ensure  
39 that measures are in place to prevent runoff from the construction area and any adverse effects of  
40 dust on active nests.

41 **Salinity:** Water conveyance facilities operations would have an effect on salinity gradients in Suisun  
42 Marsh; however, these effects cannot be reasonably disaggregated from effects resulting from tidal  
43 habitat restoration. It is expected that the salinity of water in Suisun Marsh would generally increase

1 as a result of water conveyance facilities operations and operations of salinity control gates to mimic  
2 a more natural water flow. This would likely encourage the establishment of tidal wetland plant  
3 communities tolerant of more saline environments, which should have a beneficial effect on Suisun  
4 song sparrow and saltmarsh common yellowthroat because their historical natural Suisun Marsh  
5 habitat is brackish tidal marsh. However, the degree to which salinity changes in all tidal channels  
6 and sloughs in and around Suisun Marsh would be highly variable.

7 **Methylmercury Exposure:** Marsh (tidal and nontidal) and floodplain restoration have the potential  
8 to increase exposure to methylmercury. Mercury is transformed into the more bioavailable form of  
9 methylmercury in aquatic systems, especially areas subjected to regular wetting and drying such as  
10 tidal marshes and flood plains (Alpers et al. 2008). Thus, BDCP restoration activities that create  
11 newly inundated areas could increase bioavailability of mercury (see BDCP Chapter 3, *Conservation*  
12 *Strategy*, for details of restoration). Although tidal habitat restoration might increase methylation of  
13 mercury export to other habitats, restoration is unlikely to significantly increase the exposure of  
14 Suisun song sparrow or saltmarsh common yellowthroat to methylmercury, as they currently reside  
15 in tidal marshes where elevated methylmercury levels exist. Robinson et al. (2011) found toxic  
16 levels of methylmercury levels in song sparrow populations from southern San Francisco Bay,  
17 although populations near Suisun Marsh (i.e., San Pablo and Simas Creeks) were much lower. The  
18 potential mobilization or creation of methylmercury within the study area varies with site-specific  
19 conditions and would need to be assessed at the project level. The Suisun Marsh Plan anticipates  
20 that restored tidal wetlands would generate less methylmercury than the existing managed  
21 wetlands to be restored (Bureau of Reclamation et al. 2010). *CM12 Methylmercury Management*  
22 includes provisions for project-specific Mercury Management Plans. Along with avoidance and  
23 minimization measures and adaptive management and monitoring, CM12 would be available to  
24 address the uncertainty of methylmercury levels resulting from restored tidal marsh in the study  
25 area.

26 **NEPA Effects:** Noise and visual disturbances would not have an adverse effect on Suisun song  
27 sparrow with the implementation of *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's*  
28 *Vireo, Western Yellow-Billed Cuckoo*. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting*  
29 *Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to address adverse effects of  
30 noise and visual disturbance on saltmarsh common yellowthroat. AMM1-AMM7, including *AMM2*  
31 *Construction Best Management Practices and Monitoring*, would minimize the likelihood of spills, and  
32 ensure that measures were in place to prevent runoff from the construction area and to avoid  
33 negative effects of dust on the species. Implementation of Operational Scenario A, including  
34 operation of salinity-control gates, and tidal habitat restoration would be expected to increase water  
35 salinity in Suisun Marsh, which would be expected to establish tidal marsh similar to historic  
36 conditions. Tidal habitat restoration is unlikely to have a substantial impact on Suisun song sparrow  
37 and saltmarsh common yellowthroat through increased exposure to methylmercury, as these  
38 species currently reside in tidal marshes where elevated methylmercury levels exist. However, it is  
39 unknown what concentrations of methylmercury are harmful to the species and the potential for  
40 increased exposure varies substantially within the study area. Site-specific restoration plans in  
41 addition to monitoring and adaptive management, described in *CM12 Methylmercury Management*,  
42 would address the uncertainty of methylmercury levels in restored tidal marsh. The site-specific  
43 planning phase of marsh restoration would be the appropriate place to assess the potential for risk  
44 of methylmercury exposure for these species, once site specific sampling and other information  
45 could be developed.

1 **CEQA Conclusion:** Impacts of noise, the potential for hazardous spills, increased dust and  
2 sedimentation, and operations and maintenance of the water conveyance facilities would be less  
3 than significant with the implementation of *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat,*  
4 *Least Bell's Vireo, Western Yellow-Billed Cuckoo,* Mitigation Measure BIO-75, *Conduct Preconstruction*  
5 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds,* and *AMM2 Construction Best*  
6 *Management Practices and Monitoring.* Changes in salinity gradients would be expected to have a  
7 beneficial impact on Suisun song sparrow and saltmarsh common yellowthroat through the  
8 establishment of tidal marsh similar to historic conditions. The implementation of tidal natural  
9 communities restoration (CM4) is unlikely to significantly increase the exposure of Suisun song  
10 sparrow or saltmarsh common yellowthroat to methylmercury, as they currently reside in tidal  
11 marshes where elevated methylmercury levels exist. However, it is unknown what concentrations of  
12 methylmercury are harmful to these species. Sites-specific restoration plans that address the  
13 creation and mobilization of mercury, as well as monitoring and adaptive management as described  
14 in *CM12 Methylmercury Management,* would better inform potential impacts and address the  
15 uncertainty of methylmercury levels in restored tidal marsh in the study area. With these additional  
16 avoidance and minimization measures and Mitigation Measure BIO-75, indirect effects of Alternative  
17 9 implementation would have a less-than-significant impact on Suisun song sparrow and saltmarsh  
18 common yellowthroat.

19 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**  
20 **Disturbance of Nesting Birds**

21 See Mitigation Measure BIO-75 under Impact BIO-75.

22 **Impact BIO-82: Effects on Suisun Song Sparrow and Saltmarsh Common Yellowthroat**  
23 **Associated with Electrical Transmission Facilities**

24 The range of the Suisun song sparrow extends eastward into the Plan Area to approximately Kimball  
25 Island. There are several reported occurrences from Kimball Island, Browns Island, and in the  
26 Suisun Marsh in the western portion of the Plan Area. The easternmost range of the saltmarsh  
27 common yellowthroat also ends in Suisun Marsh. These species ranges, along with areas of suitable  
28 habitat, are far from the proposed transmission line routes (BDCP Appendix 5.J, Attachment 5J.C,  
29 *Analysis of Potential Bird Collisions at Proposed BDCP Transmission Lines*). Location of the current  
30 populations, species ranges, and suitable habitat in the plan area make collision with the proposed  
31 transmission lines highly unlikely. Therefore the construction and presence of new transmission  
32 lines would not have an adverse effect on Suisun song sparrow and saltmarsh common  
33 yellowthroat.

34 **NEPA Effects:** The construction and presence of new transmission lines would not have an adverse  
35 effect on Suisun song sparrow and saltmarsh common yellowthroat because the location of the  
36 current populations, species ranges, and suitable habitat for the species make collision with the  
37 proposed transmission lines highly unlikely.

38 **CEQA Conclusion:** The construction and presence of new transmission lines would have a less-than-  
39 significant impact on Suisun song sparrow and saltmarsh common yellowthroat because the  
40 location of the current populations, species ranges, and suitable habitat for the species make  
41 collision with the proposed transmission lines highly unlikely.

1 **Swainson's Hawk**

2 The habitat model used to assess impacts on Swainson's hawk includes plant alliances and land  
3 cover types associated with Swainson's hawk nesting and foraging habitat. Construction and  
4 restoration associated with Alternative 9 conservation measures would result in both temporary  
5 and permanent losses of Swainson's hawk modeled habitat as indicated in Table 12-9-35. The  
6 majority of the losses would take place over an extended period of time as tidal marsh is restored in  
7 the study area. Although protection and restoration for the loss of nesting and foraging habitat  
8 would be initiated in the same timeframe as the losses, it would take years (for foraging habitat) and  
9 1 or more decades (for nesting habitat) for restored habitats to replace the functions of habitat lost.  
10 This time lag between impacts and restoration of habitat function would be minimized through  
11 specific requirements of *AMM18 Swainson's Hawk and White-Tailed Kite*, including transplanting  
12 mature trees in the near-term time period. Full implementation of Alternative 9 would also include  
13 the following conservation actions over the term of the BDCP to benefit the Swainson's hawk (BDCP  
14 Chapter 3, Section 3.3, *Biological Goals and Objectives*).

- 15 ● Restore or create at least 5,000 acres of valley/foothill riparian natural community, with at least  
16 3,000 acres occurring on restored seasonally inundated floodplain (Objective VFRNC1.1,  
17 associated with CM7)
- 18 ● Protect at least 750 acres of existing valley/foothill riparian natural community in CZ 7 by year  
19 10 (Objective VFRNC1.2, associated with CM3).
- 20 ● Plant and maintain native trees along roadsides and field borders within protected cultivated  
21 lands at a rate of one tree per 10 acres (Objective SH2.1, associated with CM11).
- 22 ● Establish 20- to 30- foot-wide hedgerows along fields and roadsides to promote prey  
23 populations throughout protected cultivated lands (Objective SH2.2, associated with CM3).
- 24 ● Increase prey abundance and accessibility for grassland-foraging species (Objectives ASWNC2.4,  
25 VPNC2.5, and GNC2.4, associated with CM11).
- 26 ● Conserve at least 1 acre of Swainson's hawk foraging habitat for each acre of lost foraging  
27 habitat (Objective SH1.1, associated with CM3).
- 28 ● Protect at least 42,275 acres of cultivated lands as Swainson's hawk foraging habitat with at  
29 least 50% in very high-value habitat in CZs 2, 3, 4, 5, 7, 8, 9, and 11 (Objective SH1.2, associated  
30 with CM3).
- 31 ● Of the 42,275 acres of cultivated lands protected as Swainson's hawk foraging habitat under  
32 Objective SH1.2, up to 1,500 acres can occur in CZs 5 and 6, and must have land surface  
33 elevations greater than -1 foot NAVD88 (Objective SH1.3, associated with CM3).
- 34 ● Protect at least 10,750 acres of grassland, vernal pool, and alkali seasonal wetland as Swainson's  
35 hawk foraging habitat (Objective SH1.4, associated with CM3).
- 36 ● Protect and enhance at least 8,100 acres of managed wetland, at least 1,500 acres of which are  
37 in the Grizzly Island Marsh Complex (Objective MWNC1.1, associated with CM3).
- 38 ● Maintain and protect the small patches of important wildlife habitats associated with cultivated  
39 lands within the reserve system, including isolated valley oak trees, trees and shrubs along field  
40 borders and roadsides, remnant groves, riparian corridors, water conveyance channels,  
41 grasslands, ponds, and wetlands (Objective CLNC1.3, associated with CM3).

1 As explained below, with the restoration or protection of these amounts of habitat, in addition to  
 2 management activities that would enhance habitat for the species and implementation of AMM1–  
 3 AMM7, and AMM18 Swainson’s Hawk and White-Tailed Kite to minimize potential effects, impacts on  
 4 Swainson’s hawk would not be adverse for NEPA purposes and would be less than significant for  
 5 CEQA purposes.

6 **Table 12-9-35. Changes in Swainson’s Hawk Modeled Habitat Associated with Alternative 9**  
 7 **(acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	Nesting	32	32	29	29	NA	NA
	Foraging	373	373	2,534	2,534	NA	NA
<b>Total Impacts CM1</b>		<b>405</b>	<b>405</b>	<b>2,563</b>	<b>2,563</b>	<b>NA</b>	<b>NA</b>
CM2–CM18	Nesting	252	412	54	85	41–70	189
	Foraging	8,903	48,511	504	1,540	3,025–6,635	8,008
<b>Total Impacts CM2–CM18</b>		<b>9,155</b>	<b>48,923</b>	<b>558</b>	<b>1,625</b>	<b>3,066–6,705</b>	<b>8,197</b>
<b>Total Nesting</b>		<b>284</b>	<b>444</b>	<b>83</b>	<b>114</b>	41–70	189
<b>Total Foraging</b>		<b>9,276</b>	<b>48,884</b>	<b>3,038</b>	<b>4,074</b>	3,025–6,635	8,008
<b>TOTAL IMPACTS</b>		<b>9,560</b>	<b>49,328</b>	<b>3,121</b>	<b>4,188</b>	<b>3,066–6,705</b>	<b>8,197</b>

<sup>a</sup> See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

8

9 **Impact BIO-83: Loss or Conversion of Habitat for and Direct Mortality of Swainson’s Hawk**

10 Alternative 9 conservation measures would result in the combined permanent and temporary loss  
 11 of up to 53,516 modeled habitat (558 acres of nesting habitat and 52,958 acres of foraging habitat)  
 12 for Swainson’s hawk (Table 12-9-35). Conservation measures that would result in these losses are  
 13 conveyance facilities and transmission line construction, and establishment and use of borrow and  
 14 spoil areas (CM1), Yolo Bypass fisheries improvements (CM2), tidal habitat restoration (CM4),  
 15 floodplain restoration (CM5), riparian restoration, (CM7), grassland restoration (CM8), vernal pool  
 16 and wetland restoration (CM9), nontidal marsh restoration (CM10), and construction of  
 17 conservation hatcheries (CM18). Habitat enhancement and management activities (CM11), which  
 18 include ground disturbance or removal of nonnative vegetation, could result in local habitat effects.  
 19 In addition, maintenance activities associated with the long-term operation of the water conveyance  
 20 facilities and other BDCP physical facilities could affect Swainson’s hawk modeled habitat. Each of

1 these individual activities is described below. A summary statement of the combined impacts and  
2 NEPA effects, and a CEQA conclusion follow the individual conservation measure discussions.

- 3 • **CM1 Water Conveyance Facilities and Operation:** Construction of Alternative 9 water  
4 conveyance facilities would result in the combined permanent and temporary loss of up to 61  
5 acres of Swainson’s hawk nesting habitat (32 acres of permanent loss and 29 acres of temporary  
6 loss). In addition, 2,907 acres of foraging habitat would be removed (373 acres of permanent  
7 loss, 2,534 acres of temporary loss, Table 12-9-35). Activities that would impact modeled  
8 Swainson’s hawk habitat include channel dredging, intakes, fish barriers, access roads, and  
9 construction of transmission lines. Permanent losses of nesting habitat would primarily consist  
10 of channel enlargement at the Sacramento River and Meadows Slough. Temporary losses would  
11 occur primarily along Middle River between Victoria Canal and Mildred Island, where large  
12 dredging work areas and operable barrier work areas would be placed. The riparian habitat in  
13 these areas is composed of very small patches or stringers bordering waterways, which include  
14 valley oak and scrub vegetation. Permanent impacts on foraging habitat would occur from the  
15 construction of the canals in CZ 8 east and south of Clifton Court Forebay and other conveyance  
16 structures in CZ 4, 5, 6, 7, and 8. Temporary impacts would primarily occur from borrow and  
17 spoil areas and temporary work areas. Impacts on foraging habitat would include the  
18 permanent loss of 1 acres and the temporary loss of 727 acres of very high-value alfalfa (Table  
19 12-9-36). The CM1 permanent construction footprint overlaps with 3 Swainson’s hawk  
20 occurrences. Canal construction overlaps with two occurrences and channel dredging, instream  
21 island dredging, and a potential spoil area overlap with one occurrence. Thirteen Swainson’s  
22 hawk occurrences overlap with the temporary construction footprint for CM1. These impacts  
23 would consist of potential borrow and spoil areas (3 occurrences), access road work areas (8  
24 occurrences), and work areas for dredging, a barge facility, and a siphon (one occurrence).  
25 *AMM18 Swainson’s Hawk and White-Tailed Kite* would require preconstruction surveys and the  
26 establishment of a no-disturbance buffer and minimize potential effects of construction on  
27 nesting Swainson’s hawks. Refer to the Terrestrial Biology Map Book for a detailed view of  
28 Alternative 9 construction locations.

29 **Table 12-9-36. Acres of Impacted Swainson’s Hawk Foraging Habitat by Value Classes**

Foraging Habitat Value Class	Cultivated Land and Other Land Cover Types	CM1 Permanent (temporary)	CM2-18 permanent (temporary)
Very high	Alfalfa hay	114 (727)	12,002 (345)
Moderate	Irrigated pasture, other hay crops	227 (591)	24,865 (642)
Low	Other irrigated field and truck/berry crops	7 (549)	5,911 (313)
Very low	Safflower, sunflower, corn, grain sorghum	25 (667)	5,732 (241)

- 30  
31 • **CM2 Yolo Bypass Fisheries Enhancement:** Construction of the Yolo bypass fisheries enhancement  
32 would result in the combined permanent and temporary loss of up to 133 acres of nesting  
33 habitat (79 acres of permanent loss, 54 acres of temporary loss) in the Yolo Bypass in CZ 2. In  
34 addition, 1,500 acres of foraging habitat would be removed (996 acres of permanent loss, 554  
35 acres of temporary loss). Activities through CM2 could involve excavation and grading in

1 valley/foothill riparian areas to improve passage of fish through the bypasses. Most of the  
2 riparian losses would occur at the north end of Yolo Bypass where major fish passage  
3 improvements are planned. Excavation to improve water movement in the Toe Drain and in the  
4 Sacramento Weir would also remove Swainson's hawk habitat. The loss is expected to occur  
5 during the first 10 years of Alternative 9 implementation.

- 6 • *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and  
7 inundation would permanently remove an estimated 295 acres of Swainson's hawk nesting  
8 habitat and 37,359 acres of foraging habitat. The majority of the acres lost would consist of  
9 cultivated lands in CZs 1, 2, 4, 5, 6, and/or 7. Grassland losses would likely occur in the vicinity  
10 of Cache Slough, on Decker Island in the West Delta ROA, on the upslope fringes of Suisun Marsh,  
11 and along narrow bands adjacent to waterways in the South Delta ROA. Tidal restoration would  
12 directly impact and fragment grassland just north of Rio Vista in and around French and  
13 Prospect Islands, and in an area south of Rio Vista around Threemile Slough. Losses of alkali  
14 seasonal wetland complex habitat would likely occur in the south end of the Yolo Bypass and on  
15 the northern fringes of Suisun Marsh. Impacts on foraging habitat from CM4 would consist of  
16 10,757 acres of very high-value (alfalfa), 18,565 acres of moderate-value, and 4,098 acres of  
17 low-value habitat (See Table 12-9-36 for land cover types classified by habitat value). Because  
18 the species is highly mobile and wide-ranging, habitat fragmentation is not expected to reduce  
19 the use of remaining cultivated lands or preclude access to surrounding lands. However, the  
20 conversion of cultivated lands to tidal wetlands over fairly broad areas within the tidal  
21 restoration footprints could result in the removal or abandonment of nesting territories that  
22 occur within or adjacent to the restoration areas. Trees would not be actively removed but tree  
23 mortality would be expected over time as areas became tidally inundated. Depending on the  
24 extent and value of remaining habitat, this could reduce the local nesting population. There are  
25 at least 27 Swainson's hawk nest sites that overlap with the hypothetical restoration areas for  
26 CM4, suggesting that numerous nest sites could be directly affected by inundation from tidal  
27 restoration activities.
- 28 • *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore  
29 seasonally inundated floodplain and riparian restoration actions would remove approximately  
30 69 acres of Swainson's hawk nesting habitat (38 acres of permanent loss, 31 acres of temporary  
31 loss) and 2,856 acres of foraging habitat (1,820 acres of permanent loss, 1,036 acres of  
32 temporary loss). These losses would be expected after the first 10 years of Alternative 9  
33 implementation along the San Joaquin River and other major waterways in CZ 7.
- 34 • *CM7 Riparian Natural Community Restoration*: Riparian restoration would permanently remove  
35 approximately 953 acres of Swainson's hawk foraging habitat as part of tidal restoration and  
36 3,991 acres as part of seasonal floodplain restoration through CM7. There are at least 27  
37 Swainson's hawk nest sites that overlap with the hypothetical restoration areas for CM7.
- 38 • *CM8 Grassland Natural Community Restoration*: Restoration of grassland is expected to be  
39 implemented on agricultural lands and would result in the conversion of 1,849 acres of  
40 Swainson's hawk agricultural foraging habitat to grassland foraging habitat in CZs 1, 2, 4, 5, 7, 8,  
41 and 11. If agricultural lands supporting higher value foraging habitat than the restored  
42 grassland were removed, there would be a loss of Swainson's hawk foraging habitat value.
- 43 • *CM10 Nontidal Marsh Restoration*: Restoration and creation of nontidal freshwater marsh would  
44 result in the permanent removal of 1,440 acres of Swainson's hawk foraging habitat in CZ 2 and

1 CZ 4. Small patches of riparian vegetation that support Swainson's hawk nesting habitat may  
2 develop along the margins of restored nontidal marsh if appropriate site conditions are present.

- 3 ● *CM11 Natural Communities Enhancement and Management*: Habitat management- and  
4 enhancement-related activities could disturb Swainson's hawk nests if they were present near  
5 work sites. A variety of habitat management actions that are designed to enhance wildlife values  
6 in BDCP-protected habitats may result in localized ground disturbances that could temporarily  
7 remove small amounts of Swainson's hawk habitat and reduce the functions of habitat until  
8 restoration is complete. Ground-disturbing activities, such as removal of nonnative vegetation  
9 and road and other infrastructure maintenance, are expected to have minor effects on available  
10 Swainson's hawk habitat and are expected to result in overall improvements to and  
11 maintenance of habitat values over the term of the BDCP. These effects cannot be quantified, but  
12 are expected to be minimal and would be avoided and minimized by the AMMs listed below.  
13 CM11 would also include the construction of recreational-related facilities including trails,  
14 interpretive signs, and picnic tables (BDCP Chapter 4, *Covered Activities and Associated Federal*  
15 *Actions*). The construction of trailhead facilities, signs, staging areas, picnic areas, bathrooms,  
16 etc. would be placed on existing, disturbed areas when and where possible. However,  
17 approximately 50 acres of Swainson's hawk grassland foraging habitat would be lost from the  
18 construction of trails and facilities.

- 19 ● *CM18 Conservation Hatcheries*: Implementation of CM18 would remove up to 35 acres of  
20 Swainson's hawk foraging habitat for the development of a delta and longfin smelt conservation  
21 hatchery in CZ 1. The loss is expected to occur during the first 10 years of Plan implementation.

22 Permanent and temporary nesting habitat losses from the above conservation measures, would  
23 primarily consist of small, fragmented riparian stands. Temporarily affected nesting habitat  
24 would be restored as riparian habitat within 1 year following completion of construction  
25 activities. The restored riparian habitat would require 1 to several decades to functionally  
26 replace habitat that has been affected and for trees to attain sufficient size and structure suitable  
27 for nesting by Swainson's hawks. *AMM18 Swainson's Hawk and White-Tailed Kite* contains  
28 actions described below to reduce the effect of temporal loss of nesting habitat, including the  
29 transplanting of mature trees and planting of trees near high-value foraging habitat. The  
30 functions of cultivated lands and grassland communities that provide foraging habitat for  
31 Swainson's hawk are expected to be restored relatively quickly.

- 32 ● *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground  
33 water conveyance facilities and restoration infrastructure could result in ongoing but periodic  
34 disturbances that could affect Swainson's hawk use of the surrounding habitat. Maintenance  
35 activities would include vegetation management, levee and structure repair, and re-grading of  
36 roads and permanent work areas. These effects, however, would be reduced by AMM1-AMM7  
37 and *AMM18 Swainson's Hawk and White-Tailed Kite* in addition to conservation actions as  
38 described below.

- 39 ● *Injury and Direct Mortality*: Construction-related activities would not be expected to result in  
40 direct mortality of adult or fledged Swainson's hawk if they were present in the study area,  
41 because they would be expected to avoid contact with construction and other equipment.  
42 However, if Swainson's hawk were to nest in the construction area, construction-related  
43 activities, including equipment operation, noise and visual disturbances could affect nests or  
44 lead to their abandonment, potentially resulting in mortality of eggs and nestlings. These effects

1 would be avoided and minimized with the incorporation of *AMM18 Swainson's Hawk and White-*  
2 *Tailed Kite* into the BDCP.

3 The following paragraphs summarize the combined effects discussed above and describe other  
4 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also  
5 included.

### 6 ***Near-Term Timeframe***

7 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
8 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
9 provide sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that  
10 the effect of construction would not be adverse under NEPA. Alternative 9 would remove 367 acres  
11 (284 permanent, 83 temporary) of Swainson's hawk nesting habitat in the study area in the near-  
12 term. These effects would result from the construction of the water conveyance facilities (CM1, 61  
13 acres), and implementing other conservation measures (*CM2 Yolo Bypass Fisheries Enhancement*,  
14 *CM4 Tidal Natural Communities Restoration*, *CM5 Seasonally Inundated Floodplain Restoration*, and  
15 *CM7 Riparian Natural Community Restoration*—306 acres). In addition, 12,314 acres of Swainson's  
16 hawk foraging habitat would be removed or converted in the near-term (CM1, 2,907 acres; *CM2 Yolo*  
17 *Bypass Fisheries Enhancement*, *CM4 Tidal Natural Communities Restoration*, *CM5 Seasonally*  
18 *Inundated Floodplain Restoration*, *CM7 Riparian Natural Community Restoration*, *CM8 Grassland*  
19 *Natural Community Restoration*, *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*,  
20 *CM11 Natural Communities Enhancement and Management* and *CM18 Conservation Hatcheries*—  
21 9,407 acres).

22 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected and  
23 those that are identified in the biological goals and objectives for Swainson's hawk in Chapter 3 of  
24 the BDCP would be 1:1 for restoration/creation and 1:1 protection of valley/foothill riparian habitat  
25 for nesting habitat, and 1:1 protection for foraging habitat. Using these ratios would indicate that 61  
26 acres of nesting habitat should be restored/ created and 61 acres should be protected to  
27 compensate for the CM1 losses of Swainson's hawk nesting habitat. In addition, 2,907 acres of  
28 foraging habitat should be protected to mitigate the CM1 losses of Swainson's hawk foraging habitat.  
29 The near-term effects of other conservation actions would remove 306 acres of modeled nesting  
30 habitat, and therefore require 306 acres of restoration and 306 acres of protection of nesting  
31 habitat. Similarly, the near-term effects of other conservation actions would remove 9,407 acres of  
32 modeled foraging habitat, and therefore require 9,407 acres of protection of foraging habitat using  
33 the same typical NEPA and CEQA ratios (1:1 restoration and 1:1 protection for the loss of nesting  
34 habitat; 1:1 protection for the loss of foraging habitat).

35 The BDCP has committed to near-term goals of protecting 750 acres and restoring 800 acres of  
36 valley/foothill riparian natural community, protecting 2,000 acres and restoring 1,140 acres of  
37 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of  
38 alkali seasonal wetland complex, protecting 4,800 acres of managed wetland natural community,  
39 and protecting 15,400 acres of non-rice cultivated lands (Table 3-4 in Chapter 3, *Description of*  
40 *Alternatives*). These conservation actions are associated with CM3, CM5, CM7, and CM8, and would  
41 occur in the same timeframe as the construction and early restoration losses.

42 The majority of riparian protection and restoration acres would occur in CZ 7 as part of a reserve  
43 system with extensive wide bands or large patches of valley/foothill riparian natural community

1 (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*). Riparian  
2 restoration would expand the patches of existing riparian forest in order to support nesting habitat  
3 for the species. The distribution and abundance of potential Swainson's hawk nest trees would be  
4 increased by planting and maintaining native trees along roadsides and field borders within  
5 protected cultivated lands at a rate of one tree per 10 acres (Objective SWHA2.1). In addition, small  
6 but essential nesting habitat for Swainson's hawk associated with cultivated lands would also be  
7 maintained and protected such as isolated trees, tree rows along field borders or roads, or small  
8 clusters of trees in farmyards or at rural residences (Objective CLNC1.3).

9 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1  
10 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali  
11 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous  
12 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would  
13 provide foraging habitat for Swainson's hawk and reduce the effects of current levels of habitat  
14 fragmentation. Small mammal populations would also be increased on protected lands, enhancing  
15 the foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4).  
16 Foraging opportunities would also be improved by enhancing prey populations through the  
17 establishment of 20- to 30-foot-wide hedgerows along field borders and roadsides within protected  
18 cultivated lands (Objective SWHA2.2). Remnant patches of grassland or other uncultivated areas  
19 would also be protected and maintained as part of the cultivated lands reserve system which would  
20 provide additional foraging habitat and a source of rodent prey that could recolonize cultivated  
21 fields (Objective CLNC1.3). The protection of managed wetlands (including upland grassland  
22 components) that dry during the spring would also serve as foraging habitat for Swainson's hawks  
23 as prey species recolonize the fields (Objective MWNC1.1). These biological goals and objectives  
24 would inform the near-term protection and restoration efforts and represent performance  
25 standards for considering the effectiveness of restoration actions. At least 15,400 acres of cultivated  
26 lands that provide habitat for covered and other native wildlife species would be protected in the  
27 near-term time period (Objective CLNC1.1) A minimum of 87% of cultivated lands protected by the  
28 late long-term time period would be in very high- and high-value crop types for Swainson's hawk  
29 (Objective SH1.2). This biological objective provides an estimate for the proportion of cultivated  
30 lands protected in the near-term time period which would provide high-value habitat for Swainson's  
31 hawk. The acres of restoration and protection contained in the near-term Plan goals and the  
32 additional detail in the biological objectives satisfy the typical mitigation that would be applied to  
33 the project-level effects of CM1 on Swainson's hawk foraging habitat, as well as mitigate the near-  
34 term effects of the other conservation measures.

35 The 750 acres of protection and 800 acres of restoration contained in the near-term Plan goals  
36 satisfy the typical mitigation ratios that would be applied to the project-level effects of CM1 and  
37 other near-term impacts on Swainson's hawk nesting habitat. The 800 acres of restored riparian  
38 habitat would be initiated in the near-term to offset the loss of modeled nesting habitat, but would  
39 require one to several decades to functionally replace habitat that has been affected and for trees to  
40 attain sufficient size and structure suitable for nesting by Swainson's hawks. This time lag between  
41 the removal and restoration of nesting habitat could have a substantial impact on Swainson's hawk  
42 in the near-term time period. Nesting habitat is limited throughout much of the Plan Area, consisting  
43 mainly of intermittent riparian, isolated trees, small groves, tree rows along field borders, roadside  
44 trees, and ornamental trees near rural residences. The removal of nest trees or nesting habitat  
45 would further reduce this limited resource and could reduce or restrict the number of active  
46 Swainson's hawk nests within the Plan Area until restored riparian habitat is sufficiently developed.

1 *AMM18 Swainson's Hawk and White-Tailed Kite* would implement a program to plant large mature  
2 trees, including transplanting trees scheduled for removal. These would be supplemented with  
3 additional saplings and would be expected to reduce the temporal effects of loss of nesting habitat.  
4 The plantings would occur prior to or concurrent with (in the case of transplanting) the loss of trees.  
5 In addition, at least 5 trees (five gallon container size) would be planted within the BDCP reserve  
6 system for every tree anticipated to be removed by construction during the near-term period that  
7 was suitable for nesting by Swainson's hawks (20 feet or taller). A variety of native tree species  
8 would be planted to provide trees with differing growth rates, maturation, and life span. Trees  
9 would be planted within the BDCP reserve system in areas that support high value foraging habitat  
10 in clumps of at least 3 trees each at appropriate sites within or adjacent to conserved cultivated  
11 lands, or they could be incorporated as a component of the riparian restoration (CM5, CM7) where  
12 they are in close proximity to suitable foraging habitat. Replacement trees that were incorporated  
13 into the riparian restoration would not be clustered in a single region of the study area, but would  
14 be distributed throughout the lands protected as foraging habitat for Swainson's hawk.

15 To enhance Swainson's hawk and reproductive output until the replacement nest trees become  
16 suitable for nesting, 100 acres of high-quality foraging habitat (alfalfa rotation) would be protected  
17 in the near-term for each potential nest site removed (a nest site is defined as a 125-acre block in  
18 which more than 50% of nest trees are 20 feet or greater in height) as a result of construction  
19 activity during the near-term. The foraging habitat to be protected would be within 6 kilometers of  
20 the removed tree within an otherwise suitable foraging landscape and on land not subject to threat  
21 of seasonal flooding, construction disturbances, or other conditions that would reduce the foraging  
22 value of the land. With this program in place, Alternative 9 would not have a substantial adverse  
23 effect on Swainson's hawk in the near-term timeframe, either through direct mortality or through  
24 habitat modifications.

25 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
26 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
27 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
28 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
29 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
30 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
31 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

### 32 ***Late Long-Term Timeframe***

33 The study area supports approximately 9,796 acres of modeled nesting habitat and 477,879 acres of  
34 modeled foraging habitat for Swainson's hawk. Alternative 9 as a whole would result in the  
35 permanent loss of and temporary effects on 558 acres of potential nesting habitat (6% of the  
36 potential nesting habitat in the study area) and 52,958 acres of foraging habitat (11% of the foraging  
37 habitat in the study area).

38 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*  
39 *Restoration*, *CM5 Seasonally Inundated Floodplain Restoration*, *CM7 Riparian Natural Community*  
40 *Restoration*, and *CM8 Grassland Natural Community Restoration*, to restore or create at least 5,000  
41 acres and protect at least 750 acres of valley/foothill riparian natural community, protect 8,000  
42 acres and restore 2,000 acres of grassland natural community, protect 600 acres of vernal pool  
43 complex, protect 150 acres of alkali seasonal wetland complex, protect 8,100 acres of managed

1 wetland, and protect 48,625 acres of cultivated lands that provide suitable habitat for native wildlife  
2 species (Table 3-4 in Chapter 3, *Description of Alternatives*).

3 The majority of riparian protection and restoration acres would occur in CZ 7 as part of a reserve  
4 system with extensive wide bands or large patches of valley/foothill riparian natural community  
5 (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*). Riparian  
6 restoration would expand the patches of existing riparian forest in order to support nesting habitat  
7 for the species. The distribution and abundance of potential Swainson's hawk nest trees would be  
8 increased by planting and maintaining native trees along roadsides and field borders within  
9 protected cultivated lands at a rate of one tree per 10 acres (Objective SH2.1). In addition, small but  
10 essential nesting habitat for Swainson's hawk associated with cultivated lands would also be  
11 maintained and protected such as isolated trees, tree rows along field borders or roads, or small  
12 clusters of trees in farmyards or at rural residences (Objective CLNC1.3).

13 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1  
14 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali  
15 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous  
16 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would  
17 provide foraging habitat for Swainson's hawk and reduce the effects of current levels of habitat  
18 fragmentation. Small mammal populations would also be increased on protected lands, enhancing  
19 the foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4).  
20 Foraging opportunities would also be improved by enhancing prey populations through the  
21 establishment of 20- to 30-foot-wide hedgerows along field borders and roadsides within protected  
22 cultivated lands (Objective SH2.2). Remnant patches of grassland or other uncultivated areas would  
23 also be protected and maintained as part of the cultivated lands reserve system which would  
24 provide additional foraging habitat and a source of rodent prey that could recolonize cultivated  
25 fields (Objective CLNC1.3). The protection of managed wetlands (including upland grassland  
26 components) that dry during the spring would also serve as foraging habitat for Swainson's hawks  
27 as prey species recolonize the fields (Objective MWNC1.1). These biological goals and objectives  
28 would inform the near-term protection and restoration efforts and represent performance  
29 standards for considering the effectiveness of restoration actions. Foraging habitat would be  
30 conserved at a ratio of 1:1 (Objective SH1.1) and at least 42,275 acres of cultivated lands that  
31 provide Swainson's hawk foraging habitat would be protected by the late long-term, 50% of which  
32 would be in very high-value habitat production in CZs 1-4, 7- 9, and 11 (Objective SH1.2).

33 The Plan also includes commitments to implement AMM1 Worker Awareness Training, AMM2  
34 Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention  
35 Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and  
36 Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged  
37 Material, and AMM7 Barge Operations Plan. All of these AMMs include elements that would avoid or  
38 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
39 described in detail in BDCP Appendix 3.C, Avoidance and Minimization Measures.

40 **NEPA Effects:** The loss of Swainson's hawk habitat and potential direct mortality of this special-  
41 status species under Alternative 9 would represent an adverse effect in the absence of other  
42 conservation actions. With habitat protection and restoration associated with CM3, CM5, CM7, CM8,  
43 CM9, and CM11, guided by biological goals and objectives and by AMM1-AMM7 and *AMM18*  
44 *Swainson's Hawk and White-Tailed Kite*, which would be in place throughout the construction period,

1 the effects of habitat loss and potential mortality on Swainson’s hawk under Alternative 9 would not  
2 be adverse.

3 **CEQA Conclusion:**

4 ***Near-Term Timeframe***

5 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
6 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
7 provide sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that  
8 the effect of construction would be less than significant under CEQA. Alternative 9 would remove  
9 367 acres (284 permanent, 83 temporary) of Swainson’s hawk nesting habitat in the study area in  
10 the near-term. These effects would result from the construction of the water conveyance facilities  
11 (CM1, 61 acres), and implementing other conservation measures (*CM2 Yolo Bypass Fisheries*  
12 *Enhancement, CM4 Tidal Natural Communities Restoration, CM5 Seasonally Inundated Floodplain*  
13 *Restoration, and CM7 Riparian Natural Community Restoration—306 acres). In addition, 12,314*  
14 *acres of Swainson’s hawk foraging habitat would be removed or converted in the near-term (CM1,*  
15 *2,907 acres; CM2 Yolo Bypass Fisheries Enhancement, CM4 Tidal Natural Communities Restoration,*  
16 *CM5 Seasonally Inundated Floodplain Restoration, CM7 Riparian Natural Community Restoration, CM8*  
17 *Grassland Natural Community Restoration, CM9 Vernal Pool and Alkali Seasonal Wetland Complex*  
18 *Restoration, CM11 Natural Communities Enhancement and Management and CM18 Conservation*  
19 *Hatcheries—9,407 acres).*

20 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected and  
21 those that are identified in the biological goals and objectives for Swainson’s hawk in Chapter 3 of  
22 the BDCP would be 1:1 for restoration/creation and 1:1 protection of valley/foothill riparian habitat  
23 for nesting habitat, and 1:1 protection for foraging habitat. Using these ratios would indicate that 61  
24 acres of nesting habitat should be restored/ created and 61 acres should be protected to  
25 compensate for the CM1 losses of Swainson’s hawk nesting habitat. In addition, 2,907 acres of  
26 foraging habitat should be protected to mitigate the CM1 losses of Swainson’s hawk foraging habitat.  
27 The near-term effects of other conservation actions would remove 306 acres of modeled nesting  
28 habitat, and therefore require 306 acres of restoration and 306 acres of protection of nesting  
29 habitat. Similarly, the near-term effects of other conservation actions would remove 9,407 acres of  
30 modeled foraging habitat, and therefore require 9,407 acres of protection of foraging habitat using  
31 the same typical NEPA and CEQA ratios (1:1 restoration and 1:1 protection for the loss of nesting  
32 habitat; 1:1 protection for the loss of foraging habitat).

33 The BDCP has committed to near-term goals of protecting 750 acres and restoring 800 acres of  
34 valley/foothill riparian natural community, protecting 2,000 acres and restoring 1,140 acres of  
35 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of  
36 alkali seasonal wetland complex, protecting 4,800 acres of managed wetland natural community,  
37 and protecting 15,400 acres of non-rice cultivated lands (Table 3-4 in Chapter 3, *Description of*  
38 *Alternatives*). These conservation actions are associated with CM3, CM5, CM7, and CM8, and would  
39 occur in the same timeframe as the construction and early restoration losses.

40 The majority of riparian protection and restoration acres would occur in CZ 7 as part of a reserve  
41 system with extensive wide bands or large patches of valley/foothill riparian natural community  
42 (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*). Riparian  
43 restoration would expand the patches of existing riparian forest in order to support nesting habitat

1 for the species. The distribution and abundance of potential Swainson's hawk nest trees would be  
2 increased by planting and maintaining native trees along roadsides and field borders within  
3 protected cultivated lands at a rate of one tree per 10 acres (Objective SWHA2.1). In addition, small  
4 but essential nesting habitat for Swainson's hawk associated with cultivated lands would also be  
5 maintained and protected such as isolated trees, tree rows along field borders or roads, or small  
6 clusters of trees in farmyards or at rural residences (Objective CLNC1.3).

7 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1  
8 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali  
9 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous  
10 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would  
11 provide foraging habitat for Swainson's hawk and reduce the effects of current levels of habitat  
12 fragmentation. Small mammal populations would also be increased on protected lands, enhancing  
13 the foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4).  
14 Foraging opportunities would also be improved by enhancing prey populations through the  
15 establishment of 20- to 30-foot-wide hedgerows along field borders and roadsides within protected  
16 cultivated lands (Objective SWHA2.2). Remnant patches of grassland or other uncultivated areas  
17 would also be protected and maintained as part of the cultivated lands reserve system which would  
18 provide additional foraging habitat and a source of rodent prey that could recolonize cultivated  
19 fields (Objective CLNC1.3). The protection of managed wetlands (including upland grassland  
20 components) that dry during the spring would also serve as foraging habitat for Swainson's hawks  
21 as prey species recolonize the fields (Objective MWNC1.1). These biological goals and objectives  
22 would inform the near-term protection and restoration efforts and represent performance  
23 standards for considering the effectiveness of restoration actions. At least 15,400 acres of cultivated  
24 lands that provide habitat for covered and other native wildlife species would be protected in the  
25 near-term time period (Objective CLNC1.1). A minimum of 87% of cultivated lands protected by the  
26 late long-term time period would be in very high- and high-value crop types for Swainson's hawk  
27 (Objective SH1.2). This biological objective provides an estimate for the proportion of cultivated  
28 lands protected in the near-term time period which would provide high-value habitat for Swainson's  
29 hawk. The acres of restoration and protection contained in the near-term Plan goals and the  
30 additional detail in the biological objectives satisfy the typical mitigation that would be applied to  
31 the project-level effects of CM1 on Swainson's hawk foraging habitat, as well as mitigate the near-  
32 term effects of the other conservation measures.

33 The 750 acres of protection and 800 acres of restoration contained in the near-term Plan goals  
34 satisfy the typical mitigation ratios that would be applied to the project-level effects of CM1 and  
35 other near-term impacts on Swainson's hawk nesting habitat. The 800 acres of restored riparian  
36 habitat would be initiated in the near-term to offset the loss of modeled nesting habitat, but would  
37 require one to several decades to functionally replace habitat that has been affected and for trees to  
38 attain sufficient size and structure suitable for nesting by Swainson's hawks. This time lag between  
39 the removal and restoration of nesting habitat could have a substantial impact on Swainson's hawk  
40 in the near-term time period. Nesting habitat is limited throughout much of the Plan Area, consisting  
41 mainly of intermittent riparian, isolated trees, small groves, tree rows along field borders, roadside  
42 trees, and ornamental trees near rural residences. The removal of nest trees or nesting habitat  
43 would further reduce this limited resource and could reduce or restrict the number of active  
44 Swainson's hawk within the Plan Area until restored riparian habitat is sufficiently developed.

1 *AMM18 Swainson's hawk and White-Tailed Kite* would implement a program to plant large mature  
2 trees, including transplanting trees scheduled for removal. These would be supplemented with  
3 additional saplings and would be expected to reduce the temporal effects of loss of nesting habitat.  
4 The plantings would occur prior to or concurrent with (in the case of transplanting) the loss of trees.  
5 In addition, at least five trees (5-gallon container size) would be planted within the BDCP reserve  
6 system for every tree anticipated to be removed by construction during the near-term period that  
7 was suitable for nesting by Swainson's hawks (20 feet or taller). A variety of native tree species  
8 would be planted to provide trees with differing growth rates, maturation, and life span. Trees  
9 would be planted within the BDCP reserve system in areas that support high value foraging habitat  
10 in clumps of at least three trees each at appropriate sites within or adjacent to conserved cultivated  
11 lands, or they may be incorporated as a component of the riparian restoration (CM5, CM7) where  
12 they are in close proximity to suitable foraging habitat. Replacement trees that are incorporated into  
13 the riparian restoration would not be clustered in a single region of the Plan Area, but would be  
14 distributed throughout the lands protected as foraging habitat for Swainson's hawk.

15 To enhance Swainson's hawk reproductive output until the replacement nest trees become suitable  
16 for nesting, 100 acres of high-quality foraging habitat (alfalfa rotation) would be protected in the  
17 near-term for each potential nest site removed (a nest site is defined as a 125-acre block in which  
18 more than 50% of nest trees are 20 feet or greater in height) as a result of construction activity  
19 during the near-term. The foraging habitat to be protected would be within 6 kilometers of the  
20 removed tree within an otherwise suitable foraging landscape and on land not subject to threat of  
21 seasonal flooding, construction disturbances, or other conditions that would reduce the foraging  
22 value of the land. With this program in place, Alternative 9 would not have a substantial adverse  
23 effect on Swainson's hawk in the near-term timeframe, either through direct mortality or through  
24 habitat modifications.

25 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
26 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
27 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
28 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
29 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
30 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
31 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

### 32 ***Late Long-Term Timeframe***

33 The study area supports approximately 9,796 acres of modeled nesting habitat and 477,879 acres of  
34 modeled foraging habitat for Swainson's hawk. Alternative 9 as a whole would result in the  
35 permanent loss of and temporary effects on 558 acres of potential nesting habitat (6% of the  
36 potential nesting habitat in the study area) and 52,958 acres of foraging habitat (11% of the foraging  
37 habitat in the study area).

38 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*  
39 *Restoration*, *CM5 Seasonally Inundated Floodplain Restoration*, *CM7 Riparian Natural Community*  
40 *Restoration*, and *CM8 Grassland Natural Community Restoration* to restore or create at least 5,000  
41 acres and protect at least 750 acres of valley/foothill riparian natural community, protect 8,000  
42 acres and restore 2,000 acres of grassland natural community, protect 600 acres of vernal pool  
43 complex, protect 150 acres of alkali seasonal wetland complex, protect 8,100 acres of managed

1 wetland, and protect 48,625 acres of cultivated lands that provide suitable habitat for native wildlife  
2 species (Table 3-4 in Chapter 3, *Description of Alternatives*).

3 The majority of riparian protection and restoration acres would occur in CZ 7 as part of a reserve  
4 system with extensive wide bands or large patches of valley/foothill riparian natural community  
5 (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*). Riparian  
6 restoration would expand the patches of existing riparian forest in order to support nesting habitat  
7 for the species. The distribution and abundance of potential Swainson's hawk nest trees would be  
8 increased by planting and maintaining native trees along roadsides and field borders within  
9 protected cultivated lands at a rate of one tree per 10 acres (Objective SH2.1). In addition, small but  
10 essential nesting habitat for Swainson's hawk associated with cultivated lands would also be  
11 maintained and protected such as isolated trees, tree rows along field borders or roads, or small  
12 clusters of trees in farmyards or at rural residences (Objective CLNC1.3).

13 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1  
14 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali  
15 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous  
16 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would  
17 provide foraging habitat for Swainson's hawk and reduce the effects of current levels of habitat  
18 fragmentation. Small mammal populations would also be increased on protected lands, enhancing  
19 the foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4).  
20 Foraging opportunities would also be improved by enhancing prey populations through the  
21 establishment of 20- to 30-foot-wide hedgerows along field borders and roadsides within protected  
22 cultivated lands (Objective SH2.2). Remnant patches of grassland or other uncultivated areas would  
23 also be protected and maintained as part of the cultivated lands reserve system which would  
24 provide additional foraging habitat and a source of rodent prey that could recolonize cultivated  
25 fields (Objective CLNC1.3). The protection of managed wetlands (including upland grassland  
26 components) that dry during the spring would also serve as foraging habitat for Swainson's hawks  
27 as prey species recolonize the fields (Objective MWNC1.1). These biological goals and objectives  
28 would inform the near-term protection and restoration efforts and represent performance  
29 standards for considering the effectiveness of restoration actions. Foraging habitat would be  
30 conserved at a ratio of 1:1 (Objective SH1.1) and at least 42,275 acres of cultivated lands that  
31 provide Swainson's hawk foraging habitat would be protected by the late long-term, 50% of which  
32 would be in very high-value habitat production in CZs 1-4, 7- 9, and 11 (Objective SH1.2).

33 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*  
34 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*  
35 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
36 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
37 *Material, and AMM7 Barge Operations Plan. All of these AMMs include elements that would avoid or*  
38 *minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are*  
39 *described in detail in BDCP Appendix 3.C, Avoidance and Minimization Measures.*

40 Considering Alternative 9's protection and restoration provisions, which would provide acreages of  
41 new or enhanced habitat in amounts greater than necessary to compensate for the time lag of  
42 restoring riparian and foraging habitats lost to construction and restoration activities, and  
43 implementation of AMM1-AMM7 and *AMM18 Swainson's Hawk and White-Tailed Kite*, the loss of  
44 habitat or direct mortality through implementation of Alternative 9 would not result in a substantial  
45 adverse effect through habitat modifications and would not substantially reduce the number or

1 restrict the range of the species. Therefore, the loss of habitat or potential mortality under this  
2 alternative would have a less-than-significant impact on Swainson's hawk.

### 3 **Impact BIO-84: Effects on Swainson's Hawk Associated with Electrical Transmission Facilities**

4 New transmission lines would increase the risk that Swainson's hawks could be subject to power  
5 line strikes, which could result in injury or mortality of Swainson's hawks. This species would be at  
6 low risk of bird strike mortality based on factors assessed in the bird strike vulnerability analysis  
7 (BDCP Attachment 5J.C, *Analysis of Potential Bird Collisions at Proposed BDCP Transmission Lines*).  
8 Factors analyzed include the height of the new transmission lines and the flight behavior of the  
9 species. The existing network of transmission lines in the Plan Area currently poses the same small  
10 risk for Swainson's hawk, and any incremental risk associated with the new power line corridors  
11 would also be expected to be low. *AMM20 Greater Sandhill Crane* would further reduce any potential  
12 effects.

13 **NEPA Effects:** New transmission lines would minimally increase the risk for Swainson's hawk power  
14 line strikes. With the implementation of *AMM20 Greater Sandhill Crane* the potential effect of the  
15 construction of new transmission lines on Swainson's hawk would not be adverse.

16 **CEQA Conclusion:** New transmission lines would minimally increase the risk for Swainson's hawk  
17 power line strikes. *AMM20 Greater Sandhill Crane* would reduce the potential impact of the  
18 construction of new transmission lines on Swainson's hawk to a less-than-significant level.

### 19 **Impact BIO-85: Indirect Effects of Plan Implementation on Swainson's Hawk**

20 Noise and visual disturbances from the construction of water conveyance facilities and other  
21 conservation measures could reduce Swainson's hawk use of modeled habitat adjacent to work  
22 areas. Construction noise above background noise levels (greater than 50 dBA) could extend 1,900  
23 to 5,250 feet from the edge of construction activities (BDCP Appendix 5.J, Attachment 5J.D, *Indirect*  
24 *Effects of the Construction of the BDCP Conveyance Facility on Sandhill Crane*, Table 4), although there  
25 are no available data to determine the extent to which these noise levels could affect Swainson's  
26 hawk. Moreover, operation and maintenance of the water conveyance facilities, including the  
27 transmission facilities, could result in ongoing but periodic postconstruction disturbances that could  
28 affect Swainson's hawk use of the surrounding habitat. These construction activities would include  
29 water conveyance construction, tidal restoration activities, floodplain restoration, and Fremont  
30 Weir/Yolo Bypass Enhancements. Swainson's hawks are seasonally abundant across much of the  
31 study area wherever adequate nest trees occur within a cultivated landscape that supports suitable  
32 foraging habitat. There would be a potential for noise and visual disturbances associated with BDCP  
33 actions to temporarily displace Swainson's hawks and temporarily reduce the use of suitable habitat  
34 adjacent to construction areas. These adverse effects would be minimized with the implementation  
35 of *AMM18 Swainson's Hawk and White-Tailed Kite*.

36 The use of mechanical equipment during water conveyance facilities construction could cause the  
37 accidental release of petroleum or other contaminants that could affect Swainson's hawk foraging in  
38 the surrounding habitat. The inadvertent discharge of sediment or excessive dust adjacent to  
39 suitable habitat could also have an adverse effect on these species. *AMM2 Construction Best*  
40 *Management Practices and Monitoring* would minimize the likelihood of such spills and ensure that  
41 measures are in place to prevent runoff from the construction area and negative effects of dust on  
42 habitat.

1 **NEPA Effects:** Noise and visual disturbances from the construction of water conveyance facilities  
2 could reduce Swainson's hawk use of modeled habitat adjacent to work areas. Moreover, operation  
3 and maintenance of the water conveyance facilities, including the transmission facilities, could result  
4 in ongoing but periodic postconstruction disturbances that could affect Swainson's hawk use of the  
5 surrounding habitat. The effects of noise, the potential for hazardous spills, increased dust and  
6 sedimentation, and operations and maintenance of the water conveyance facilities would not have  
7 an adverse effect on Swainson's hawk with the implementation of AMM1-AMM7, and *AMM18*  
8 *Swainson's Hawk and White-Tailed Kite*.

9 **CEQA Conclusion:** Noise and visual disturbances from the construction of water conveyance  
10 facilities could reduce Swainson's hawk use of modeled habitat adjacent to work areas. Moreover,  
11 operation and maintenance of the water conveyance facilities, including the transmission facilities,  
12 could result in ongoing but periodic postconstruction disturbances that could affect Swainson's  
13 hawk use of the surrounding habitat. The effects of noise, the potential for hazardous spills,  
14 increased dust and sedimentation, and operations and maintenance of the water conveyance  
15 facilities would result in a less-than-significant impact on Swainson's hawk with the implementation  
16 of AMM1-AMM7 and *AMM18 Swainson's Hawk and White-Tailed Kite*.

17 **Impact BIO-86: Periodic Effects of Inundation of Swainson's Hawk Nesting and Foraging**  
18 **Habitat as a Result of Implementation of Conservation Components**

19 Flooding of the Yolo Bypass from Fremont Weir operations (*CM2 Yolo Bypass Fisheries*  
20 *Enhancement*) would increase the frequency and duration of inundation on approximately 3,066-  
21 6,706 acres of modeled Swainson's hawk habitat (consisting of approximately 41-70 acres of  
22 nesting habitat and 3,025-6,635 acres of foraging habitat; Table 12-9-35). However, project-  
23 associated inundation of areas that would not otherwise have been inundated would be expected to  
24 occur in no more than 30% of all years, since Fremont Weir is expected to overtop the remaining  
25 estimated 70% of all years, and during those years notch operations would not typically affect the  
26 maximum extent of inundation. In more than half of all years under Existing Conditions, an area  
27 greater than the project-related inundation area already inundates in the bypass. Therefore, habitat  
28 conditions in the bypass would not be expected to change substantially as a result of Yolo Bypass  
29 operations. However, increased duration of inundation during years of Fremont Weir operation,  
30 may delay the period for which foraging habitat is available to Swainson's hawks by up to several  
31 weeks.

32 Based on hypothetical footprints, implementation of *CM5 Seasonally Inundated Floodplain*  
33 *Restoration*, could result in the periodic inundation of up to approximately 8,197 acres of modeled  
34 Swainson's hawk habitat (Table 12-9-35), consisting of 189 acres of nesting and 8,008 acres of  
35 foraging habitat. Floodplain restoration would be expected to restore a more natural flood regime  
36 and sustain riparian vegetation types that support regeneration of Swainson's hawk nesting habitat.  
37 The restored floodplains would transition from areas that flood frequently (e.g., every 1 to 2 years)  
38 to areas that flood infrequently (e.g., every 10 years or more). Foraging habitat that is inundated  
39 after Swainson's hawks arrive in the Central Valley in mid-March could result in a periodic loss of  
40 available foraging habitat due to the reduction in available prey. Inundated habitats would be  
41 expected to recover following draw-down and provide suitable foraging conditions until the  
42 following inundation period. Thus, this is considered a periodic and short term effect that is unlikely  
43 to affect Swainson's hawk distribution and abundance, or foraging use of the study area.

1 **NEPA Effects:** Increased periodic flooding would not be expected to cause any adverse effect on nest  
2 sites because trees in which nest sites are situated already withstand floods, the increase in  
3 inundation frequency and duration is expected to remain within the range of tolerance of riparian  
4 trees, and nest sites are located above floodwaters. Although foraging habitat would be periodically  
5 unavailable to Swainson's hawk, inundated habitats are expected to recover following draw down.  
6 This would be considered a short-term effect that would not result in an adverse effect on  
7 Swainson's hawk.

8 **CEQA Conclusion:** Increased periodic flooding would not be expected to cause any adverse effect on  
9 nest sites because trees in which nest sites are situated already withstand floods, the increase in  
10 inundation frequency and duration is expected to remain within the range of tolerance of riparian  
11 trees, and nest sites are located above floodwaters. Although foraging habitat would be periodically  
12 unavailable to Swainson's hawk, inundated habitats are expected to recover following draw down.  
13 This would be considered a short-term effect that would not have a significant impact on Swainson's  
14 hawk.

### 15 **Tricolored Blackbird**

16 This section describes the effects of Alternative 9, including water conveyance facilities construction  
17 and implementation of other conservation components, on tricolored blackbird. The habitat model  
18 used to assess effects on tricolored blackbird is based on breeding habitat and nonbreeding habitat.  
19 Although breeding colonies have been documented along the fringe of Suisun Marsh, in the Yolo  
20 Bypass and along the southwestern perimeter of the study area, breeding colonies are uncommon in  
21 the study area. Modeled breeding habitat includes bulrush/cattail wetlands and shrub communities  
22 that may provide suitable nesting substrate, and adjacent high-value foraging areas that occur  
23 within 5 miles of nesting colonies documented in the study area. The foraging component includes  
24 land cover types known to support abundant insect populations such as grasslands, pasturelands  
25 (including alfalfa), natural seasonal wetlands, and sunflower croplands. The Delta is recognized as a  
26 major wintering area for tricolored blackbird (Hamilton 2004, Beedy 2008). Modeled nonbreeding  
27 habitat includes emergent wetlands and shrub stands that provide suitable roosting habitat, as well  
28 as cultivated lands and noncultivated lands that provide foods sought by tricolored blackbirds  
29 during the winter. Outside of the breeding season, tricolored blackbirds are primarily granivores  
30 that forage opportunistically across the Plan Area in grasslands, pasturelands, croplands, dairies,  
31 and livestock feed lots. Factors considered in assessing the value of affected habitat for the  
32 tricolored blackbird, include patch size, suitability of vegetation, and proximity to recorded  
33 occurrences.

34 Construction and restoration associated with Alternative 9 conservation measures would result in  
35 both temporary and permanent losses of tricolored blackbird modeled habitat as indicated in Table  
36 12-9-37. Full implementation of Alternative 9 would also include the following conservation actions  
37 over the term of the BDCP to benefit the tricolored blackbird (BDCP Chapter 3, Section 3.3, *Biological*  
38 *Goals and Objectives*).

- 39 ● Protect and manage at least 50 acres of occupied or recently occupied (within the last 15 years)  
40 tricolored blackbird nesting habitat located within 5 miles of high-value foraging habitat in CZs  
41 1, 2, 8, or 11. (Objective TRBL1.1).
- 42 ● Protect at least 26,300 acres of moderate-, high-, or very high-value cultivated lands as  
43 nonbreeding foraging habitat, 50% of which is of high or very high value (Objective TRBL1.2).

- 1       • Protect at least 11,050 acres of high- to very high-value breeding-foraging habitat within 5 miles  
2       of occupied or recently occupied (within the last 15 years) tricolored blackbird nesting habitat  
3       in CZs 1, 2, 3, 4, 7, 8, or 11. At least 1,000 acres of this habitat would be within 5 miles of the  
4       nesting habitat protected under Objective TRBL1.1 (Objective TRBL1.3).
- 5       • Maintain and protect the small patches of important wildlife habitats associated with cultivated  
6       lands within the reserve system, including isolated valley oak trees, trees and shrubs along field  
7       borders and roadsides, remnant groves, riparian corridors, water conveyance channels,  
8       grasslands, ponds, and wetlands (Objective CLNC1.3, associated with CM3).
- 9       • Protect at least 8,000 acres of grassland, with at least 2,000 acres protected in CZ 1, at least  
10       1,000 acres protected in CZ 8, at least 2,000 acres protected in CZ 11, and the remainder  
11       distributed among CZs 1, 2, 4, 5, 7, 8, and 11 (Objective GNC1.1, associated with CM3).
- 12       • Restore at least 2,000 acres of grasslands (Objective GNC1.2, associated with CM8).
- 13       • Protect at least 150 acres of alkali seasonal wetland and at least 600 acres of existing vernal pool  
14       complex in CZs 1, 8, and/or 11 (Objectives ASWNC1.1 and VPNC1.1, associated with CM3).
- 15       • Increase prey abundance and accessibility for grassland-foraging species (Objectives ASWNC2.4,  
16       VPNC2.5, and GNC2.4, associated with CM11).

17       As explained below, with the restoration or protection of these amounts of habitat, in addition to  
18       management activities that would enhance these natural communities for the species and  
19       implementation of AMM1–AMM7 and AMM21 *Tricolored Blackbird*, impacts on tricolored blackbird  
20       would not be adverse for NEPA purposes and would be less than significant for CEQA purposes.

1 **Table 12-9-37. Changes in Tricolored Blackbird Modeled Habitat Associated with Alternative 9 (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>		
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5	
CM1	Breeding	<i>Nesting</i>	8	8	2	2	NA	NA
		<i>Foraging - cultivated</i>	230	230	293	293	NA	NA
		<i>Foraging - noncultivated</i>	55	55	71	71	NA	NA
	Nonbreeding	<i>Roosting</i>	58	58	198	198	NA	NA
		<i>Foraging - cultivated</i>	36	36	1,334	1,334	NA	NA
		<i>Foraging - noncultivated</i>	28	28	273	273	NA	NA
<b>Total Impacts CM1</b>		<b>415</b>	<b>415</b>	<b>2,171</b>	<b>2,171</b>			
CM2–CM18	Breeding	<i>Nesting</i>	13	72	75	77	11-26	30
		<i>Foraging - cultivated</i>	1,657	9,525	84	359	1,837-2,598	2,124
		<i>Foraging noncultivated</i>	704	1,991	155	184	600-1,689	355
	Nonbreeding	<i>Roosting</i>	570	1,642	0	1	0-4	29
		<i>Foraging - cultivated</i>	3,747	23,955	54	420	222-1,057	2,506
		<i>Foraging - noncultivated</i>	459	1,341	0	3	42-191	158
<b>Total Impacts CM2–CM18</b>		<b>7,150</b>	<b>38,526</b>	<b>368</b>	<b>1,044</b>			
<b>Total Breeding</b>		<b>2,667</b>	<b>11,881</b>	<b>623</b>	<b>991</b>			
<b>Total Nonbreeding</b>		<b>4,898</b>	<b>27,060</b>	<b>1,859</b>	<b>2,229</b>			
<b>TOTAL IMPACTS</b>		<b>7,565</b>	<b>38,941</b>	<b>2,482</b>	<b>3,220</b>			

<sup>a</sup> See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

**Impact BIO-87: Loss or Conversion of Habitat for and Direct Mortality of Tricolored Blackbird**

Alternative 9 conservation measures would result in the permanent and temporary loss combined of up to 12,872 acres of modeled breeding habitat and up to 29,289 acres of modeled nonbreeding for tricolored blackbird (Table 12-9-37). Conservation measures that would result in these losses are conveyance facilities and transmission line construction, and establishment and use of borrow and spoil areas (CM1), Yolo Bypass improvements (CM2), tidal habitat restoration (CM4), floodplain restoration (CM5), riparian restoration (CM7), grassland restoration (CM8), marsh restoration (CM10), and construction of conservation hatcheries (CM18). Habitat enhancement and management activities (CM11), which include ground disturbance or removal of nonnative vegetation, could result in local adverse habitat effects. In addition, maintenance activities associated with the long-term operation of the water conveyance facilities and other BDCP physical facilities could degrade or eliminate tricolored blackbird habitat. Each of these individual activities is described below. A summary statement of the combined impacts and NEPA effects and a CEQA conclusion follow the individual conservation measure discussions.

- *CM1 Water Facilities and Operation:* Construction of Alternative 9 conveyance facilities would result in the permanent loss of 293 acres of tricolored blackbird breeding habitat (8 acres nesting habitat, 230 acres of cultivated lands, and 55 acres of noncultivated lands suitable for foraging) and 122 acres of nonbreeding habitat (58 acres roosting habitat, 36 acres of cultivated lands, and 28 acres of noncultivated lands suitable for foraging; Table 12-9-37). In addition, CM1 would result in the temporary removal of 366 acres of breeding habitat (2 acres nesting habitat, 293 acres of cultivated lands, and 71 acres of noncultivated lands suitable for foraging) and 1,805 acres of nonbreeding habitat (198 acres roosting habitat, 1,334 acres of cultivated lands, and 273 acres of noncultivated lands suitable for foraging, Table 12-9-37). Habitat that would be lost is located in the central Delta, in CZ 4, 5, 6, 7, and 8. There are no occurrences of tricolored blackbird that overlap with the construction footprint for CM1. However, records exist throughout the study area. The implementation of *AMM21 Tricolored Blackbird* (BDCP Appendix 3.C, *Avoidance and Minimization Measures*) would require preconstruction surveys and the establishment of nodisturbance buffers and would minimize potential effects on nesting tricolored blackbirds. Refer to the Terrestrial Biology Map Book for a detailed view of Alternative 9 construction locations. Construction of CM1 would occur within the first 10 years of Alternative 9 implementation.
- *CM2 Yolo Bypass Fisheries Enhancement:* Construction activity associated with fisheries improvements in the Yolo Bypass would permanent loss of 595 acres of tricolored blackbird breeding habitat (13 acres nesting habitat, 477 acres of cultivated lands, and 105 acres of noncultivated lands suitable for foraging) and 8 acres of nonbreeding habitat (consisting entirely of roosting habitat). In addition, CM2 construction would result in the temporary removal of 314 acres of breeding habitat (75 acres nesting habitat, 84 acres of cultivated lands, and 155 acres of noncultivated lands suitable for foraging) and 54 acres of nonbreeding habitat (consisting entirely of cultivated lands). The loss is expected to occur during the first 10 years of Alternative 9 implementation.
- *CM4 Tidal Natural Communities Restoration:* Tidal natural communities restoration would result in the inundation of approximately 3,937 acres of tricolored blackbird breeding habitat (21 acres of nesting, 2,814 acres of cultivated lands, and 1,102 acres of noncultivated lands suitable for foraging) and 10,794 acres of nonbreeding habitat (1,633 acres of roosting, 18,489 acres of cultivated lands, and 672 acres of noncultivated lands suitable for foraging). An estimated

1 13,692 acres of the 28,424 acres to be permanently lost would be expected to convert to tidal  
2 emergent wetland communities that could provide nonbreeding season roosting habitat for  
3 tricolored blackbirds, depending on future vegetation density and composition. Conversion  
4 would result in the loss of an estimated 4,316 acres of tricolored blackbird breeding habitat (34  
5 acres of nesting habitat; plus 3,635 acres of cultivated lands and 647 acres of noncultivated  
6 habitats suitable for foraging) and 9,375 acres of nonbreeding habitat (8,716 acres of cultivated  
7 lands and 659 acres of noncultivated habitats suitable for foraging). These habitat losses and  
8 conversions would occur in CZs 1, 2, 4, 5, 6, 7, 8, and 11. Although considered to be a permanent  
9 loss, due to the uncertainty of the quantity of restored suitable habitat, any areas that develop  
10 into riparian scrub-shrub could provide suitable nesting and roosting habitat for tricolored  
11 blackbird.

12 ● *CM5 Seasonally Inundated Floodplain Restoration*: Levee construction and riparian restoration  
13 associated with floodplain restoration in the south Delta (CZ 7) would result in the permanent  
14 removal of up to 554 acres of tricolored blackbird breeding habitat (4 acres of nesting habitat,  
15 503 acres of cultivated lands, and 47 acres of noncultivated habitats suitable for foraging) and  
16 656 acres of nonbreeding habitat (1 acre of roosting habitat, 652 acres of cultivated lands, and 3  
17 acres of noncultivated habitats suitable for foraging) in CZ 7. Patches of riparian scrub  
18 associated with the restoration of approximately 1,000 acres of valley/foothill riparian habitat  
19 managed as early- to mid-successional habitats (as a component of CM5) could provide suitable  
20 nesting, roosting or foraging habitat for tricolored blackbird once these restored habitats have  
21 developed habitat functions for the species.

22 ● *CM8 Grassland Natural Communities Restoration*: Restoration of grassland would result in the  
23 permanent removal of 1,521 acres of tricolored breeding habitat and 210 acres of nonbreeding  
24 habitat. Grassland restoration would be implemented on cultivated lands and would therefore  
25 result in the conversion of tricolored blackbird cultivated foraging habitat to high-value  
26 grassland foraging habitat in CZs 2, 4, and 5.

27 ● *CM10 Nontidal Marsh Restoration*: Marsh restoration activities would result in the permanent  
28 removal or conversion of approximately 568 acres of tricolored blackbird breeding habitat and  
29 945 acres of nonbreeding habitat (all cultivated lands suitable for foraging). About two-thirds of  
30 the restored nontidal marsh would be open water, and the remainder would support emergent  
31 wetland vegetation that could provide low-value roosting habitat for tricolored blackbird  
32 depending on vegetation density and composition.

33 ● *CM11 Natural Communities Enhancement and Management*: A variety of habitat management  
34 actions that are designed to enhance wildlife values in BDCP-protected habitats could result in  
35 localized ground disturbances that could temporarily remove small amounts of tricolored  
36 blackbird habitat. Ground-disturbing activities, such as removal of nonnative vegetation and  
37 road and other infrastructure maintenance, would be expected to have minor effects on  
38 available tricolored blackbird habitat and are expected to result in overall improvements to and  
39 maintenance of tricolored blackbird habitat values over the term of the BDCP. These effects  
40 cannot be quantified, but are expected to be minimal and would be avoided and minimized by  
41 the AMMs listed below. CM11 would also include the construction of recreational-related  
42 facilities including trails, interpretive signs, and picnic tables (BDCP Chapter 4, *Covered Activities  
43 and Associated Federal Actions*). Trailhead facilities, signs, staging areas, picnic areas, bathrooms,  
44 etc. would be placed on existing, disturbed areas when and where possible. However,  
45 approximately 43.5 acres of breeding habitat and 6.5 acres of nonbreeding habitat (all grassland

1 suitable for foraging) would be lost as a result of construction of trails and facilities. Impacts  
2 from recreational-related facilities that would occur within the first 10 years of Alternative 9  
3 implementation would include a loss of 13 acres of breeding habitat.

- 4 • *CM18 Conservation Hatcheries*: Implementation of CM18 would remove up to 35 acres of  
5 tricolored blackbird grassland foraging habitat in CZ 1.
- 6 • *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground  
7 water conveyance facilities and restoration infrastructure could result in ongoing but periodic  
8 disturbances that could affect tricolored blackbird use of the surrounding habitat in or adjacent  
9 to work areas. Maintenance activities would include vegetation management, levee and  
10 structure repair, and re-grading of roads and permanent work areas. These effects, however,  
11 would be reduced by AMMs and conservation actions as described below.
- 12 • *Injury and Direct Mortality*: Operation of construction equipment may cause injury to or  
13 mortality of tricolored blackbirds. Risk would be greatest to eggs and nestlings susceptible to  
14 land clearing activities, nest abandonment, or increased exposure to the elements or to  
15 predators. Injury to or mortality of adults and fledged juveniles would not be expected as  
16 individuals would be expected to avoid contact with construction equipment. Construction  
17 activities could temporarily fragment existing tricolored blackbird habitat during grading, filling,  
18 contouring, and other initial ground-disturbing operations that could temporarily reduce the  
19 extent and functions supported by the affected habitat. To the maximum extent practicable,  
20 construction activity will be avoided up to 1,300 feet, but not less than a minimum of 250 feet,  
21 from an active tricolored blackbird nesting colony. If monitoring determines an activity is  
22 adversely affecting a nesting colony, construction will be modified, as practicable, by either  
23 delaying construction until the colony site is abandoned or until the end of the breeding season,  
24 whichever occurs first, by temporarily relocating staging areas, or temporarily rerouting access  
25 to the construction site. These measures to avoid injury or mortality of nesting tricolored  
26 blackbirds are described in *AMM21 Tricolored Blackbird* (Appendix 3.C, *Avoidance and*  
27 *Minimization Measures*).

28 The following paragraphs summarize the combined effects discussed above and describe other  
29 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also  
30 included.

### 31 ***Near-Term Timeframe***

32 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
33 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
34 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
35 effects of construction would not be adverse under NEPA. Alternative 9 would remove 3,290 acres  
36 of breeding habitat (98 acres of nesting, 2,264 acres of cultivated lands, and 985 acres of  
37 noncultivated lands suitable for foraging) and 6,757 acres of nonbreeding habitat (826 acres of  
38 roosting, 5,171 acres of cultivated lands, and 760 acres of noncultivated lands suitable for foraging)  
39 for tricolored blackbird in the study area in the near-term. These effects would result from the  
40 construction of the water conveyance facilities (CM1, 659 acres of breeding, 1,927 acres of  
41 nonbreeding), and implementing other conservation measures (*CM2 Yolo Bypass Fisheries*  
42 *Enhancement*, *CM4 Tidal Natural Communities Restoration*, and *CM5 Seasonally Inundated Floodplain*  
43 *Restoration*, *CM7 Riparian Natural Community Restoration*—2,688 acres of breeding, 4,830 acres of  
44 nonbreeding).

1 Typical NEPA and CEQA project-level mitigation ratios would be 1:1 for restoration/creation and  
2 1:1 for protection for the loss of nesting and roosting wetland habitat, 2:1 protection for loss of  
3 noncultivated lands suitable for foraging (for the breeding and nonbreeding season), and 1:1  
4 protection for the loss of cultivated lands.

5 Using these ratios would indicate that the compensation for loss or conversion of tricolored  
6 blackbird habitat from CM1 would require 10 acres of restoration and 10 acres of protection of  
7 nesting habitat, 256 acres of restoration and 256 acres of protection of roosting habitat, 854 acres of  
8 protection of noncultivated lands that provide foraging habitat, 523 acres of protection of cultivated  
9 lands suitable for foraging during the breeding season, and 1,370 acres of cultivated lands that  
10 provide foraging habitat during the nonbreeding season. The near-term effects of other  
11 conservation actions would remove or convert 88 acres of nesting habitat, 570 acres of roosting  
12 habitat, 619 acres of noncultivated lands suitable for foraging, 1,741 acres of cultivated lands that  
13 provide foraging habitat during the breeding season, and 3,801 acres of cultivated lands during the  
14 nonbreeding season. Compensation for these losses from other conservation measures would  
15 therefore require 88 acres of restoration and 88 acres of protection of nesting habitat, 570 acres of  
16 restoration and 570 acres of protection of roosting habitat, 1,238 acres of protection of  
17 noncultivated lands that provide foraging habitat, 1,741 acres of protection of cultivated lands  
18 suitable for foraging during the breeding season, and 3,801 acres of cultivated lands that provide  
19 foraging habitat during the nonbreeding season. using the same typical NEPA and CEQA ratios.

20 Total compensation for near-term loss or conversion of tricolored blackbird required using the  
21 typical ratios above would be 98 acres of restoration and 98 acres of protection for nesting habitat,  
22 826 acres of restoration and 826 acres of protection for roosting habitat, 3,490 acres of protection of  
23 noncultivated foraging habitat, 2,264 acres of protection for cultivated lands that provide foraging  
24 habitat during the breeding season, and 5,171 acres of cultivated lands that provide foraging habitat  
25 during the nonbreeding season.

26 The BDCP has committed to near-term goals of protecting 25 acres and restoring protecting 750  
27 acres and restoring 800 acres of valley/foothill riparian natural community, protecting 2,000 acres  
28 and restoring 1,140 acres of grassland natural community, protecting 400 acres of vernal pool  
29 complex, protecting 120 acres of alkali seasonal wetland complex, protecting 4,800 acres of  
30 managed wetland natural community, protecting 15,400 acres of non-rice cultivated lands,  
31 protecting 900 acres of rice or rice equivalent habitat, restoring 8,850 acres of tidal freshwater  
32 emergent wetlands and 2,000 acres of tidal brackish emergent wetlands (Table 3-4 in Chapter 3,  
33 *Description of Alternatives*). These conservation actions are associated with CM3, CM4, CM5, CM7,  
34 and CM8 and would occur in the same timeframe as the construction and early restoration losses.  
35 Some proportion of these natural communities provide suitable habitat for tricolored blackbird as  
36 described below.

37 Nesting by tricolored blackbirds is currently limited by the availability of high-value breeding  
38 habitat, which is represented by suitable nesting substrate, such as cattail/bulrush emergent  
39 wetland, in close association with highly productive foraging areas that support abundant insect  
40 prey, such as grasslands, seasonal wetlands, pasturelands, alfalfa and other hay crops, and some  
41 croplands. The nesting habitat would be located within 5 miles of high-value foraging habitat in CZs  
42 1, 2, 8, or 11 (see Table 12-9-38 for foraging habitat values) and would be actively managed to  
43 maintain actively growing stands of bulrush/cattail emergent vegetation through mechanical  
44 habitat manipulation, prescribed fire, or other measures described in *CM11 Natural Communities*  
45 *Enhancement and Management*. In addition to the actively managed nesting habitat, a portion of the

1 750 acres of protection and 800 acres of restoration of valley/foothill riparian natural community,  
2 and the restoration of 900 acres nontidal marsh would provide nesting habitat for tricolored  
3 blackbird. The Plan estimates that modeled nesting habitat in the Plan Area currently includes 8% of  
4 valley/foothill riparian and 22% of nontidal freshwater emergent marsh (BDCP Chapter 5, Section  
5 5.6.12.2, *Beneficial Effects*). Assuming similar proportions of modeled habitat on conservation lands  
6 restored in the near-term, approximately 64 acres of valley foothill riparian and 198 acres of  
7 nontidal marsh restored would provide nesting habitat for tricolored blackbird.

8 The Plan estimates that modeled roosting habitat in the Plan Area currently includes 95% of tidal  
9 freshwater emergent wetland, 57% of brackish emergent wetland, 21% of valley/foothill riparian,  
10 75% of nontidal marsh, and 15% of managed wetlands (BDCP Chapter 5, Section 5.6.12.2, *Beneficial*  
11 *Effects*). Assuming similar proportions of modeled habitat on conservation lands restored in the  
12 near-term, the restoration of approximately 8,408 acres of tidal freshwater emergent wetland, 1,140  
13 acres of tidal brackish emergent wetland, 675 acres of nontidal marsh, and 168 acres of valley  
14 foothill riparian would provide 10,391 acres of nesting habitat for tricolored blackbird. An estimated  
15 878 acres of roosting habitat would also be protected in the near-term time period (158 acres of  
16 valley/foothill riparian, 720 acres managed wetland).

17 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1  
18 and GNC1.2). Grassland protection in CZs 1, 8, and 11 would be associated with vernal pool and  
19 alkali seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) which would result in a  
20 contiguous matrix of grassland, alkali seasonal wetland, and vernal pool natural communities. The  
21 protection and restoration of grasslands, alkali seasonal wetlands, and vernal pool complexes would  
22 provide improved foraging opportunities for tricolored blackbirds during both the breeding and  
23 nonbreeding seasons. Proximity of nesting colonies to suitable foraging habitat contributes to high  
24 reproductive success in tricolored blackbirds. These natural communities are known to support  
25 large insect populations, a vital food resource for successful rearing and fledging of young. Those  
26 conservation lands that lie within a few miles of active nesting colonies would provide high-value  
27 foraging areas to support breeding tricolored blackbirds. Under *CM11 Natural Communities*  
28 *Enhancement and Management*, insect prey populations would be increased on protected lands,  
29 further enhancing the foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5,  
30 and GNC2.4).

31 Cultivated lands that provide habitat for covered and other native wildlife species would provide  
32 approximately 15,600 acres of potential foraging habitat for tricolored blackbird in the near-term  
33 (Objective CLNC1.1). Objective TRBL1.3 commits to protecting 11,050 acres (23% of the total  
34 cultivated lands commitment) of high- to very high-value breeding-foraging habitat by the late long-  
35 term. Assuming that lands would be protected proportional to the conservation objectives for  
36 covered species, approximately 3,588 acres of high- to very high-value breeding foraging habitat  
37 consisting of cultivated lands would be protected in the near-term. These lands would be protected  
38 within 5 miles of occupied or recently occupied tricolored blackbird nesting habitat in CZs 1, 2, 3, 4,  
39 7, 8 or 11. In addition, Objective TRBL1.2 states that of the cultivated lands protected in the late  
40 long-term time period, 26,300 acres (54% of all cultivated lands protected) would be maintained in  
41 moderate – high, or very high-value cultivated lands, at least 50% of which would be high- to very  
42 high-value. Assuming proportional conservation in the near-term, an estimated 8,424 acres of  
43 cultivated lands that provide foraging habitat for tricolored blackbird would be protected in the  
44 near-term, 4,212 of which would be in high- to very high-value cultivated lands. Small but essential  
45 habitats for species including tricolored blackbird would also be protected that occur within the

1 agricultural matrix. This would include the retention of wetlands, grassland patches, shrub stands,  
2 and herbaceous edge habitats, which could provide suitable nesting, foraging or roosting habitat for  
3 tricolored blackbird (Objective CLNC1.3).

4 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*  
5 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*  
6 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
7 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
8 *Material, and AMM7 Barge Operations Plan. All of these AMMs include elements that would avoid or*  
9 *minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are*  
10 *described in detail in BDCP Appendix 3.C, Avoidance and Minimization Measures.*

11 The acres of protection and restoration contained in the near-term Plan goals, in addition to the  
12 detailed habitat value goals that would be applied to near-term acres, are more than sufficient to  
13 satisfy the typical mitigation ratios that would be applied to the project-level effects of CM1 and the  
14 near-term impacts from other conservation measures on nesting, roosting, and cultivated lands  
15 foraging habitat. The 3,660 acres of grassland protection in the near-term are 213 acres short of the  
16 2:1 protection mitigation ratio. However, the acres of permanent impact would be compensated for  
17 by this acreage, and temporary impacts on grassland would be restored to preproject conditions  
18 (including revegetation with native vegetation if within 1 year of completion of construction) under  
19 *AMM2 Construction Best Management Practices and Monitoring. With the enhancement of grasslands*  
20 *described above, and the restoration of temporary habitat impacts, this difference between*  
21 *impacted and conserved grassland acreages in the near-term time period would not result in an*  
22 *adverse effect on tricolored blackbird.*

23 **Table 12-9-38. Tricolored Blackbird Foraging Habitat Value Classes**

Foraging Habitat Value Class	Agricultural Crop Type/Habitats	
	Breeding Season <sup>a</sup> Foraging Habitat	Nonbreeding Season Foraging Habitat
Very high	Native pasture, nonirrigated native pasture, annual grasslands, vernal pool grasslands, alkali grasslands	Livestock feed lots
High	Sunflower, alfalfa and mixed alfalfa, mixed pasture, induced high water table native pasture, nonirrigated mixed pasture, dairies	Corn, sunflower, millet, alfalfa and mixed alfalfa, mixed pasture, native pasture, induced high water table native pasture, nonirrigated native pasture, rice, dairies, annual grasslands, vernal pool grasslands, alkali grasslands
Moderate	Miscellaneous grass pasture, fallow lands cropped within 3 years, new lands prepped for crop production, livestock feed lots	Miscellaneous grass pasture, nonirrigated mixed pasture, fallow lands cropped within 3 years, new lands prepped for crop production
Low	Wheat, mixed grain and hay, farmsteads	Wheat, oats, mixed grain and hay, farmsteads
Marginal	Rice	None
None	All remaining crop types	All remaining crop types

<sup>a</sup> Generally March through August; occasional breeding in fall (September through November).

24

1 **Late Long-Term Timeframe**

2 Based on the habitat model, the study area approximately 164,947 acres of breeding and 259,093  
3 acres of nonbreeding habitat for tricolored blackbird. The Delta is an important wintering area for  
4 the tricolored blackbird (Hamilton 2004, Beedy 2008). Although there is a large acreage of modeled  
5 breeding habitat available, the study area does not currently support many nesting tricolored  
6 blackbirds with the exception of a few occurrences on the fringes of the Suisun Marsh, in the Yolo  
7 Bypass, and along the southwestern perimeter of the study area (BDCP, Chapter 5, *Effects Analysis*).  
8 Alternative 9 as a whole would result in the permanent loss of and temporary effects on 12,872  
9 acres of breeding habitat and 29,289 acres of nonbreeding habitat for tricolored blackbird during  
10 the term of the Plan (8% of the total breeding habitat in the study area and 11% of the total  
11 nonbreeding habitat in the study area). The locations of these losses are described above in the  
12 analyses of individual conservation measures.

13 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*  
14 *Restoration, CM4 Tidal Natural Communities Restoration, CM5 Seasonally Inundated Floodplain*  
15 *Restoration, CM7 Riparian Natural Community Restoration, and CM8 Grassland Natural Community*  
16 *Restoration* to restore or create at least 5,000 acres and protect at least 750 acres of valley/foothill  
17 riparian natural community, protect 8,000 acres and restore 2,000 acres of grassland natural  
18 community, protect 600 acres of vernal pool complex, protect 150 acres of alkali seasonal wetland  
19 complex, protect 8,100 acres of managed wetland, and protect 48,625 acres of cultivated lands that  
20 provide suitable habitat for native wildlife species (Table 3-4 in Chapter 3, *Description of*  
21 *Alternatives*). In addition,

22 Species-specific biological goals and objectives for tricolored blackbird commit to protecting or  
23 restoring at least 50 acres of occupied or recently occupied (within the last 15 years) tricolored  
24 blackbird nesting habitat located within 5 miles of high-value foraging habitat in CZs 1, 2, 8, or 11  
25 (Objective TRBL1.1). Foraging habitat value classes for tricolored blackbird are found in Table 12-9-  
26 38. To ensure that natural community conservation benefits tricolored blackbird, the Plan further  
27 specifies that cultivated lands protected for tricolored blackbird retain residual wetland, grassland  
28 patches, shrub stands, and herbaceous edge habitats which may provide suitable nesting, foraging  
29 or roosting habitat for the species (Objective CLNC1.3). In addition, 26,300 acres of moderate-, high-,  
30 or very high-value cultivated lands would be conserved and managed as nonbreeding foraging  
31 habitat, 50% of which would be of high- or very high-value (Objective TRBL1.2). At least 11,050  
32 acres of cultivated lands managed as high to very high breeding foraging habitat would be conserved  
33 within 5 miles of occupied or recently occupied (within the last 15 years) tricolored blackbird  
34 nesting habitat in CZs 1, 2, 3, 4, 7, 8, or 11 (Objective TRBL1.2). Most of the loss of breeding and  
35 nonbreeding habitat would be to cultivated lands that are abundant throughout the study area, so  
36 the loss is not expected to adversely affect the population in the study area.

37 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*  
38 *Plant Species*) estimates that the restoration and protection actions discussed above could result in  
39 the protection of an estimated 46,566 acres of tricolored blackbird habitat (16,476 acres breeding  
40 habitat and 31,090 acres nonbreeding habitat) and restoration of 31,001 acres of tricolored  
41 blackbird habitat (2,190 acres breeding habitat and 28,811 acres nonbreeding habitat).

42 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*  
43 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*  
44 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*

1 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
2 *Material, and AMM7 Barge Operations Plan. All of these AMMs include elements that would avoid or*  
3 *minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are*  
4 *described in detail in BDCP Appendix 3.C, Avoidance and Minimization Measures.*

5 **NEPA Effects:** The losses of tricolored blackbird habitat and potential direct mortality of a special  
6 status species under Alternative 9 would represent an adverse effect in the absence of other  
7 conservation actions. However, with habitat protection and restoration associated with CM3, CM4,  
8 CM5, CM7, CM8, and CM11, guided by species-specific goals and objectives and by AMM1-AMM7  
9 and *AMM21 Tricolored Blackbird*, which would be in place throughout the construction period, the  
10 effects of habitat loss or potential mortality on tricolored blackbird would not be adverse under  
11 Alternative 9.

12 **CEQA Conclusion:**

13 **Near-Term Timeframe**

14 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
15 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
16 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
17 effects of construction would be less than significant under CEQA. Alternative 9 would remove 3,290  
18 acres of breeding habitat (98 acres of nesting, 2,264 acres of cultivated lands, and 985 acres of  
19 noncultivated lands suitable for foraging) and 6,757 acres of nonbreeding habitat (826 acres of  
20 roosting, 5,171 acres of cultivated lands, and 760 acres of noncultivated lands suitable for foraging)  
21 for tricolored blackbird in the study area in the near-term. These effects would result from the  
22 construction of the water conveyance facilities (CM1, 659 acres of breeding, 1,927 acres of  
23 nonbreeding), and implementing other conservation measures (CM2 *Yolo Bypass Fisheries*  
24 *Enhancement*, CM4 *Tidal Natural Communities Restoration*, and CM5 *Seasonally Inundated Floodplain*  
25 *Restoration*, and CM7 *Riparian Natural Community Restoration*—2,688 acres of breeding, 4,830 acres  
26 of nonbreeding).

27 Typical NEPA and CEQA project-level mitigation ratios would be 1:1 for restoration/creation and  
28 1:1 for protection for the loss of nesting and roosting wetland habitat, 2:1 protection for loss of  
29 noncultivated lands suitable for foraging (for the breeding and nonbreeding season), and 1:1  
30 protection for the loss of cultivated lands.

31 Using these ratios would indicate that the compensation for loss or conversion of tricolored  
32 blackbird habitat from CM1 would require 10 acres of restoration and 10 acres of protection of  
33 nesting habitat, 256 acres of restoration and 256 acres of protection of roosting habitat, 854 acres of  
34 protection of noncultivated lands that provide foraging habitat, 523 acres of protection of cultivated  
35 lands suitable for foraging during the breeding season, and 1,370 acres of cultivated lands that  
36 provide foraging habitat during the nonbreeding season. The near-term effects of other  
37 conservation actions would remove or convert 88 acres of nesting habitat, 570 acres of roosting  
38 habitat, 619 acres of noncultivated lands suitable for foraging, 1,741 acres of cultivated lands that  
39 provide foraging habitat during the breeding season, and 3,801 acres of cultivated lands during the  
40 nonbreeding season. Compensation for these losses from other conservation measures would  
41 therefore require 88 acres of restoration and 88 acres of protection of nesting habitat, 570 acres of  
42 restoration and 570 acres of protection of roosting habitat, 1,238 acres of protection of  
43 noncultivated lands that provide foraging habitat, 1,741 acres of protection of cultivated lands

1 suitable for foraging during the breeding season, and 3,801 acres of cultivated lands that provide  
2 foraging habitat during the nonbreeding season. using the same typical NEPA and CEQA ratios.

3 Total compensation for near-term loss or conversion of tricolored blackbird required using the  
4 typical ratios above would be 98 acres of restoration and 98 acres of protection for nesting habitat,  
5 826 acres of restoration and 826 acres of protection for roosting habitat, 3,490 acres of protection of  
6 noncultivated foraging habitat, 2,264 acres of protection for cultivated lands that provide foraging  
7 habitat during the breeding season, and 5,171 acres of cultivated lands that provide foraging habitat  
8 during the nonbreeding season.

9 The BDCP has committed to near-term goals of protecting 25 acres and restoring protecting 750  
10 acres and restoring 800 acres of valley/foothill riparian natural community, protecting 2,000 acres  
11 and restoring 1,140 acres of grassland natural community, protecting 400 acres of vernal pool  
12 complex, protecting 120 acres of alkali seasonal wetland complex, protecting 4,800 acres of  
13 managed wetland natural community, protecting 15,400 acres of non-rice cultivated lands,  
14 protecting 900 acres of rice or rice equivalent habitat, restoring 8,850 acres of tidal freshwater  
15 emergent wetlands and 2,000 acres of tidal brackish emergent wetlands (Table 3-4 in Chapter 3,  
16 *Description of Alternatives*). These conservation actions are associated with CM3, CM4, CM5, CM7,  
17 and CM8 and would occur in the same timeframe as the construction and early restoration losses.  
18 Some proportion of these natural communities provide suitable habitat for tricolored blackbird as  
19 described below.

20 Nesting by tricolored blackbirds is currently limited by the availability of high-value breeding  
21 habitat, which is represented by suitable nesting substrate, such as cattail/bulrush emergent  
22 wetland, in close association with highly productive foraging areas that support abundant insect  
23 prey, such as grasslands, seasonal wetlands, pasturelands, alfalfa and other hay crops, and some  
24 croplands. The nesting habitat would be located within 5 miles of high-value foraging habitat in CZs  
25 1, 2, 8, or 11 (see Table 12-9-38 for foraging habitat values) and would be actively managed to  
26 maintain actively growing stands of bulrush/cattail emergent vegetation through mechanical  
27 habitat manipulation, prescribed fire, or other measures described in *CM11 Natural Communities*  
28 *Enhancement and Management*. In addition to the actively managed nesting habitat, a portion of the  
29 750 acres of protection and 800 acres of restoration of valley/foothill riparian natural community,  
30 and the restoration of 900 acres nontidal marsh would provide nesting habitat for tricolored  
31 blackbird. The Plan estimates that modeled nesting habitat in the Plan Area currently includes 8% of  
32 valley/foothill riparian and 22% of nontidal freshwater emergent marsh (BDCP Chapter 5, Section  
33 5.6.12.2, *Beneficial Effects*). Assuming similar proportions of modeled habitat on conservation lands  
34 restored in the near-term, approximately 64 acres of valley foothill riparian and 198 acres of  
35 nontidal marsh restored would provide nesting habitat for tricolored blackbird.

36 The Plan estimates that modeled roosting habitat in the Plan Area currently includes 95% of tidal  
37 freshwater emergent wetland, 57% of brackish emergent wetland, 21% of valley/foothill riparian,  
38 75% of nontidal marsh, and 15% of managed wetlands (BDCP Chapter 5, Section 5.6.12.2, *Beneficial*  
39 *Effects*). Assuming similar proportions of modeled habitat on conservation lands restored in the  
40 near-term, the restoration of approximately 8,408 acres of tidal freshwater emergent wetland, 1,140  
41 acres of tidal brackish emergent wetland, 675 acres of nontidal marsh, and 168 acres of valley  
42 foothill riparian would provide 10,391 acres of nesting habitat for tricolored blackbird. An estimated  
43 878 acres of roosting habitat would also be protected in the near-term time period (158 acres of  
44 valley/foothill riparian, 720 acres managed wetland).

1 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1  
2 and GNC1.2). Grassland protection in CZs 1, 8, and 11 would be associated with vernal pool and  
3 alkali seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) which would result in a  
4 contiguous matrix of grassland, alkali seasonal wetland, and vernal pool natural communities. The  
5 protection and restoration of grasslands, alkali seasonal wetlands, and vernal pool complexes would  
6 provide improved foraging opportunities for tricolored blackbirds during both the breeding and  
7 nonbreeding seasons. Proximity of nesting colonies to suitable foraging habitat contributes to high  
8 reproductive success in tricolored blackbirds. These natural communities are known to support  
9 large insect populations, a vital food resource for successful rearing and fledging of young. Those  
10 conservation lands that lie within a few miles of active nesting colonies would provide high-value  
11 foraging areas to support breeding tricolored blackbirds. Under *CM11 Natural Communities*  
12 *Enhancement and Management*, insect prey populations would be increased on protected lands,  
13 further enhancing the foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5,  
14 and GNC2.4).

15 Cultivated lands that provide habitat for covered and other native wildlife species would provide  
16 approximately 15,600 acres of potential foraging habitat for tricolored blackbird in the near-term  
17 (Objective CLNC1.1). Objective TRBL1.3 commits to protecting 11,050 acres (23% of the total  
18 cultivated lands commitment) of high- to very high-value breeding-foraging habitat by the late long-  
19 term. Assuming that lands would be protected proportional to the conservation objectives for  
20 covered species, approximately 3,588 acres of high- to very high-value breeding foraging habitat  
21 consisting of cultivated lands would be protected in the near-term. These lands would be protected  
22 within 5 miles of occupied or recently occupied tricolored blackbird nesting habitat in CZs 1, 2, 3, 4,  
23 7, 8 or 11. In addition, Objective TRBL1.2 states that of the cultivated lands protected in the late  
24 long-term time period, 26,300 acres (54% of all cultivated lands protected) would be maintained in  
25 moderate – high, or very high-value cultivated lands, at least 50% of which would be high- to very  
26 high-value. Assuming proportional conservation in the near-term, an estimated 8,424 acres of  
27 cultivated lands that provide foraging habitat for tricolored blackbird would be protected in the  
28 near-term, 4,212 of which would be in high- to very high-value cultivated lands. Small but essential  
29 habitats for species including tricolored blackbird would also be protected that occur within the  
30 agricultural matrix. This would include the retention of wetlands, grassland patches, shrub stands,  
31 and herbaceous edge habitats, which could provide suitable nesting, foraging or roosting habitat for  
32 tricolored blackbird (Objective CLNC1.3).

33 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
34 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
35 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
36 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
37 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
38 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
39 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

40 The acres of protection and restoration contained in the near-term Plan goals, in addition to the  
41 detailed habitat value goals that would be applied to near-term acres, are more than sufficient to  
42 satisfy the typical mitigation ratios that would be applied to the project-level effects of CM1 and the  
43 near-term impacts from other conservation measures on nesting, roosting, and cultivated lands  
44 foraging habitat. The 3,660 acres of grassland protection in the near-term are 213 acres short of the  
45 2:1 protection mitigation ratio. However, the acres of permanent impact would be compensated for

1 by this acreage, and temporary impacts on grassland would be restored to preproject conditions  
2 (including revegetation with native vegetation if within 1 year of completion of construction) under  
3 *AMM2 Construction Best Management Practices and Monitoring*. With the enhancement of grasslands  
4 described above, and the restoration of temporary habitat impacts, this difference between  
5 impacted and conserved grassland acreages in the near-term time period would not result in a  
6 significant impact on tricolored blackbird.

7 ***Late Long-Term Timeframe***

8 Based on the habitat model, the study area approximately 164,947 acres of breeding and 259,093  
9 acres of nonbreeding habitat for tricolored blackbird. The Delta is an important wintering area for  
10 the tricolored blackbird (Hamilton 2004, Beedy 2008). Although there is a large acreage of modeled  
11 breeding habitat available, the study area does not currently support many nesting tricolored  
12 blackbirds with the exception of a few occurrences on the fringes of the Suisun Marsh, in the Yolo  
13 Bypass, and along the southwestern perimeter of the study area (BDCP, Chapter 5, *Effects Analysis*).  
14 Alternative 9 as a whole would result in the permanent loss of and temporary effects on 12,872  
15 acres of breeding habitat and 29,289 acres of nonbreeding habitat for tricolored blackbird during  
16 the term of the Plan (8% of the total breeding habitat in the study area and 11% of the total  
17 nonbreeding habitat in the study area). The locations of these losses are described above in the  
18 analyses of individual conservation measures.

19 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*  
20 *Restoration*, *CM4 Tidal Natural Communities Restoration*, *CM5 Seasonally Inundated Floodplain*  
21 *Restoration*, *CM7 Riparian Natural Community Restoration*, and *CM8 Grassland Natural Community*  
22 *Restoration* to restore or create at least 5,000 acres and protect at least 750 acres of valley/foothill  
23 riparian natural community, protect 8,000 acres and restore 2,000 acres of grassland natural  
24 community, protect 600 acres of vernal pool complex, protect 150 acres of alkali seasonal wetland  
25 complex, protect 8,100 acres of managed wetland, and protect 48,625 acres of cultivated lands that  
26 provide suitable habitat for native wildlife species (Table 3-4 in Chapter 3, *Description of*  
27 *Alternatives*). In addition,

28 Species-specific biological goals and objectives for tricolored blackbird commit to protecting or  
29 restoring at least 50 acres of occupied or recently occupied (within the last 15 years) tricolored  
30 blackbird nesting habitat located within 5 miles of high-value foraging habitat in CZs 1, 2, 8, or 11  
31 (Objective TRBL1.1). Foraging habitat value classes for tricolored blackbird are found in Table 12-9-  
32 38. To ensure that natural community conservation benefits tricolored blackbird, the Plan further  
33 specifies that cultivated lands protected for tricolored blackbird retain residual wetland, grassland  
34 patches, shrub stands, and herbaceous edge habitats which may provide suitable nesting, foraging  
35 or roosting habitat for the species (Objective CLNC1.3). In addition, 26,300 acres of moderate-, high-,  
36 or very high-value cultivated lands would be conserved and managed as nonbreeding foraging  
37 habitat, 50% of which would be of high- or very high-value (Objective TRBL1.2). At least 11,050  
38 acres of cultivated lands managed as high to very high breeding foraging habitat would be conserved  
39 within 5 miles of occupied or recently occupied (within the last 15 years) tricolored blackbird  
40 nesting habitat in CZs 1, 2, 3, 4, 7, 8, or 11 (Objective TRBL1.2). Most of the loss of breeding and  
41 nonbreeding habitat would be to cultivated lands that are abundant throughout the study area, so  
42 the loss is not expected to adversely affect the population in the study area.

43 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6.12.2, *Effects Analysis*) estimates  
44 that the restoration and protection actions discussed above could result in the protection of an

1 estimated 46,566 acres of tricolored blackbird habitat (16,476 acres breeding habitat and 31,090  
2 acres nonbreeding habitat) and restoration of 31,001 acres of tricolored blackbird habitat (2,190  
3 acres breeding habitat and 28,811 acres nonbreeding habitat).

4 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
5 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
6 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
7 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
8 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
9 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
10 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*. Considering these  
11 protection and restoration provisions, which would provide acreages of new or enhanced habitat in  
12 amounts greater than necessary to compensate for habitats lost to construction and restoration  
13 activities, and with implementation of AMM1–AMM7 and *AMM21 Tricolored Blackbird*, the loss of  
14 habitat or direct mortality through the implementation of Alternative 9 as a whole would not result  
15 in a substantial adverse effect through habitat modifications and would not substantially reduce the  
16 number or restrict the range of the species. Therefore, the alternative would have a less-than-  
17 significant impact on tricolored blackbird.

18 Other factors relevant to effects on tricolored blackbird are listed here.

- 19 • Very little loss of nesting habitat would occur (up to 84 acres of permanent loss and 88 acres of  
20 temporary loss).
- 21 • Most of the loss of breeding and nonbreeding habitat would be to cultivated lands that are  
22 abundant throughout the Plan Area, so the loss is not expected to adversely affect the population  
23 in the Plan Area.
- 24 • Most temporary impacts would be to cultivated lands and grasslands that could be restored  
25 relatively quickly to suitable foraging habitat after completion of construction activities.

26 Considering these protection and restoration provisions, which would provide acreages of new or  
27 enhanced habitat in amounts greater than necessary to compensate for habitats lost to construction  
28 and restoration activities, and implementation of AMM1–AMM7 and *AMM21 Tricolored Blackbird*,  
29 the loss of habitat or direct mortality through the implementation of Alternative 9 as a whole would  
30 not result in a substantial adverse effect through habitat modifications and would not substantially  
31 reduce the number or restrict the range of the species. Therefore, the alternative would have a less-  
32 than-significant impact on tricolored blackbird.

### 33 **Impact BIO-88: Effects on Tricolored Blackbird Associated with Electrical Transmission** 34 **Facilities**

35 New transmission lines would increase the risk that tricolored blackbirds could be subject to power  
36 line strikes, which could result in injury or mortality of individuals. Tricolored blackbirds would  
37 have the potential to intersect the proposed transmission lines largely due to winter movements  
38 throughout the study area, when individuals are migrating in large flocks and dense fog is common  
39 in the area). Although migratory movements may increase the risk of strike hazard, daily flights  
40 associated with winter foraging likely occurs in smaller flocks at heights that are lower than the  
41 transmission lines (BDCP Attachment 5J.C, *Analysis of Potential Bird Collisions at Proposed BDCP*  
42 *Transmission Lines*). Transmission line poles and towers provide perching substrate for raptors,

1 which could result in increased predation pressure on local tricolored blackbirds. The existing  
2 network of transmission lines in the Plan Area currently poses these risks and any incremental risk  
3 associated with the new power line corridors would not be expected to affect the study area  
4 population. *AMM20 Greater Sandhill Crane* would further reduce any potential effects of  
5 transmission lines on tricolored blackbird.

6 **NEPA Effects:** New transmission lines would increase the risk for tricolored blackbird powerline  
7 strikes, primarily in winter during migration movements. *AMM20 Greater Sandhill Crane* would  
8 reduce the potential impact of the construction of new transmission lines on tricolored blackbird  
9 and would not result in an adverse effect on the species.

10 **CEQA Conclusion:** New transmission lines would increase the risk for tricolored blackbird  
11 powerline strikes, primarily in winter during migration movements. *AMM20 Greater Sandhill Crane*  
12 would reduce the potential impact of the construction of new transmission lines on tricolored  
13 blackbird to a less-than-significant level.

#### 14 **Impact BIO-89: Indirect Effects of Plan Implementation on Tricolored Blackbird**

15 **Indirect construction- and operation-related effects:** Tricolored blackbird nesting habitat within  
16 the vicinity of proposed construction areas that could be indirectly affected by construction  
17 activities. Construction noise above background noise levels (greater than 50 dBA) could extend  
18 1,900 to 5,250 feet from the edge of construction activities (BDCP Appendix 5.J, Attachment 5J.D,  
19 *Indirect Effects of the Construction of the BDCP Conveyance Facility on Sandhill Crane*, Table 4),  
20 although there are no available data to determine the extent to which these noise levels could affect  
21 tricolored blackbird. Indirect effects associated with construction include noise, dust, and visual  
22 disturbance caused by grading, filling, contouring, and other ground-disturbing operations outside  
23 the project footprint but within 1,300 feet from the construction edge. Construction and subsequent  
24 maintenance-related noise and visual disturbances could mask calls, disrupt foraging and nesting  
25 behaviors, and reduce the functions of suitable nesting habitat for these species. *AMM21 Tricolored*  
26 *Blackbird* would require preconstruction surveys, and if detected, covered activities would be  
27 avoided within a minimum 250 feet of an active nesting colony and up to 1,300 feet where  
28 practicable until breeding has ceased. In addition, monitoring would be implemented to ensure that  
29 construction does not adversely affect the nesting colony. The use of mechanical equipment during  
30 water conveyance facilities construction could cause the accidental release of petroleum or other  
31 contaminants that could affect tricolored blackbird in the surrounding habitat. The inadvertent  
32 discharge of sediment or excessive dust adjacent to tricolored blackbird habitat could also affect the  
33 species. *AMM1-AMM7*, including *AMM2 Construction Best Management Practices and Monitoring*,  
34 would minimize the likelihood of such spills and ensure that measures are in place to prevent runoff  
35 from the construction area and negative effects of dust on active nests.

36 **Methylmercury Exposure:** Covered activities have the potential to exacerbate bioaccumulation of  
37 mercury in avian species, including tricolored blackbird. Marsh (tidal and nontidal) and floodplain  
38 restoration also have the potential to increase exposure to methylmercury. Mercury is transformed  
39 into the more bioavailable form of methylmercury in aquatic systems, especially areas subjected to  
40 regular wetting and drying such as tidal marshes and flood plains (Alpers et al. 2008). Thus, BDCP  
41 restoration activities that create newly inundated areas could increase bioavailability of mercury  
42 (see BDCP Chapter 3 *Conservation Strategy*, for details of restoration).

1 The potential mobilization or creation of methylmercury within the study area varies with site-  
2 specific conditions and would need to be assessed at the project level. *CM12 Methylmercury*  
3 *Management* contains provisions for project-specific Mercury Management Plans. Breeding  
4 tricolored blackbirds are not thought to be highly susceptible to methylmercury exposure because  
5 tidal wetlands are not expected to be a major foraging area for the species. Furthermore, the Suisun  
6 Marsh Plan (Bureau of Reclamation et al. 2010) anticipates that tidal wetlands restored under the  
7 plan would generate less methylmercury than the existing managed wetlands, potentially reducing  
8 the overall risk. However, species sensitivity to methylmercury differs widely and there is a large  
9 amount of uncertainty with respect to species-specific effects and increased methylmercury  
10 associated with natural community and floodplain restoration could indirectly affect tricolored  
11 blackbird, via uptake in lower trophic levels (as described in the BDCP, Appendix 5.D, *Contaminants*).  
12 Site-specific restoration plans that address the creation and mobilization of mercury, as well as  
13 monitoring and adaptive management as described in CM12 would be available to address the  
14 uncertainty of methylmercury levels in restored tidal marsh and potential impacts on tricolored  
15 blackbird.

16 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in  
17 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,  
18 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,  
19 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz  
20 2009). The effect of selenium toxicity differs widely between species and also between age and sex  
21 classes within a species. In addition, the effect of selenium on a species can be confounded by  
22 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith  
23 2009).

24 The primary source of selenium bioaccumulation in birds is through their diet (Ackerman and  
25 Eagles-Smith 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the  
26 trophic level at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At  
27 Kesterson Reservoir in the San Joaquin Valley, selenium concentrations in invertebrates have been  
28 found to be two to six times the levels in rooted plants. Furthermore, bivalves sampled in the San  
29 Francisco Bay contained much higher selenium levels than crustaceans such as copepods (Stewart et  
30 al. 2004). Studies conducted at the Grasslands in Merced County recorded higher selenium levels in  
31 black-necked stilts which feed on aquatic invertebrates than in mallards and pintails, which are  
32 primarily herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which  
33 forage on bivalves) have much higher levels of selenium levels than shorebirds that prey on aquatic  
34 invertebrates (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high  
35 levels of selenium have a higher risk of selenium toxicity.

36 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations  
37 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to  
38 exacerbate bioaccumulation of selenium in avian species, including tricolored blackbird. Marsh  
39 (tidal and nontidal) and floodplain restoration have the potential to mobilize selenium, and  
40 therefore increase avian exposure from ingestion of prey items with elevated selenium levels. Thus,  
41 BDCP restoration activities that create newly inundated areas could increase bioavailability of  
42 selenium (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Changes in  
43 selenium concentrations were analyzed in Chapter 8, *Water Quality*, and it was determined that,  
44 relative to Existing Conditions and the No Action Alternative, CM1 would not result in substantial,  
45 long-term increases in selenium concentrations in water in the Delta under any alternative.

1 However, it is difficult to determine whether the effects of potential increases in selenium  
2 bioavailability associated with restoration-related conservation measures (CM4 and CM5) would  
3 lead to adverse effects on tricolored blackbird.

4 Because of the uncertainty that exists at this programmatic level of review, there could be a  
5 substantial effect on tricolored blackbird from increases in selenium associated with restoration  
6 activities. This effect would be addressed through the implementation of *AMM27 Selenium*  
7 *Management* (BDCP Appendix 3.C, *Avoidance and Minimization Measures*) which would provide  
8 specific tidal habitat restoration design elements to reduce the potential for bioaccumulation of  
9 selenium and its bioavailability in tidal habitats. Furthermore, the effectiveness of selenium  
10 management to reduce selenium concentrations and/or bioaccumulation would be evaluated  
11 separately for each restoration effort as part of design and implementation. This avoidance and  
12 minimization measure would be implemented as part of the tidal habitat restoration design  
13 schedule.

14 **NEPA Effects:** The effects of noise, potential spills of hazardous material, increased dust and  
15 sedimentation, and operations and maintenance of the water conveyance facilities would not be  
16 adverse with the implementation of AMM1-AMM7 and *AMM21 Tricolored Blackbird*. Tidal habitat  
17 restoration could result in increased exposure of California least tern to selenium. This effect would  
18 be addressed through the implementation of *AMM26, Selenium Management* which would provide  
19 specific tidal habitat restoration design elements to reduce the potential for bioaccumulation of  
20 selenium and its bioavailability in tidal habitats. The implementation of tidal natural communities  
21 restoration or floodplain restoration could result in increased exposure of tricolored blackbird to  
22 methylmercury. It is unlikely that breeding tricolored blackbird would be highly susceptible to  
23 methylmercury exposure because tidal wetlands are not expected to be a major foraging area for the  
24 species. However, it is unknown what concentrations of methylmercury are harmful to this species  
25 and the potential for increased exposure varies substantially within the study area. Site-specific  
26 restoration plans that address the creation and mobilization of mercury, as well as monitoring and  
27 adaptive management as described in *CM12 Methylmercury Management*, would better inform the  
28 potential effects of methylmercury on tricolored blackbird. The site-specific planning phase of  
29 marsh restoration would be the appropriate place to assess the potential for risk of methylmercury  
30 exposure for tricolored blackbird, once site specific sampling and other information could be  
31 developed.

32 **CEQA Conclusion:** Impacts of noise, the potential for hazardous spills, increased dust and  
33 sedimentation, and operations and maintenance of the water conveyance facilities would be less  
34 than significant with the implementation of *AMM21 Tricolored Blackbird* and AMM1-AMM7. Tidal  
35 habitat restoration could result in increased exposure of California least tern to selenium. This  
36 impact would be addressed through the implementation of *AMM26, Selenium Management* which  
37 would provide specific tidal habitat restoration design elements to reduce the potential for  
38 bioaccumulation of selenium and its bioavailability in tidal habitats. The implementation of tidal  
39 natural communities restoration or floodplain restoration could result in increased exposure of  
40 tricolored blackbird to methylmercury. It is unlikely that breeding tricolored blackbird would be  
41 highly susceptible to methylmercury exposure because tidal wetlands are not expected to be a major  
42 foraging area for the species. However, it is unknown what concentrations of methylmercury are  
43 harmful to this species. Site-specific restoration plans that address the creation and mobilization of  
44 mercury, as well as monitoring and adaptive management as described in *CM12 Methylmercury*  
45 *Management*, would better inform the potential impacts of methylmercury on tricolored blackbird.

1 With these measures in place, indirect effects from Alternative 9 would have a less-than-significant  
2 impact on tricolored blackbird.

3 **Impact BIO-90: Periodic Effects of Inundation of Tricolored Blackbird Habitat as a Result of**  
4 **Implementation of Conservation Components**

5 Flooding of the Yolo Bypass (CM2) would inundate 2,447–4,312 acres of breeding habitat and 263–  
6 1,252 acres of nonbreeding habitat (Table 12-9-37). Based on hypothetical floodplain restoration,  
7 construction of setback levees for *CM5 Seasonally Inundated Floodplain Restoration* could result in  
8 periodic inundation of approximately 2,509 acres of breeding habitat (30 acres of nesting, 2,124  
9 acres of cultivated lands, 355 acres of noncultivated lands suitable for foraging) and 2,694 acres of  
10 nonbreeding habitat (29 acres of roosting, 2,506 acres of cultivated lands, 158 acres of noncultivated  
11 lands suitable for foraging, Table 12-9-37) resulting in the temporary loss of these habitats.  
12 Tricolored blackbirds are highly nomadic during the winter and would be expected to move to  
13 adjacent suitable foraging habitat when the bypass is inundated, as they do under the current  
14 flooding regime. However, this inundation could reduce the availability of nesting habitat during  
15 years when flooding extends into the nesting season (past March). The periodic inundation of the  
16 Yolo Bypass (CM2) and of other floodplains (CM5) is expected to restore a more natural flood  
17 regime in support of wetland and riparian vegetation types that support nesting habitat. There  
18 would be no expected adverse effect on tricolored blackbird.

19 **NEPA Effects:** Implementation of CM2 and CM5 would result in periodic inundation of nesting and  
20 foraging habitat for tricolored blackbird. Periodic inundation would not result in an adverse effect  
21 on tricolored blackbird because inundation is expected to take place outside of the breeding season.  
22 Although foraging habitat would be temporarily unavailable, tricolored blackbirds are highly  
23 nomadic in winter and wintering birds would be expected to move to adjacent foraging habitat.

24 **CEQA Conclusion:** Implementation of CM2 and CM5 would result in periodic inundation of nesting  
25 and foraging habitat for tricolored blackbird. Periodic inundation would have a less-than-significant  
26 impact on tricolored blackbird because inundation is expected to take place outside of the breeding  
27 season. Although foraging habitat would be temporarily unavailable, tricolored blackbirds are highly  
28 nomadic in winter and wintering birds would be expected to move to adjacent foraging habitat.

29 **Western Burrowing Owl**

30 Western burrowing owl modeled habitat consisted of high- and low-value habitat for nesting and  
31 foraging. High-value habitat consists of plant alliances within the grassland and vernal pool natural  
32 communities and pasture. Low-value habitat includes plant alliances and crop types from managed  
33 wetland, alkali seasonal wetland, and cultivated lands. Value was determined through reported  
34 species use patterns from the literature.

35 Construction and restoration associated with Alternative 9 conservation measures would result in  
36 both temporary and permanent losses of western burrowing owl modeled habitat as indicated in  
37 Table 12-9-39. Full implementation of Alternative 9 would also include the following conservation  
38 actions over the term of the BDCP to benefit the western burrowing owl (BDCP Chapter 3, Section  
39 3.3, *Biological Goals and Objectives*).

- 40 • Protect at least 1,000 acres of cultivated lands in CZs 1 and 11 that support high-value  
41 burrowing owl habitat and are within 0.5 mile of high-value grassland habitat or occupied low-  
42 value habitat (Objective WBO1.1, associated with CM3).

- 1 • Protect at least 8,000 acres of grassland, with at least 2,000 acres protected in CZ 1, at least  
2 1,000 acres protected in CZ 8, at least 2,000 acres protected in CZ 11, and the remainder  
3 distributed among CZs 1, 2, 4, 5, 7, 8, and 11 (Objective GNC1.1, associated with CM3).
- 4 • Restore at least 2,000 acres of grasslands (Objective GNC1.2, associated with CM8).
- 5 • Protect at least 150 acres of alkali seasonal wetland and at least 600 acres of existing vernal pool  
6 complex in CZs 1, 8, and/or 11 (Objectives ASWNC1.1 and VPNC1.1, associated with CM3).
- 7 • Restore or create alkali seasonal wetlands and vernal pool complex in CZs 1, 8, and/or 11 to  
8 achieve no net loss of wetted acres (Objectives ASWNC1.2 and VPNC1.2, associated with CM9).
- 9 • Increase burrow availability and prey abundance and accessibility (Objectives ASWNC2.3,  
10 ASWNC2.4, VPNC2.4, VPNC2.5, GNC2.3, and GNC2.4, associated with CM11).
- 11 • Protect at least 48,600 acres of cultivated lands that provide suitable habitat for covered and  
12 other native wildlife species and maintain and protect the small patches of important wildlife  
13 habitats associated with cultivated lands (Objectives CLNC1.1 and CLNC1.3, associated with  
14 CM3).

15 As explained below, with the restoration or protection of these amounts of habitat, in addition to  
16 management activities that would enhance habitat for the species and implementation of AMM1–  
17 AMM7, and AMM23 *Western Burrowing Owl*, impacts on western burrowing owl would not be  
18 adverse for NEPA purposes and would be less than significant for CEQA purposes.

19 **Table 12-9-39. Changes in Western Burrowing Owl Modeled Habitat Associated with Alternative 9**  
20 **(acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	High-value	87	87	407	407	NA	NA
	Low-value	298	298	2,120	2,120	NA	NA
<b>Total Impacts CM1</b>		<b>385</b>	<b>385</b>	<b>2,527</b>	<b>2,527</b>	<b>NA</b>	<b>NA</b>
CM2–CM18	High-value	4,487	11,570	245	328	1,390–3,303	779
	Low-value	3,527	28,506	144	971	1,522–2,927	6,162
<b>Total Impacts CM2–CM18</b>		<b>8,014</b>	<b>40,076</b>	<b>389</b>	<b>1,299</b>	<b>2,912–6,230</b>	<b>6,941</b>
<b>Total High-value</b>		<b>4,574</b>	<b>11,657</b>	<b>652</b>	<b>735</b>		
<b>Total Low-value</b>		<b>3,825</b>	<b>28,804</b>	<b>2,264</b>	<b>3,091</b>		
<b>TOTAL IMPACTS</b>		<b>8,399</b>	<b>40,461</b>	<b>2,916</b>	<b>3,826</b>		

<sup>a</sup> See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

1 **Impact BIO-91: Loss or Conversion of Habitat for and Direct Mortality of Western Burrowing**  
2 **Owl**

3 Alternative 9 conservation measures would result in the combined permanent and temporary loss  
4 of up to 44,287 acres of modeled habitat for western burrowing owl (of which 12,392 acres is of  
5 high value and 31,895 acres is of low value, Table 12-9-39). Conservation measures that would  
6 result in these losses are conveyance facilities and transmission line construction, and establishment  
7 and use of borrow and spoil areas (CM1), *CM2 Yolo Bypass Fisheries Enhancement*, *CM4 Tidal Natural*  
8 *Communities Restoration*, *CM5 Seasonally Inundated Floodplain Restoration*, *CM7 Riparian Natural*  
9 *Community Restoration*, *CM8 Grassland Natural Community Restoration*, *CM10 Nontidal Marsh*  
10 *Restoration*, *CM11 Natural Communities Enhancement and Management* and *CM18 Conservation*  
11 *Hatcheries*. Habitat enhancement and management activities (CM11), which include ground  
12 disturbance or removal of nonnative vegetation, could result in local adverse habitat effects. In  
13 addition, maintenance activities associated with the long-term operation of the water conveyance  
14 facilities and other BDCP physical facilities could degrade or eliminate western burrowing owl  
15 habitat. Each of these individual activities is described below. A summary statement of the combined  
16 impacts and NEPA effects, and a CEQA conclusion follow the individual conservation measure  
17 discussions.

- 18 • *CM1 Water Facilities and Operation*: Construction of Alternative 9 conveyance facilities would  
19 result in the combined permanent and temporary loss of up to 494 acres of modeled  
20 high-value western burrowing owl habitat (87 acres of permanent loss, 407 acres of temporary  
21 loss) from CZs 4, 5, 6, 7, and 8. In addition, 2,418 acres of low-value burrowing owl habitat  
22 would be removed (298 acres of permanent loss, 2,120 acres of temporary loss). The permanent  
23 and temporary losses to habitat would occur at numerous locations where dredging,  
24 construction of operable barriers and canals, and channel enlargement would be undertaken.  
25 The CM1 footprint does not overlap with any western burrowing owl occurrences. However,  
26 there is suitable habitat throughout the study area. Refer to the Terrestrial Biology Map Book for  
27 a detailed view of Alternative 9 construction locations.
- 28 • *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo bypass fisheries enhancement  
29 would result in the combined permanent and temporary loss of up to 1,127 acres of high-value  
30 western burrowing owl habitat (882 acres of permanent loss, 245 acres of temporary loss) in  
31 the Yolo Bypass in CZ 2. In addition, 242 acres of low-value habitat would be removed (98 acres  
32 of permanent loss, 144 acres of temporary loss). The loss is expected to occur during the first 10  
33 years of Alternative 9 implementation.
- 34 • *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and  
35 inundation would permanently remove an estimated 29,668 acres of modeled western  
36 burrowing owl habitat in CZs 1, 2, 4, 5, 6, 7, 8, 10, and 11. The majority of removed or converted  
37 acres (19,739 acres) is composed of low-value habitat. However, 9,929 acres of high-value  
38 habitat would also be lost from tidal restoration actions. Tidal restoration would directly impact  
39 and fragment remaining high-value grassland habitat just north of Rio Vista in and around  
40 French and Prospect Islands, and in an area south of Rio Vista around Threemile Slough. Tidal  
41 natural community restoration efforts would impact one extant record of burrowing owl just  
42 northeast of Oakley along Dutch Slough and one possibly extirpated record in Suisun Marsh.
- 43 • *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore  
44 seasonally inundated floodplain would permanently and temporarily remove approximately  
45 2,504 acres of modeled western burrowing owl in CZs 2, 4, and 7. This total is comprised of

1 2,279 acres of low-value habitat. Also, 225 acres of high-value grassland habitat would be  
2 removed (142 permanent, 83 temporary) consisting of small patches of habitat along the San  
3 Joaquin, Old, and Middle Rivers in CZ 7.

- 4 • *CM6 Channel Margin Enhancement*: Sites for channel margin enhancement would be located  
5 along levees where western burrowing owl could be present. The species is known to use often  
6 the grassland edges along canals and levees in agricultural areas. The implementation of *AMM23*  
7 *Western Burrowing Owl* would reduce the potential for channel margin enhancement activities  
8 to disturb owls or affect active nests.

- 9 • *CM7 Riparian Natural Community Restoration*: Riparian restoration would permanently remove  
10 approximately 11 acres of high-value burrowing owl habitat as part of tidal restoration. In  
11 addition, 960 acres of low-value habitat would be removed as a part of tidal restoration and  
12 3,991 acres would be removed as part of seasonal floodplain restoration through CM7.

- 13 • *CM8 Grassland Natural Community Restoration*: Grassland restoration would primarily be  
14 implemented on agricultural lands and would result in the permanent loss of 1,676 acres (362  
15 acres of high-value and 1,314 acres of low-value) of western burrowing owl habitat. The  
16 conversion of 1,676 acres of low-value habitat to high-value grassland, would temporarily  
17 remove available habitat but would ultimately have a beneficial effect on the western burrowing  
18 owl.

- 19 • *CM10 Nontidal Marsh Restoration*: Implementation would result in the permanent removal of  
20 159 acres of high-value and 952 acres of low-value western burrowing owl habitat.

- 21 • *CM11 Natural Communities Enhancement and Management*: A variety of habitat management  
22 actions that are designed to enhance wildlife values in restored or protected habitats could  
23 result in localized ground disturbances that could temporarily remove small amounts of  
24 western burrowing owl habitat. The burrowing owl's fossorial habits make the species more  
25 sensitive to the effects of ground disturbance than other raptors. Ground-disturbing activities,  
26 such as removal of nonnative vegetation and road and other infrastructure maintenance  
27 activities, would be expected to have minor adverse effects on available western burrowing owl  
28 habitat and would be expected to result in overall improvements to and maintenance of habitat  
29 values over the term of the BDCP. CM11 would also include the construction of recreational-  
30 related facilities including trails, interpretive signs, and picnic tables (BDCP Chapter 4, *Covered*  
31 *Activities and Associated Federal Actions*). The construction of trailhead facilities, signs, staging  
32 areas, picnic areas, bathrooms, etc. would be placed on existing, disturbed areas when and  
33 where possible. However, approximately 50 acres of grassland habitat would be lost from the  
34 construction of trails and facilities.

35 Habitat management- and enhancement-related activities and equipment operation could  
36 destroy nests burrows, and noise and visual disturbances could lead to their abandonment,  
37 resulting in mortality of eggs and nestlings. The potential for these activities to result in nest  
38 failure and mortality or other adverse effects on western burrowing owl would be avoided or  
39 minimized with the incorporation of *AMM23 Western Burrowing Owl* into the BDCP which would  
40 require surveys to determine presence or absence and the establishment of no-disturbance  
41 buffers around active sites.

- 42 • *CM18 Conservation Hatcheries*: Implementation of CM18 would remove up to 35 acres of high-  
43 value western burrowing owl habitat for the development of a delta and longfin smelt  
44 conservation hatchery in CZ 1.

- 1 • Operations and Maintenance: Postconstruction operation and maintenance of the above-ground  
2 water conveyance facilities and restoration infrastructure could result in ongoing but periodic  
3 disturbances that could affect western burrowing owl use of the surrounding habitat.  
4 Maintenance activities would include vegetation management, levee and structure repair, and  
5 re-grading of roads and permanent work areas. These effects, however, would be reduced by  
6 AMMs and conservation actions as described below.
- 7 • Injury and Direct Mortality: Construction would not be expected to result in direct mortality of  
8 western burrowing owl. However, if nest burrows were occupied in the vicinity of construction  
9 activities, equipment operation could destroy nests and noise and visual disturbances could lead  
10 to abandonment. *AMM23 Western Burrowing Owl* would ensure that preconstruction surveys  
11 detected any occupied burrows and no-disturbance buffers would be implemented.

12 The following paragraphs summarize the combined effects discussed above and describe other  
13 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also  
14 included.

### 15 ***Near-Term Timeframe***

16 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
17 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
18 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
19 effects of construction would not be adverse under NEPA. Alternative 9 would remove 5,226 acres  
20 (4,574 acres permanent, 652 acres temporary) of high-value habitat for western burrowing owl in  
21 the study area in the near-term. These effects would result from the construction of the water  
22 conveyance facilities (CM1, 494 acres), and implementing other conservation measures (CM2 *Yolo*  
23 *Bypass Fisheries Enhancement*, CM4 *Tidal Natural Communities Restoration*, CM7 *Riparian Natural*  
24 *Community Restoration*, CM8 *Grassland Natural Community Restoration*, CM9 *Vernal Pool and Alkali*  
25 *Seasonal Wetland Complex Restoration*, CM11 *Natural Communities Enhancement and Management*  
26 and CM18 *Conservation Hatcheries*—4,732 acres). In addition, 7,373 acres of low-value habitat  
27 would be removed or converted in the near-term (CM1, 2,120 acres; CM2 *Yolo Bypass Fisheries*  
28 *Enhancement*, CM4 *Tidal Natural Communities Restoration*, CM7 *Riparian Natural Community*  
29 *Restoration*, CM8 *Grassland Natural Community Restoration*, CM9 *Vernal Pool and Alkali Seasonal*  
30 *Wetland Complex Restoration*, CM11 *Natural Communities Enhancement and Management* and CM18  
31 *Conservation Hatcheries*—3,671 acres).

32 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected would  
33 be 2:1 protection of high-value habitat, and 1:1 protection of low-value habitat. A proportion of the  
34 loss of low-value habitat would result from conversion and enhancement to high-value habitats.  
35 Using these typical ratios would indicate that 988 acres should be protected to compensate for the  
36 loss of high-value habitat from CM1 and that 4,836 acres should be protected to compensate for the  
37 loss of low-value habitat from CM1. The near-term effects of other conservation actions would  
38 require 9,464 acres of protection to compensate for the loss of high-value habitat and 3,671 acres of  
39 protection to compensate for the loss of low-value habitat using the same typical NEPA and CEQA  
40 ratios (2:1 protection for the loss of high-value habitat, 1:1 protection for the loss of low-value  
41 habitat).

42 The BDCP has committed to near-term goals of protecting 2,000 acres and restoring 1,140 acres of  
43 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of  
44 alkali seasonal wetland complex, and protecting 15,400 acres of non-rice cultivated lands (Table 3-4

1 in Chapter 3, *Description of Alternatives*). These conservation actions are associated with CM3, CM8,  
2 and CM9 and would occur in the same timeframe as the construction and early restoration losses.

3 The protection of high-value grasslands is essential in order to sustain existing western burrowing  
4 owl populations in the study area. Grassland restoration and protection would occur in CZs 1, 2, 4, 5,  
5 7, 8, and 11 (Objectives GNC1.1 and GNC1.2). Grassland protection in CZs 1, 8, and 11 would be  
6 associated with vernal pool and alkali seasonal wetland complexes (Objectives ASWNC1.1 and  
7 VPNC1.1) and would result in a contiguous matrix of grassland, alkali seasonal wetland, and vernal  
8 pool natural communities which would provide habitat for western burrowing owl and reduce the  
9 effects of current levels of habitat fragmentation. This protection would not only expand the amount  
10 of protected high-value habitat in the study area, but also support existing western burrowing owl  
11 populations that occur to the west of CZ 8 and in the areas surrounding CZs 1 and 11, which would  
12 especially benefit declining populations in the vicinity of Suisun Marsh and San Pablo Bay. Certain  
13 types of cultivated lands such as irrigated pasture, alfalfa and other hay crops, and some row crops  
14 can provide foraging habitat for western burrowing owl. Under appropriate management regimes,  
15 cultivated lands can support breeding and wintering burrowing owls. Under *CM11 Natural*  
16 *Communities Enhancement and Management*, small mammal and insect prey populations would be  
17 increased on protected lands, enhancing the foraging value of these natural communities (Objectives  
18 ASWNC2.4, VPNC2.5, and GNC2.4). In addition, burrow availability would be increased on protected  
19 natural communities by encouraging ground squirrel occupancy and expansion through the creation  
20 of berms, mounds, edges, and through the prohibition of ground squirrel control programs (i.e.,  
21 poisoning, Objectives ASWNC2.3, VPNC2.4, GNC2.3). These Plan objectives represent performance  
22 standards for considering the effectiveness of conservation actions.

23 The combined acres of restoration and protection of 3,660 acres of grassland, vernal pool complex,  
24 and alkali seasonal wetland contained in the near-term Plan goals and the additional detail in the  
25 biological objectives satisfy the typical mitigation that would be applied to the project-level effects of  
26 CM1 on western burrowing owl habitat. Some portion of the 15,400 acres of cultivated lands  
27 protected in the near-term timeframe would include high-value crop types. These acres, in addition  
28 to the management and enhancement activities that are contained in the Plan goals, would satisfy  
29 the typical mitigation ratios that would be applied to the other near-term conservation actions,  
30 providing that the 15,400 acres of cultivated lands protected in the near-term were managed in  
31 suitable crop types to compensate for the loss of high-value habitat at a ratio of 2:1. Mitigation  
32 Measure BIO-91, *Compensate For the Near-Term Loss of High-Value Burrowing Owl Habitat*, would be  
33 available to address the adverse effect of high-value habitat loss in the near-term. The acres of  
34 protection of cultivated lands would be sufficient to compensate for the loss of low-value burrowing  
35 owl habitat from CM1 and from the other near-term conservation actions.

36 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
37 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
38 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
39 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
40 *Material*, *AMM7 Barge Operations Plan*, and *AMM23 Western Burrowing Owl*. All of these AMMs  
41 include elements that avoid or minimize the risk of affecting habitats and species adjacent to work  
42 areas and storage sites. The AMMs are described in detail in BDCP Appendix 3.C.

1 **Late Long-Term Timeframe**

2 Based on the habitat model, the study area supports approximately 152,014 acres of high-value and  
3 254,352 acres of low-value habitat for western burrowing owl. Alternative 9 as a whole would result  
4 in the permanent loss of and temporary effects on 12,392 acres of high-value habitat and 31,895  
5 acres of low value habitat over the term of the Plan. The locations of these losses are described  
6 above in the analyses of individual conservation measures.

7 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*  
8 *Restoration*, *CM8 Grassland Natural Community Restoration*, and *CM9 Vernal Pool and Alkali Seasonal*  
9 *Wetland Complex Restoration* to protect 8,000 acres and restore 2,000 acres of grassland natural  
10 community, protect 600 acres of vernal pool complex, protect 150 acres of alkali seasonal wetland  
11 complex and protect 48,625 acres of cultivated lands that provide suitable habitat for native wildlife  
12 species (Table 3-4 in Chapter 3). Grassland restoration and protection would occur in CZs 1, 2, 4, 5,  
13 7, 8, and 11 (Objectives GNC1.1 and GNC1.2). Grassland protection in CZs 1, 8, and 11 would be  
14 associated with vernal pool and alkali seasonal wetland complexes (Objectives ASWNC1.1 and  
15 VPNC1.1) and would result in a contiguous matrix of grassland, alkali seasonal wetland, and vernal  
16 pool natural communities which would provide habitat for western burrowing owl and reduce the  
17 effects of current levels of habitat fragmentation. This protection would not only expand the amount  
18 of protected high-value habitat in the Plan Area, but also support existing western burrowing owl  
19 populations that occur to the west of CZ 8 and in the areas surrounding CZs 1 and 11, which would  
20 especially benefit declining populations in the vicinity of Suisun Marsh and San Pablo Bay. Certain  
21 types of cultivated lands such as irrigated pasture, alfalfa and other hay crops, and some row crops  
22 can provide foraging habitat for western burrowing owl. Under appropriate management regimes,  
23 cultivated lands can support breeding and wintering burrowing owls. To ensure that cultivated  
24 lands conservation benefits western burrowing owl, the Plan's biological goals and objectives  
25 further specify that, of the cultivated lands protected in the late long-term, at least 1,000 acres  
26 would be protected in CZs 1 and 11 that support high-value burrowing owl habitat and are within  
27 0.5 miles of high-value grassland habitat or occupied low-value habitat (Objective WBO1.1). Under  
28 *CM11 Natural Communities Enhancement and Management*, small mammal and insect prey  
29 populations would be increased on protected lands, enhancing the foraging value of these natural  
30 communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4). In addition, burrow availability would  
31 be increased on protected natural communities by encouraging ground squirrel occupancy and  
32 expansion through the creation of berms, mounds, edges, and through the prohibition of ground  
33 squirrel control programs (i.e., poisoning, Objectives ASWNC2.3, VPNC2.4, GNC2.3).

34 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*  
35 *Plant Species*) estimates that the restoration and protection actions discussed above could result in  
36 the protection of an estimated 33,766 acres of western burrowing owl habitat (8,589 acres high-  
37 value and 25,177 acres low-value habitat) and restoration of 1,645 acres of western burrowing owl  
38 habitat (1,642 acres high-value and 3 acres low-value habitat).

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40 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
41 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
42 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
43 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
44 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
45 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

1 **NEPA Effects:** The loss of western burrowing owl habitat and potential mortality of this special-  
2 status species under Alternative 9 would represent an adverse effect in the absence of other  
3 conservation actions. With habitat protection and restoration associated with CM3, CM8, and CM11,  
4 guided by biological goals and objectives and by AMM1–AMM7 and AMM23 *Western Burrowing Owl*,  
5 and with the implementation of Mitigation Measure BIO-91, *Compensate For the Near-Term Loss of*  
6 *High-Value Burrowing Owl Habitat*, which would be available to guide the near-term protection and  
7 management of cultivated lands, the effects of habitat loss and potential mortality on western  
8 burrowing owl would not be adverse under Alternative 9.

9 **CEQA Conclusion:**

10 **Near-Term Timeframe**

11 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
12 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
13 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
14 effects of construction would be less than significant under CEQA. Alternative 9 would remove 5,226  
15 acres (4,574 acres permanent, 652 acres temporary) of high-value habitat for western burrowing  
16 owl in the study area in the near-term. These effects would result from the construction of the water  
17 conveyance facilities (CM1, 494 acres), and implementing other conservation measures (CM2 *Yolo*  
18 *Bypass Fisheries Enhancement*, CM4 *Tidal Natural Communities Restoration*, CM7 *Riparian Natural*  
19 *Community Restoration*, CM8 *Grassland Natural Community Restoration*, CM9 *Vernal Pool and Alkali*  
20 *Seasonal Wetland Complex Restoration*, CM11 *Natural Communities Enhancement and Management*  
21 and CM18 *Conservation Hatcheries*—4,732 acres). In addition, 7,373 acres of low-value habitat  
22 would be removed or converted in the near-term (CM1, 2,120 acres; CM2 *Yolo Bypass Fisheries*  
23 *Enhancement*, CM4 *Tidal Natural Communities Restoration*, CM7 *Riparian Natural Community*  
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25 *Wetland Complex Restoration*, CM11 *Natural Communities Enhancement and Management* and CM18  
26 *Conservation Hatcheries*—3,671 acres).

27 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected would  
28 be 2:1 protection of high-value habitat, and 1:1 protection of low-value habitat. A proportion of the  
29 loss of low-value habitat would result from conversion and enhancement to high-value habitats.  
30 Using these typical ratios would indicate that 988 acres should be protected to compensate for the  
31 loss of high-value habitat from CM1 and that 4,836 acres should be protected to compensate for the  
32 loss of low-value habitat from CM1. The near-term effects of other conservation actions would  
33 require 9,464 acres of protection to compensate for the loss of high-value habitat and 3,671 acres of  
34 protection to compensate for the loss of low-value habitat using the same typical NEPA and CEQA  
35 ratios (2:1 protection for the loss of high-value habitat, 1:1 protection for the loss of low-value  
36 habitat).

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38 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of  
39 alkali seasonal wetland complex, and protecting 15,400 acres of non-rice cultivated lands (Table 3-4  
40 in Chapter 3, *Description of Alternatives*). These conservation actions are associated with CM3, CM8,  
41 and CM9 and would occur in the same timeframe as the construction and early restoration losses.

42 The protection of high-value grasslands is essential in order to sustain existing western burrowing  
43 owl populations in the study area. Grassland restoration and protection would occur in CZs 1, 2, 4, 5,

1 7, 8, and 11 (Objectives GNC1.1 and GNC1.2). Grassland protection in CZs 1, 8, and 11 would be  
2 associated with vernal pool and alkali seasonal wetland complexes (Objectives ASWNC1.1 and  
3 VPNC1.1) and would result in a contiguous matrix of grassland, alkali seasonal wetland, and vernal  
4 pool natural communities which would provide habitat for western burrowing owl and reduce the  
5 effects of current levels of habitat fragmentation. This protection would not only expand the amount  
6 of protected high-value habitat in the study area, but also support existing western burrowing owl  
7 populations that occur to the west of CZ 8 and in the areas surrounding CZs 1 and 11, which would  
8 especially benefit declining populations in the vicinity of Suisun Marsh and San Pablo Bay. Certain  
9 types of cultivated lands such as irrigated pasture, alfalfa and other hay crops, and some row crops  
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11 cultivated lands can support breeding and wintering burrowing owls. Under *CM11 Natural*  
12 *Communities Enhancement and Management*, small mammal and insect prey populations would be  
13 increased on protected lands, enhancing the foraging value of these natural communities (Objectives  
14 ASWNC2.4, VPNC2.5, and GNC2.4). In addition, burrow availability would be increased on protected  
15 natural communities by encouraging ground squirrel occupancy and expansion through the creation  
16 of berms, mounds, edges, and through the prohibition of ground squirrel control programs (i.e.,  
17 poisoning, Objectives ASWNC2.3, VPNC2.4, GNC2.3). These Plan objectives represent performance  
18 standards for considering the effectiveness of conservation actions.

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20 and alkali seasonal wetland contained in the near-term Plan goals and the additional detail in the  
21 biological objectives satisfy the typical mitigation that would be applied to the project-level effects of  
22 CM1 on western burrowing owl habitat. Some portion of the 15,400 acres of cultivated lands  
23 protected in the near-term timeframe would include high-value crop types. These acres, in addition  
24 to the management and enhancement activities that are contained in the Plan goals, would satisfy  
25 the typical mitigation ratios that would be applied to the other near-term conservation actions,  
26 providing that the 15,400 acres of cultivated lands protected in the near-term were managed in  
27 suitable crop types to compensate for the loss of high-value habitat at a ratio of 2:1. Mitigation  
28 Measure BIO-91, *Compensate For the Near-Term Loss of High-Value Burrowing Owl Habitat*, would  
29 reduce the significant effect of high-value habitat loss in the near-term. The acres of protection of  
30 cultivated lands would be sufficient to compensate for the loss of low-value burrowing owl habitat  
31 from CM1 and from the other near-term conservation actions.

32 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
33 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
34 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
35 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
36 *Material Disposal Plan*, *AMM7 Barge Operations Plan*, and *AMM23 Western Burrowing Owl*. All of  
37 these AMMs include elements that avoid or minimize the risk of affecting habitats and species  
38 adjacent to work areas and storage sites. The AMMs are described in detail in BDCP Appendix 3.C.

### 39 **Late Long-Term Timeframe**

40 Based on the habitat model, the study area supports approximately 152,014 acres of high-value and  
41 254,352 acres of low-value habitat for western burrowing owl. Alternative 9 as a whole would result  
42 in the permanent loss of and temporary effects on 12,392 acres of high-value habitat and 31,895  
43 acres of low value habitat over the term of the Plan. The locations of these losses are described  
44 above in the analyses of individual conservation measures.

1 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*  
2 *Restoration, CM8 Grassland Natural Community Restoration, and CM9 Vernal Pool and Alkali Seasonal*  
3 *Wetland Complex Restoration* to protect 8,000 acres and restore 2,000 acres of grassland natural  
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7 7, 8, and 11 (Objectives GNC1.1 and GNC1.2). Grassland protection in CZs 1, 8, and 11 would be  
8 associated with vernal pool and alkali seasonal wetland complexes (Objectives ASWNC1.1 and  
9 VPNC1.1) and would result in a contiguous matrix of grassland, alkali seasonal wetland, and vernal  
10 pool natural communities which would provide habitat for western burrowing owl and reduce the  
11 effects of current levels of habitat fragmentation. This protection would not only expand the amount  
12 of protected high-value habitat in the Plan Area, but also support existing western burrowing owl  
13 populations that occur to the west of CZ 8 and in the areas surrounding CZs 1 and 11, which would  
14 especially benefit declining populations in the vicinity of Suisun Marsh and San Pablo Bay. Certain  
15 types of cultivated lands such as irrigated pasture, alfalfa and other hay crops, and some row crops  
16 can provide foraging habitat for western burrowing owl. Under appropriate management regimes,  
17 cultivated lands can support breeding and wintering burrowing owls. To ensure that cultivated  
18 lands conservation benefits western burrowing owl, the Plan's biological goals and objectives  
19 further specify that, of the cultivated lands protected in the late long-term, at least 1,000 acres  
20 would be protected in CZs 1 and 11 that support high-value burrowing owl habitat and are within  
21 0.5 miles of high-value grassland habitat or occupied low-value habitat (Objective WBO1.1). Under  
22 *CM11 Natural Communities Enhancement and Management*, small mammal and insect prey  
23 populations would be increased on protected lands, enhancing the foraging value of these natural  
24 communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4). In addition, burrow availability would  
25 be increased on protected natural communities by encouraging ground squirrel occupancy and  
26 expansion through the creation of berms, mounds, edges, and through the prohibition of ground  
27 squirrel control programs (i.e., poisoning, Objectives ASWNC2.3, VPNC2.4, GNC2.3).

28 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*  
29 *Plant Species*) estimates that the restoration and protection actions discussed above could result in  
30 the protection of an estimated 33,766 acres of western burrowing owl habitat (8,589 acres high-  
31 value and 25,177 acres low-value habitat) and restoration of 1,645 acres of western burrowing owl  
32 habitat (1,642 acres high-value and 3 acres low-value habitat).

33 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*  
34 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*  
35 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
36 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
37 *Material, and AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
38 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
39 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

40 Considering Alternative 9's protection and restoration provisions, which would provide acreages of  
41 new high-value or enhanced habitat in amounts suitable to compensate for habitats lost to  
42 construction and restoration activities, and with implementation of *AMM1-AMM7, AMM23 Western*  
43 *Burrowing Owl*, and Mitigation Measure BIO-91, *Compensate for Near-Term Loss of High-Value*  
44 *Western Burrowing Owl Habitat*, which would be available to guide the near-term protection and  
45 management of cultivated lands, the loss of habitat and direct mortality through implementation of

1 Alternative 9 would not result in a substantial adverse effect through habitat modifications and  
2 would not substantially reduce the number or restrict the range of the species. Therefore, the loss of  
3 habitat or potential mortality under this alternative would have a less-than-significant impact on  
4 western burrowing owl.

5 **Mitigation Measure BIO-91: Compensate for Near-Term Loss of High-Value Western**  
6 **Burrowing Owl Habitat**

7 Because the BDCP lacks acreage commitment for crop types that would be protected and  
8 managed within the 15,400 acres of cultivated lands protected in the near-term time period,  
9 DWR will compensate for the loss of high-value burrowing owl habitat with high-value natural  
10 communities or cultivated crop types a ratio of 2:1 in the near-term time period.

11 **Impact BIO-92: Effects on Western Burrowing Owl Associated with Electrical Transmission**  
12 **Facilities**

13 New transmission lines would increase the risk for bird-power line strikes and/or electrocution,  
14 which could result in injury or mortality of western burrowing owl. The species is large-bodied but  
15 with relatively long and rounded wings, making it moderately maneuverable. While burrowing owls  
16 may nest in loose colonies, they do not flock or congregate in roosts or foraging groups. Collectively,  
17 the species' keen eyesight and largely ground-based hunting behavior make it a relatively low-risk  
18 species for powerline collision. While the species is not widespread in the study area, it may become  
19 more widely distributed as grassland enhancement improves habitat for the species. Even so, the  
20 risk of effects on the population are low, given its physical and behavioral characteristics (BDCP  
21 Attachment 5J.C, *Analysis of Potential Bird Collisions at Proposed BDCP Transmission Lines*). and new  
22 transmission lines would not be expected to have an adverse effect on the species.

23 **NEPA Effects:** The construction and presence of new transmission lines would not result in an  
24 adverse effect on western burrowing owl because the risk of bird strike is considered to be minimal  
25 based on the owl's physical and behavioral characteristics.

26 **CEQA Conclusion:** The construction and presence of new transmission lines would have a less-than-  
27 significant impact on western burrowing owl because the risk of bird strike is considered to be  
28 minimal based on the owl's physical and behavioral characteristics.

29 **Impact BIO-93: Indirect Effects of Plan Implementation on Western Burrowing Owl**

30 Noise and visual disturbances associated with construction-related activities could result in  
31 temporary disturbances that affect western burrowing owl use of modeled habitat adjacent to  
32 proposed construction areas. Indirect effects associated with construction include noise, dust, and  
33 visual disturbance caused by grading, filling, contouring, and other ground-disturbing operations.  
34 Any disturbance within 250 feet of a burrow occupied by burrowing owl during the breeding season  
35 (February 1–August 31) and within 160 feet during the nonbreeding season (September 1–January  
36 31) could potential displace winter owls or cause abandonment of active nests. These potential  
37 effects would be minimized with the implementation of *AMM23 Western Burrowing Owl* into the  
38 BDCP. AMM23, would require preconstruction surveys and establish no-disturbance buffers around  
39 active burrows. Construction noise above background noise levels (greater than 50 dBA) could  
40 extend 1,900 to 5,250 feet from the edge of construction activities (BDCP Appendix 5.J, Attachment  
41 5J.D, *Indirect Effects of the Construction of the BDCP Conveyance Facility on Sandhill Crane*, Table 4),

1 although there are no available data to determine the extent to which these noise levels could affect  
2 western burrowing owl.

3 The use of mechanical equipment during water conveyance facilities construction could cause the  
4 accidental release of petroleum or other contaminants that could affect western burrowing owl in  
5 the surrounding habitat. The inadvertent discharge of sediment or excessive dust adjacent to  
6 western burrowing owl habitat could also affect the species. AMM1–AMM7 in addition to *AMM23*  
7 *Western Burrowing Owl* would minimize the likelihood of such spills from occurring and ensure that  
8 measures were in place to prevent runoff from the construction area and any adverse effects of dust  
9 on active nests.

10 **NEPA Effects:** Indirect effects on western burrowing owl as a result of Alternative 9 implementation  
11 could have adverse effects on this species through the modification of habitat and potential for  
12 direct mortality. Construction of the new forebay in CZ 8 would have the potential to disrupt nesting  
13 owls or active burrows in the high-value grassland habitat surrounding Clifton Court Forebay and  
14 adjacent to work area. With the implementation of AMM1–AMM7 and *AMM23 Western Burrowing*  
15 *Owl*, the indirect effects from Alternative 9 implementation would not be adverse under NEPA.

16 **CEQA Conclusion:** Indirect effects on western burrowing owl as a result of Alternative 9  
17 implementation could have significant impacts on these species through the modification of habitat  
18 and potential for direct mortality. Construction of the new forebay in CZ 8 would have the potential  
19 to disrupt nesting owls or active burrows in the high-value grassland habitat surrounding Clifton  
20 Court Forebay and adjacent to work areas. With the implementation of AMM1–AMM7 and *AMM23*  
21 *Western Burrowing Owl*, the indirect effects resulting from Alternative 9 implementation would have  
22 a less-than-significant impact on western burrowing owl.

### 23 **Impact BIO-94: Periodic Effects of Inundation on Western Burrowing Owl Habitat as a Result** 24 **of Implementation of Conservation Components**

25 Flooding of the Yolo Bypass from Fremont Weir operations (*CM2 Yolo Bypass Fisheries*  
26 *Enhancement*) would increase the frequency and duration of inundation on approximately 1,390–  
27 3,303 acres of high-value habitat and 1,522–2,927 acres of low-value habitat (Table 12-9-39).

28 Based on hypothetical footprints, implementation of *CM5 Seasonally Inundated Floodplain*  
29 *Restoration* could result in the periodic inundation of up to approximately 6,941 acres of modeled  
30 habitat (6,162 acres, of which would be low-value foraging habitat; Table 12-9-39).

31 Burrowing owls cannot use inundated areas for foraging or nesting, and increased inundation  
32 frequency and duration of cultivated lands and grassland habitats may affect prey populations that  
33 have insufficient time to recover following inundation events. Depending on timing, seasonal  
34 inundation of western burrowing owl habitat could result in displacement from nesting burrows or  
35 drowning of individuals. The potential for this effect is considered low because suitable burrow sites  
36 would most likely be located along setback levees, which are expected to be subject to inundation  
37 less frequently than floodplain surfaces that would be less likely to support suitable nesting  
38 burrows.

39 **NEPA Effects:** The periodically inundated habitat would not be expected to have an adverse effect on  
40 the population. The potential for direct mortality of western burrowing owl caused by inundation  
41 would be low because the locations of burrows would likely be above elevations consistently subject  
42 to inundation; therefore, the potential impact would not be adverse.

1 **CEQA Conclusion:** The potential for direct mortality of western burrowing owl caused by inundation  
2 would be low because the locations of burrows would likely be above elevations consistently subject  
3 to inundation. Therefore, periodic inundation would be expected to have a less-than-significant  
4 impact on the population.

### 5 **Western Yellow-Billed Cuckoo**

6 This section describes the effects of Alternative 9, including water conveyance facilities construction  
7 and implementation of other conservation components, on the western yellow-billed cuckoo. The  
8 habitat model for western yellow-billed cuckoo includes potential breeding habitat, which includes  
9 plant alliances from the valley/foothill riparian modeled habitat that contain a dense forest canopy  
10 for foraging with understory willow for nesting, and a minimum patch size of 25 acres, and  
11 migratory habitat, which includes the same plant alliances as breeding habitat without the minimum  
12 25 acres patch size requirement.

13 The western yellow-billed cuckoo is uncommon in the study area at present, and the likelihood that  
14 it would be found using the modeled habitat (Table 12-9-40) is low relative to more abundant  
15 riparian species. Nesting of the species in the study area has not been confirmed for approximately  
16 100 years. Western yellow-billed cuckoo was detected in the study area during 2009 DHCCP  
17 surveys, but nesting was not confirmed and the bird is suspected to have been a migrant (Appendix  
18 12C, *2009 to 2011 Bay Delta Conservation Plan EIR/EIS Environmental Data Report*). Construction  
19 and restoration associated with Alternative 9 conservation measures would result in both  
20 temporary and permanent losses of western yellow-billed cuckoo modeled habitat as indicated in  
21 Table 12-9-40. Full implementation Alternative 9 would also include the following conservation  
22 actions over the term of the BDCP to benefit the western yellow-billed cuckoo (BDCP Chapter 3,  
23 Section 3.3, *Biological Goals and Objectives*).

- 24 ● Restore or create at least 5,000 acres of valley/foothill riparian natural community, with at least  
25 3,000 acres occurring on restored seasonally inundated floodplain (Objective VFRNC1.1,  
26 associated with CM7).
- 27 ● Protect at least 750 acres of existing valley/foothill riparian natural community in CZ 7 by year  
28 10 (Objective VFRNC1.2, associated with CM3).
- 29 ● Maintain at least 500 acres of mature riparian forest in CZ 4 or CZ 7 (Objective VFRNC2.3,  
30 associated with CM3 and CM7).
- 31 ● Maintain the 500 acres of mature riparian forest (VFRNC2.3) intermixed with a portion of the  
32 early- to mid-successional riparian vegetation (VFRNC2.2) in large blocks with a minimum patch  
33 size of 50 acres and minimum width of 330 feet (Objective VFRNC2.4, associated with CM3 and  
34 CM7).

35 As explained below, with the restoration or protection of these amounts of habitat, in addition to  
36 management activities that would enhance these natural communities for the species and  
37 implementation of AMM1–AMM7 and AMM22 *Suisun Song Sparrow, Yellow-Breasted Chat, Least*  
38 *Bell's Vireo, Western Yellow-Billed Cuckoo*, impacts on western yellow-billed cuckoo would not be  
39 adverse for NEPA purposes and would be less than significant for CEQA purposes.

1 **Table 12-9-40. Changes in Western Yellow-Billed Cuckoo Modeled Habitat Associated with**  
2 **Alternative 9 (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	Breeding	14	14	12	12	NA	NA
	Migratory	30	30	205	205	NA	NA
<b>Total Impacts CM1</b>		<b>44</b>	<b>44</b>	<b>217</b>	<b>217</b>	<b>NA</b>	<b>NA</b>
CM2-CM18	Breeding	29	142	5	10	11-20	17
	Migratory	278	383	83	94	37-64	125
<b>Total Impacts CM2-CM18</b>		<b>307</b>	<b>525</b>	<b>88</b>	<b>104</b>	<b>48-84</b>	<b>142</b>
<b>Total Breeding</b>		<b>43</b>	<b>156</b>	<b>17</b>	<b>22</b>	11-20	17
<b>Total Migratory</b>		<b>308</b>	<b>413</b>	<b>288</b>	<b>299</b>	37-64	125
<b>TOTAL IMPACTS</b>		<b>351</b>	<b>569</b>	<b>305</b>	<b>321</b>	<b>48-84</b>	<b>142</b>

<sup>a</sup> See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-95: Loss or Conversion of Habitat for and Direct Mortality of Western Yellow-**  
5 **Billed Cuckoo**

6 Alternative 9 conservation measures would result in the combined permanent and temporary loss  
7 of up to 890 acres of modeled habitat for western yellow-billed cuckoo (178 acres of breeding  
8 habitat, 712 acres of migratory habitat; Table 12-9-40). Conservation measures that would result in  
9 these losses are conveyance facilities and transmission line construction, and establishment and use  
10 of borrow and spoil areas (CM1), Yolo Bypass fisheries improvements (CM2), tidal habitat  
11 restoration (CM4), and floodplain restoration (CM5). Habitat enhancement and management  
12 activities (CM11) which include ground disturbance or removal of nonnative vegetation, could result  
13 in local adverse habitat effects. In addition, maintenance activities associated with the long-term  
14 operation of the water conveyance facilities and other BDCP physical facilities could degrade or  
15 eliminate western yellow-billed cuckoo modeled habitat. Each of these individual activities is  
16 described below. A summary statement of the combined impacts and NEPA effects and a CEQA  
17 conclusion follow the individual conservation measure discussions.

- 18 • *CM1 Water Conveyance Facilities and Operation:* Construction of Alternative 9 water conveyance  
19 facilities would result in the combined permanent and temporary loss of up to 26 acres of  
20 breeding habitat (14 acres of permanent loss, 12 acres of temporary loss) and 235 acres of  
21 migratory habitat (30 acres of permanent loss, 205 acres of temporary loss) for western yellow-

1 billed cuckoo (Table 12-9-40). Permanent losses would primarily consist of channel  
2 enlargement at the Sacramento River and Meadows Slough. Temporary losses would occur  
3 primarily along Middle River between Victoria Canal and Mildred Island, where large dredging  
4 work areas and operable barrier work areas would be placed. The riparian habitat in these areas  
5 is composed of very small patches or stringers bordering waterways, which are composed of  
6 valley oak and scrub vegetation. There are no extant occurrences of yellow-billed cuckoo nests  
7 in the study area. However, this loss would have the potential to displace individuals, if present,  
8 and remove the functions and value of modeled habitat for nesting, protection, or foraging. Refer  
9 to the Terrestrial Biology Map Book for a detailed view of Alternative 9 construction locations.  
10 Impacts from CM1 would occur within the first 10 years of Alternative 9 implementation.

- 11 ● *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo bypass fisheries enhancement  
12 would result in the loss of approximately 31 acres of breeding habitat (26 acres of permanent  
13 loss and 5 acres of temporary loss) and 140 acres of migratory habitat (57 acres of permanent  
14 loss and 83 acres of temporary loss) for yellow-billed cuckoo in the Yolo Bypass in CZ 2. The loss  
15 is expected to occur during the first 10 years of Alternative 9 implementation. There are no  
16 extant occurrences of yellow-billed cuckoo nesting in the study area.
- 17 ● *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and  
18 inundation would permanently remove an estimated 110 acres of modeled yellow-billed cuckoo  
19 breeding habitat and 310 acres of modeled migratory habitat in CZ 1, 2, 6, and 11. There are no  
20 extant nesting records of yellow-billed cuckoo in the study area. However, a yellow-billed  
21 cuckoo detection was recorded during DHCCP surveys in 2009 (Appendix 12C, *2009 to 2011 Bay  
22 Delta Conservation Plan EIR/EIS Environmental Data Report*) in CZ 5 between Twin Cities Road  
23 and Walnut Grove. These detections do not overlap with the hypothetical restoration areas for  
24 CM4.
- 25 ● *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore  
26 seasonally inundated floodplain would permanently and temporarily remove approximately 11  
27 acres of modeled yellow-billed cuckoo breeding habitat (6 acres of permanent loss and 5 acres  
28 of temporary loss) and 27 acres of migratory habitat (16 acres of permanent loss and 11 acres of  
29 temporary loss) in CZ 7. Based on the riparian habitat restoration assumptions, approximately  
30 3,000 acres of valley/foothill riparian habitat would be restored as a component of seasonally  
31 inundated floodplain restoration actions. The actual number of acres that would be restored  
32 may differ from these estimates, depending on how closely the outcome of seasonally inundated  
33 floodplain restoration approximates the assumed outcome. Once this restored riparian  
34 vegetation has developed habitat functions, a portion of it would be suitable to support western  
35 yellow-billed cuckoo habitat once the riparian vegetation has developed habitat functions for  
36 the cuckoo.
- 37 ● *CM11 Natural Communities Enhancement and Management*: Habitat protection and management  
38 activities that could be implemented in protected western yellow-billed cuckoo habitats would  
39 maintain and improve the functions of the habitat over the term of the BDCP. With conditions  
40 favorable for its future establishment in the study area, western yellow-billed cuckoo would be  
41 expected to benefit from the increase in protected habitat. However, habitat management- and  
42 enhancement-related activities could disturb western yellow-billed cuckoo nests if they were  
43 present near work sites. *CM11 Natural Communities Enhancement and Management* actions  
44 designed to enhance wildlife values in restored riparian habitats may result in localized ground  
45 disturbances that could temporarily remove small amounts of western yellow-billed cuckoo

1 habitat. Ground-disturbing activities, such as removal of nonnative vegetation and road and  
2 other infrastructure maintenance activities, would be expected to have minor adverse effects on  
3 available western yellow-billed cuckoo habitat and would be expected to result in overall  
4 improvements and maintenance of western yellow-billed cuckoo habitat values over the term of  
5 the BDCP.

- 6 • Permanent and temporary habitat losses from the above CMs, would primarily consist of small,  
7 fragmented riparian stands in CZ 2–CZ 8 that do not provide high-value habitat for the species.  
8 Temporarily affected areas would be restored as riparian habitat within 1 year following  
9 completion of construction activities. Although the effects are considered temporary, the  
10 restored riparian habitat would require 5 years to several decades, for ecological succession to  
11 occur and for restored riparian habitat to functionally replace habitat that has been affected. The  
12 majority of the riparian vegetation to be temporarily removed is early- to mid-successional;  
13 therefore, the replaced riparian vegetation would be expected to have structural components  
14 comparable to the temporarily removed vegetation within the first 5 to 10 years after the initial  
15 restoration activities are complete.
- 16 • Operations and Maintenance: Postconstruction operation and maintenance of the above-ground  
17 water conveyance facilities and restoration infrastructure could result in ongoing but periodic  
18 disturbances that could affect western yellow-billed cuckoo use of the surrounding habitat.  
19 Maintenance activities would include vegetation management, levee and structure repair, and  
20 re-grading of roads and permanent work areas. These effects, however, would be reduced by  
21 AMMs and conservation actions as described below.
- 22 • Injury and Direct Mortality: Western yellow-billed cuckoo nesting has not been confirmed in the  
23 Delta for approximately 100 years. However, an unconfirmed breeding detection in 2009 in  
24 DHCCP surveys (*Appendix 12C, 2009 to 2011 Bay Delta Conservation Plan EIR/EIS Environmental*  
25 *Data Report*) and the present of suitable habitat indicates that the species is potentially breeding  
26 in the study area, or may nest there in the future. Construction-related activities would not be  
27 expected to result in direct mortality of adult or fledged western yellow-billed cuckoo if they  
28 were present in the study area, because they would be expected to avoid contact with  
29 construction and other equipment. If western yellow-billed cuckoo were to nest in the  
30 construction area, construction-related activities, including equipment operation, noise and  
31 visual disturbances could destroy nests or lead to their abandonment, resulting in mortality of  
32 eggs and nestlings. These effects would be avoided and minimized with the incorporation of  
33 *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed*  
34 *Cuckoo* into the BDCP.

35 The following paragraphs summarize the combined effects discussed above and describe other  
36 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also  
37 included.

### 38 ***Near-Term Timeframe***

39 Because the water conveyance facilities construction is being evaluated at the project level, the near-  
40 term BDCP conservation strategy has been evaluated to determine whether it would provide  
41 sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that the  
42 effects of construction would not be adverse under NEPA. Alternative 9 would remove 656 acres of  
43 modeled habitat for yellow-billed cuckoo in the study area in the near-term. These effects would  
44 result from the construction of the water conveyance facilities (CM1, 261 acres of modeled breeding

1 and migratory habitat), and implementing other conservation measures (*CM2 Yolo Bypass Fisheries*  
2 *Enhancement, CM4 Tidal Natural Communities Restoration, and CM5 Seasonally Inundated Floodplain*  
3 *Restoration*—395 acres of modeled breeding and migratory habitat). These habitat losses would  
4 primarily consist of small, fragmented riparian stands in CZ 2-CZ 8 that do not provide high-value  
5 habitat for the species.

6 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by  
7 CM1 and that are identified in the biological goals and objectives for yellow-billed cuckoo in Chapter  
8 3 of the BDCP would be 1:1 for restoration/creation and 1:1 protection of valley/foothill riparian  
9 habitat. Using these ratios would indicate that 261 acres of valley/foothill riparian habitat should be  
10 restored/created and 261 acres should be protected to compensate for the CM1 losses of yellow-  
11 billed cuckoo habitat. The near-term effects of other conservation actions would remove 395 acres  
12 of modeled habitat, and therefore require 395 acres of restoration and 395 acres of protection of  
13 valley/foothill riparian using the same typical NEPA and CEQA ratios (1:1 for restoration and 1:1 for  
14 protection).

15 The BDCP has committed to near-term goals of protecting 750 acres and restoring 800 acres of the  
16 valley/foothill riparian natural community in the Plan Area (Table 3-4 in Chapter 3, *Description of*  
17 *Alternatives*). These conservation actions are associated with CM3 and CM7 and would occur in the  
18 same timeframe as the construction and early restoration losses, thereby avoiding adverse effects of  
19 habitat loss on yellow-billed cuckoo. The majority of the riparian restoration acres would occur in  
20 CZ 7 as part of a reserve system with extensive wide bands or large patches of valley/foothill  
21 riparian natural community (Objectives VFRNC1.1 and VFRNC1.2, BDCP Chapter 3, *Conservation*  
22 *Strategy*). Goals and objectives in the Plan for riparian restoration also include the restoration,  
23 maintenance and enhancement of structural heterogeneity with adequate vertical and horizontal  
24 overlap among vegetation components and over adjacent riverine channels, freshwater emergent  
25 wetlands, and grasslands (Objective VFRNC2.1). These natural community biological goals and  
26 objectives would inform the near-term protection and restoration efforts and represent  
27 performance standards for considering the effectiveness of conservation actions for the species.

28 The acres of protection contained in the near-term Plan goals satisfy the typical mitigation ratios  
29 that would be applied to the project-level effects of CM1 and other near-term impacts. However, the  
30 restored riparian habitat would require several years (early-mid successional) and several decades  
31 (mature riparian forest), for ecological succession to occur and for restored riparian habitat to  
32 functionally replace habitat that has been affected. Because the western yellow-billed cuckoo is not  
33 known to be an established breeder in the study area, the time lag in riparian restoration from BDCP  
34 actions would not be expected to have an adverse population-level effect on the species. Overall,  
35 BDCP riparian habitat restoration actions would be expected to benefit western yellow-billed  
36 cuckoo by increasing opportunities for a breeding population to become reestablished in the study  
37 area.

38 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*  
39 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*  
40 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
41 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
42 *Material, AMM7 Barge Operations Plan, and AMM22 Suisun Song Sparrow, Yellow-Breasted Chat,*  
43 *Least Bell's Vireo, Western Yellow-Billed Cuckoo.* All of these AMMs include elements that would  
44 avoid or minimize the risk of affecting individuals and species habitats adjacent to work areas and

1 storage sites. The AMMs are described in detail in BDCP Appendix 3.C, *Avoidance and Minimization*  
2 *Measures*.

### 3 **Late Long-Term Timeframe**

4 The habitat model indicates that the study area supports approximately 12,395 acres of modeled  
5 breeding and migratory habitat for yellow-billed cuckoo. Alternative 9 as a whole would result in  
6 the permanent loss of and temporary effects on 890 acres of modeled habitat (7% of the modeled  
7 habitat in the study area). These losses would occur from the construction of the water conveyance  
8 facilities (CM1) and from *CM2 Yolo Bypass Fisheries Enhancement*, *CM4 Tidal Natural Communities*  
9 *Restoration*, and *CM5 Seasonally Inundated Floodplain Restoration*. The locations of these losses  
10 would be in fragmented riparian habitat throughout the study area.

11 The Plan includes conservation commitments through *CM7 Riparian Natural Community Restoration*  
12 and *CM3 Natural Communities Protection and Restoration* to restore or create at least 5,000 acres  
13 and protect at least 750 acres of valley/foothill riparian woodland. Of the 5,000 acres of restored  
14 riparian natural communities, a minimum of 3,000 acres of valley/foothill riparian would be  
15 restored within the seasonally inundated floodplain, and 1,000 acres would be managed as dense  
16 early to mid-successional riparian forest (Objectives VFRNC1.1 and VFRNC1.2). In addition, at least  
17 500 acres of mature riparian forest would be maintained in CZ 4 or CZ 7 (Objective VFRNC2.3). This  
18 mature, riparian forest would be mixed with a portion of the early- to mid-successional riparian  
19 vegetation in large blocks with a minimum patch size of 50 acres and a minimum width of 330 feet  
20 (Objective VFRNC2.2 and VFRNC2.4), which would provide suitable nesting habitat for the cuckoo.  
21 The protection of 750 acres of existing valley/foothill riparian forest in CZ 7 would not provide in its  
22 entirety the vegetative structure needed to support these species, because patch sizes may not be  
23 large enough to support yellow-billed cuckoo breeding habitat. However, a portion of the protected  
24 habitat would provide suitable habitat for the species. Restoration actions through CM7 and CM11  
25 would expand the patches of existing riparian forest in order to support the species should they  
26 become established breeders in the study area.

27 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*  
28 *Plant Species*) estimates that the restoration and protection actions discussed above could result in  
29 the restoration of 3,397 acres and the protection of 517 acres of habitat for the yellow-billed cuckoo.

30 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
31 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
32 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
33 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
34 *Material*, *AMM7 Barge Operations Plan*, and *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat,*  
35 *Least Bell's Vireo, Western Yellow-Billed Cuckoo*. All of these AMMs include elements that would  
36 avoid or minimize the risk of affecting individuals and species habitats adjacent to work areas and  
37 storage sites. The AMMs are described in detail in BDCP Appendix 3.C, *Avoidance and Minimization*  
38 *Measures*.

39 **NEPA Effects:** The loss of western yellow-billed cuckoo habitat associated with Alternative 9 would  
40 represent an adverse effect in the absence of other conservation actions. The species is not an  
41 established breeder in the study area and current presence is limited to migrants. In addition, the  
42 habitat lost would consist of small, fragmented riparian stands that would not provide high-value  
43 habitat for the species. With habitat protection and restoration associated with CM3, CM7, and

1 CM11, guided by biological goals and objectives and by AMM1–AMM7 and *AMM22 Suisun Song*  
2 *Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo*, which would be in  
3 place throughout the construction period, the effects of habitat loss and potential mortality under  
4 Alternative 9 on western yellow-billed cuckoo would not be adverse.

5 **CEQA Conclusion:**

6 **Near-Term Timeframe**

7 Because the water conveyance facilities construction is being evaluated at the project level, the near-  
8 term BDCP conservation strategy has been evaluated to determine whether it would provide  
9 sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that the  
10 effects of construction would be less than significant under CEQA. Alternative 9 would remove 656  
11 acres of modeled habitat for yellow-billed cuckoo in the study area in the near-term. These effects  
12 would result from the construction of the water conveyance facilities (CM1, 261 acres of modeled  
13 breeding and migratory habitat), and implementing other conservation measures (CM2 *Yolo Bypass*  
14 *Fisheries Enhancement, CM4 Tidal Natural Communities Restoration, and CM5 Seasonally Inundated*  
15 *Floodplain Restoration*—395 acres of modeled breeding and migratory habitat). These habitat losses  
16 would primarily consist of small, fragmented riparian stands in CZ 2–CZ 8 that do not provide high-  
17 value habitat for the species.

18 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by  
19 CM1 and that are identified in the biological goals and objectives for yellow-billed cuckoo in Chapter  
20 3 of the BDCP would be 1:1 for restoration/creation and 1:1 protection of valley/foothill riparian  
21 habitat. Using these ratios would indicate that 261 acres of valley/foothill riparian habitat should be  
22 restored/created and 261 acres should be protected to compensate for the CM1 losses of yellow-  
23 billed cuckoo habitat. The near-term effects of other conservation actions would remove 395 acres  
24 of modeled habitat, and therefore require 395 acres of restoration and 395 acres of protection of  
25 valley/foothill riparian using the same typical NEPA and CEQA ratios (1:1 for restoration and 1:1 for  
26 protection).

27 The BDCP has committed to near-term goals of protecting 750 acres and restoring 800 acres of the  
28 valley/foothill riparian natural community in the study area (Table 3-4 in Chapter 3, *Description of*  
29 *Alternatives*). These conservation actions are associated with CM3 and CM7 and would occur in the  
30 same timeframe as the construction and early restoration losses, thereby avoiding adverse effects of  
31 habitat loss on yellow-billed cuckoo. The majority of the riparian restoration acres would occur in  
32 CZ 7 as part of a reserve system with extensive wide bands or large patches of valley/foothill  
33 riparian natural community (Objectives VFRNC1.1 and VFRNC1.2, BDCP Chapter 3, *Conservation*  
34 *Strategy*). Goals and objectives in the Plan for riparian restoration also include the restoration,  
35 maintenance and enhancement of structural heterogeneity with adequate vertical and horizontal  
36 overlap among vegetation components and over adjacent riverine channels, freshwater emergent  
37 wetlands, and grasslands (Objective VFRNC2.1). These natural community biological goals and  
38 objectives would inform the near-term protection and restoration efforts and represent  
39 performance standards for considering the effectiveness of conservation actions for the species.

40 The acres of protection contained in the near-term Plan goals satisfy the typical mitigation ratios  
41 that would be applied to the project-level effects of CM1 and other near-term impacts. However, the  
42 restored riparian habitat would require several years (early-mid successional) and several decades  
43 (mature riparian forest), for ecological succession to occur and for restored riparian habitat to

1 functionally replace habitat that has been affected. Because the western yellow-billed cuckoo is not  
2 known to be an established breeder in the study area, the time lag in riparian restoration from BDCP  
3 actions would not be expected to have an adverse population-level effect on the species. Overall,  
4 BDCP riparian habitat restoration actions would be expected to benefit western yellow-billed  
5 cuckoo by increasing opportunities for a breeding population to become reestablished in the study  
6 area.

7 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*  
8 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*  
9 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
10 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
11 *Material, AMM7 Barge Operations Plan, and AMM22 Suisun Song Sparrow, Yellow-Breasted Chat,*  
12 *Least Bell's Vireo, Western Yellow-Billed Cuckoo.* All of these AMMs include elements that would  
13 avoid or minimize the risk of affecting individuals and species habitats adjacent to work areas and  
14 storage sites. The AMMs are described in detail in BDCP Appendix 3.C, *Avoidance and Minimization*  
15 *Measures.*

### 16 **Late Long-Term Timeframe**

17 The habitat model indicates that the study area supports approximately 12,395 acres of modeled  
18 breeding and migratory habitat for yellow-billed cuckoo. Alternative 9 as a whole would result in  
19 the permanent loss of and temporary effects on 890 acres of modeled habitat (7% of the modeled  
20 habitat in the study area). These losses would occur from the construction of the water conveyance  
21 facilities (CM1) and from *CM2 Yolo Bypass Fisheries Enhancement, CM4 Tidal Natural Communities*  
22 *Restoration, and CM5 Seasonally Inundated Floodplain Restoration.* The locations of these losses  
23 would be in fragmented riparian habitat throughout the study area.

24 The Plan includes conservation commitments through *CM7 Riparian Natural Community Restoration*  
25 and *CM3 Natural Communities Protection and Restoration* to restore or create at least 5,000 acres  
26 and protect at least 750 acres of valley/foothill riparian woodland. Of the 5,000 acres of restored  
27 riparian natural communities, a minimum of 3,000 acres of valley/foothill riparian would be  
28 restored within the seasonally inundated floodplain, and 1,000 acres would be managed as dense  
29 early to mid-successional riparian forest (Objectives VFRNC1.1 and VFRNC1.2). In addition, at least  
30 500 acres of mature riparian forest would be maintained in CZ 4 or CZ 7 (Objective VFRNC2.3). This  
31 mature, riparian forest would be mixed with a portion of the early- to mid-successional riparian  
32 vegetation in large blocks with a minimum patch size of 50 acres and a minimum width of 330 feet  
33 (Objectives VFRNC2.2 and VFRNC2.4), which would provide suitable nesting habitat for the cuckoo.  
34 The protection of 750 acres of existing valley/foothill riparian forest in CZ 7 would not provide in its  
35 entirety the vegetative structure needed to support these species, because patch sizes may not be  
36 large enough to support yellow-billed cuckoo breeding habitat. However, a portion of the protected  
37 habitat would provide suitable habitat for the species. Restoration actions through CM7 and CM11  
38 would expand the patches of existing riparian forest in order to support the species should they  
39 become established breeders in the study area.

40 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*  
41 *Plant Species*) estimates that the restoration and protection actions discussed above could result in  
42 the restoration of 3,397 acres and the protection of 517 acres of habitat for the yellow-billed cuckoo.

1 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
2 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
3 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
4 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
5 *Material*, *AMM7 Barge Operations Plan*, and *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat,*  
6 *Least Bell's Vireo, Western Yellow-Billed Cuckoo*. All of these AMMs include elements that would  
7 avoid or minimize the risk of affecting individuals and species habitats adjacent to work areas and  
8 storage sites. The AMMs are described in detail in BDCP Appendix 3.C, *Avoidance and Minimization*  
9 *Measures*.

10 Considering Alternative 9's protection and restoration provisions, which would provide acreages of  
11 new or enhanced habitat in amounts greater than necessary to compensate for the time lag of  
12 restoring habitats lost to construction and restoration activities, and with implementation of  
13 *AMM1-AMM7* and *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western*  
14 *Yellow-Billed Cuckoo*, the loss of habitat or direct mortality through implementation of Alternative 9  
15 would not result in a substantial adverse effect through habitat modifications and would not  
16 substantially reduce the number or restrict the range of the species. Therefore, the loss of habitat or  
17 potential mortality under this alternative would have a less-than-significant impact on western  
18 yellow-billed cuckoo.

#### 19 **Impact BIO-96: Fragmentation of Western Yellow-Billed Cuckoo Habitat as a Result of** 20 **Constructing the Water Conveyance Facilities**

21 Grading, filling, contouring, and other initial ground-disturbing operations for water conveyance  
22 facilities construction may temporarily fragment modeled western yellow-billed cuckoo habitat.  
23 This could temporarily reduce the extent and functions supported by the affected habitat. Because  
24 western yellow-billed cuckoo is not currently present in the study area, and because the  
25 implementation of *CM5 Seasonally Inundated Floodplain Restoration* would protect and create  
26 contiguous high-value riparian habitat, any such habitat fragmentation is expected to have no or  
27 minimal effect on the species.

28 **NEPA Effects:** Fragmentation of habitat would not have an adverse effect on western yellow-billed  
29 cuckoo. The habitat functions in the study area for the species would be greatly improved through  
30 the implementation of *CM5*, which would restore and protect large contiguous patches of riparian  
31 habitat.

32 **CEQA Conclusion:** Fragmentation of habitat would have a less-than-significant impact on western  
33 yellow-billed cuckoo. The habitat functions in the study area for the species would be greatly  
34 improved through the implementation of *CM5*, which would restore and protect large contiguous  
35 patches of riparian habitat.

#### 36 **Impact BIO-97: Effects on Western Yellow-Billed Cuckoo Associated with Electrical** 37 **Transmission Facilities**

38 New transmission lines would increase the risk for bird-power line strikes, which could result in  
39 injury or mortality of western yellow-billed cuckoo. Because the western yellow-billed cuckoo uses  
40 riparian forests to meet all of its breeding and wintering life requisites, the species remains  
41 primarily within the canopy of riparian forests and rarely ventures into open spaces except during  
42 migration, limiting its opportunity to encounter the proposed transmission lines. As a summer

1 resident, the species occurs in the study area during periods of relatively high visibility and clear  
2 weather conditions, thus further reducing collision risk from daily use patterns or seasonal  
3 migration flights. Finally, western yellow-billed cuckoo wing shape is characterized by low wing  
4 loading and a moderate aspect ratio, making the species moderately maneuverable and presumably  
5 able to avoid collisions, especially during high-visibility conditions (BDCP Attachment 5J.C, *Analysis*  
6 *of Potential Bird Collisions at Proposed BDCP Transmission Lines*). Transmission line poles and  
7 towers also provide perching substrate for raptors, which could result in increased predation  
8 pressure on western yellow-billed cuckoo if they were to use habitat adjacent to lines.

9 **NEPA Effects:** The risk of bird-strike is considered to be minimal based on the species' rarity in the  
10 study area, its proclivity to remain in the riparian canopy, its presence in the study area during  
11 periods of relative high visibility, and its overall ability to successfully negotiate around overhead  
12 wires that it may encounter. Transmission line poles and towers also provide perching substrate for  
13 raptors, which could result in increased predation pressure on western yellow-billed cuckoo. This  
14 would not be expected to have an adverse effect on the western yellow-billed cuckoo population.

15 **CEQA Conclusion:** The construction and presence of new transmission lines would have a less-than-  
16 significant impact on western yellow-billed cuckoo because the risk of bird-strike is considered to  
17 be minimal based on the species' rarity in the study area, its proclivity to remain in the riparian  
18 canopy, its presence during periods of relative high visibility, and its overall ability to successfully  
19 negotiate around overhead wires that it may encounter. Transmission line poles and towers also  
20 provide perching substrate for raptors, which could result in increased predation pressure on  
21 western yellow-billed cuckoo. This would be expected to have a less-than-significant impact on the  
22 western yellow-billed cuckoo population.

### 23 **Impact BIO-98: Indirect Effects of Plan Implementation on Western Yellow-Billed Cuckoo**

24 **Indirect construction- and operation-related effects:** Noise and visual disturbances associated  
25 with construction-related activities could result in temporary disturbances that affect western  
26 yellow-billed cuckoo use of modeled habitat adjacent to proposed construction areas. Construction  
27 noise above background noise levels (greater than 50 dBA) could extend 1,900 to 5,250 feet from  
28 the edge of construction activities (BDCP Appendix 5.J, Attachment 5J.D, *Indirect Effects of the*  
29 *Construction of the BDCP Conveyance Facility on Sandhill Crane*, Table 4), although there are no  
30 available data to determine the extent to which these noise levels could affect western yellow-billed  
31 cuckoo. Indirect effects associated with construction include noise, dust, and visual disturbance  
32 caused by grading, filling, contouring, and other ground-disturbing operations outside the project  
33 footprint but within 1,300 feet from the construction edge. If western yellow-billed cuckoo were to  
34 nest in or adjacent to work areas, construction and subsequent maintenance-related noise and  
35 visual disturbances could mask calls, disrupt foraging and nesting behaviors, and reduce the  
36 functions of suitable nesting habitat for these species. These potential effects would be minimized  
37 with incorporation of *AMM22 Suisun Song Sparrow*, *Yellow-Breasted Chat*, *Least Bell's Vireo*, *Western*  
38 *Yellow-Billed Cuckoo* into the BDCP. The use of mechanical equipment during water conveyance  
39 facilities construction could cause the accidental release of petroleum or other contaminants that  
40 could affect western yellow-billed cuckoo in the surrounding habitat. The inadvertent discharge of  
41 sediment or excessive dust adjacent to western yellow-billed cuckoo habitat could also affect the  
42 species. *AMM1-AMM7*, including *AMM2 Construction BMPs and Monitoring*, in addition to *AMM22*  
43 *Suisun Song Sparrow*, *Yellow-Breasted Chat*, *Least Bell's Vireo*, *Western Yellow-Billed Cuckoo* would

1 minimize the likelihood of such spills and ensure that measures were in place to prevent runoff from  
2 the construction area and any adverse effects of dust on active nests.

3 **NEPA Effects:** Indirect effects on western yellow-billed cuckoo as a result of Alternative 9  
4 implementation could have adverse effects on the species through the modification of habitat and  
5 potential for direct mortality. However, due to the species' minimal presence in the study area, and  
6 with the incorporation of AMM1–AMM7 and AMM22 *Suisun Song Sparrow*, *Yellow-Breasted Chat*,  
7 *Least Bell's Vireo*, *Western Yellow-Billed Cuckoo* into the BDCP, indirect effects would not have an  
8 adverse effect on western yellow-billed cuckoo.

9 **CEQA Conclusion:** Indirect effects on western yellow-billed cuckoo as a result of Alternative 9  
10 implementation could have a significant impact on the species from modification of habitat. With the  
11 incorporation of AMM1–AMM7 and AMM22 *Suisun Song Sparrow*, *Yellow-Breasted Chat*, *Least Bell's*  
12 *Vireo*, *Western Yellow-Billed Cuckoo* into the BDCP, indirect effects as a result of Alternative 9  
13 implementation would have a less-than-significant impact on western yellow-billed cuckoo.

#### 14 **Impact BIO-99: Periodic Effects of Inundation of Western Yellow-Billed Cuckoo Habitat as a** 15 **Result of Implementation of Conservation Components**

16 Flooding of the Yolo Bypass from Fremont Weir operations (CM2) would increase the frequency and  
17 duration of inundation of approximately 11-20 acres of modeled western yellow-billed cuckoo  
18 breeding habitat and 37–64 acres of modeled migratory habitat. No adverse effects of increased  
19 inundation frequency on western yellow-billed cuckoo or its habitat are expected because the  
20 cuckoo breeding period is outside the period the weir would be operated. In addition, riparian  
21 vegetation supporting habitat has persisted under the existing Yolo Bypass flooding regime, and  
22 changes to frequency and inundation would be within the tolerance of these vegetation types.

23 Based on hypothetical floodplain restoration, CM5 implementation could result in periodic  
24 inundation of up to 142 acres of modeled western yellow-billed cuckoo habitat (17 acres of breeding  
25 habitat, 125 acres of migratory habitat). Inundation of restored floodplains is not expected to affect  
26 western yellow-billed cuckoo or its habitat adversely because the cuckoo breeding period is outside  
27 the period the floodplains would likely be inundated, and periodic inundation of floodplains is  
28 expected to restore a more natural flood regime in support of riparian vegetation types that provide  
29 nesting and migratory habitat for western yellow-billed cuckoo. The overall effect of seasonal  
30 inundation in existing riparian natural communities is likely to be beneficial for western yellow-  
31 billed cuckoo, because, historically, flooding was the main natural disturbance regulating ecological  
32 processes in riparian areas, and flooding promotes the germination and establishment of many  
33 native riparian plants.

34 **NEPA Effects:** Periodic effects of inundation would not have an adverse on yellow-billed cuckoo if  
35 they were to establish as breeders in the study area, because flooding is expected to occur outside of  
36 the breeding season.

37 **CEQA Conclusion:** Periodic effects of inundation would have a less-than-significant impact on  
38 yellow-billed cuckoos if they were to establish as breeders in the study area, because flooding is  
39 expected to occur outside of the breeding season.

1       **White-Tailed Kite**

2       The habitat model used to assess impacts on white-tailed kite includes breeding habitat and foraging  
3       habitat. Most white-tailed kites in the Sacramento Valley are found in oak and cottonwood riparian  
4       forests, valley oak woodlands, or other groups of trees and are usually associated with compatible  
5       foraging habitat for the species in patches greater than 1,500 square meters (Erichsen et al. 1996).  
6       Modeled foraging habitat for white-tailed kite consists of pasture and hay crops, compatible row and  
7       grain crops and natural vegetation such as seasonal wetlands and annual grasslands (Erichsen et al.  
8       1995).

9       Construction and restoration associated with Alternative 9 conservation measures would result in  
10      both temporary and permanent losses of white-tailed kite modeled habitat as indicated in Table 12-  
11      9-41. The majority of the losses would take place over an extended period of time as tidal marsh is  
12      restored in the study area. Although restoration for the loss of nesting and foraging habitat would be  
13      initiated in the same timeframe as the losses, it could take one or more decades (for nesting habitat)  
14      for restored habitats to replace the functions of habitat lost. This time lag between impacts and  
15      restoration of habitat function would be minimized by specific requirements of *AMM18 Swainson's*  
16      *Hawk and White-Tailed Kite*, including the planting of mature trees in the near-term time period. Full  
17      implementation of Alternative 9 would also include the following biological objectives over the term  
18      of the BDCP to benefit the white-tailed kite (BDCP Chapter 3, Section 3.3, *Biological Goals and*  
19      *Objectives*).

- 20      • Restore or create at least 5,000 acres of valley/foothill riparian natural community, with at least  
21      3,000 acres occurring on restored seasonally inundated floodplain (Objective VFRNC1.1,  
22      associated with CM7).
- 23      • Protect at least 750 acres of existing valley/foothill riparian natural community in CZ 7 by year  
24      10 (Objective VFRNC1.2, associated with CM3).
- 25      • Protect at least 8,000 acres of grassland with at least 2,000 acres protected in CZ 1, at least 1,000  
26      acres protected in CZ 8, at least 2,000 acres protected in CZ 11, and the remainder distributed  
27      among CZs 1, 2, 4, 5, 7, 8, and 11 (Objective GNC1.1, associated with CM3).
- 28      • Restore at least 2,000 acres of grasslands (Objective GNC1.2, associated with CM8).
- 29      • Protect at least 150 acres of alkali seasonal wetland and at least 600 acres of existing vernal pool  
30      complex in CZs 1, 8, and/or 11 (Objectives ASWNC1.1 and VPNC1.1, associated with CM3).
- 31      • Protect and enhance at least 8,100 acres of managed wetland, at least 1,500 acres of which are  
32      in the Grizzly Island Marsh Complex (Objective MWNC1.1, associated with CM3).
- 33      • Increase prey availability and accessibility for grassland-foraging species (Objectives ASWNC2.4,  
34      VPNC2.5, and GNC2.4, associated with CM11).
- 35      • Protect at least 48,625 acres of cultivated lands that provide suitable habitat for covered and  
36      other native wildlife species (Objective CLNC1.1, associated with CM3).
- 37      • Plant and maintain native trees along roadsides and field borders within protected cultivated  
38      lands at a rate of one tree per 10 acres (Objective SH2.1, associated with CM11).
- 39      • Maintain and protect the small patches of important wildlife habitats associated with cultivated  
40      lands within the reserve system including isolated valley oak trees, trees and shrubs along field

- 1 borders and roadsides, remnant groves, riparian corridors, water conveyance channels,  
2 grasslands, ponds, and wetlands (Objective CLNC1.3, associated with CM3).
- 3 • Establish 20- to 30- foot-wide hedgerows along fields and roadsides to promote prey  
4 populations throughout protected cultivated lands (Objective SH2.2, associated with CM3).

5 As explained below, with the restoration or protection of these amounts of habitat, in addition to  
6 management activities that would enhance these natural communities for the species and  
7 implementation of AMM1–AMM7 and *AMM18 Swainson’s Hawk and White-Tailed Kite*, impacts on  
8 white-tailed kite would not be adverse for NEPA purposes and would be less than significant for  
9 CEQA purposes.

10 **Table 12-9-41. Changes in White-Tailed Kite Modeled Habitat Associated with Alternative 9**  
11 **(acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	Nesting	43	43	89	89	NA	NA
	Foraging	374	374	2,542	2,542	NA	NA
<b>Total Impacts CM1</b>		<b>417</b>	<b>417</b>	<b>2,631</b>	<b>2,631</b>		
CM2–CM18	Nesting	312	507	88	121	48–82	230
	Foraging	8,723	52,675	516	1,484	3,030–6,651	7,402
<b>Total Impacts CM2–CM18</b>		<b>9,035</b>	<b>53,182</b>	<b>604</b>	<b>1,605</b>	<b>3,078–6,733</b>	<b>7,632</b>
<b>Total Nesting</b>		<b>355</b>	<b>550</b>	<b>177</b>	<b>210</b>	48–82	230
<b>Total Foraging</b>		<b>9,097</b>	<b>53,049</b>	<b>3,058</b>	<b>4,026</b>	3,030–6,651	7,402
<b>TOTAL IMPACTS</b>		<b>9,452</b>	<b>53,599</b>	<b>3,235</b>	<b>4,236</b>	<b>3,078–6,733</b>	<b>7,632</b>

<sup>a</sup> See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

12

13 **Impact BIO-100: Loss or Conversion of Habitat for and Direct Mortality of White-Tailed Kite**

14 Alternative 9 conservation measures would result in the combined permanent and temporary loss  
15 of up to 57,835 acres of modeled habitat for white-tailed kite (760 acres of nesting habitat, 57,075  
16 acres foraging habitat; Table 12-9-41). Conservation measures that would result in these losses are  
17 conveyance facilities and transmission line construction, and establishment and use of borrow and  
18 spoil areas (CM1), Yolo Bypass fisheries improvements (CM2), tidal habitat restoration (CM4),  
19 floodplain restoration (CM5), riparian habitat restoration, (CM7), grassland restoration (CM8),

1 vernal pool and wetland restoration (CM9), nontidal marsh restoration (CM10), and construction of  
2 conservation hatcheries (CM18). Habitat enhancement and management activities (CM11), which  
3 include ground disturbance or removal of nonnative vegetation, could result in local habitat effects.  
4 In addition, maintenance activities associated with the long-term operation of the water conveyance  
5 facilities and other BDCP physical facilities could affect white-tailed kite modeled habitat. Each of  
6 these individual activities is described below. A summary statement of the combined impacts and  
7 NEPA effects, and a CEQA conclusion follow the individual conservation measure discussions.

- 8 • *CM1 Water Conveyance Facilities and Operation:* Construction of Alternative 9 water conveyance  
9 facilities would result in the combined permanent and temporary loss of up to 132 acres of  
10 white-tailed kite nesting habitat (43 acres of permanent loss and 89 acres of temporary loss). In  
11 addition, 2,916 acres of foraging habitat would be removed (374 acres of permanent loss, 2,542  
12 acres of temporary loss, Table 12-9-41). Activities that would impact modeled White-tailed kite  
13 habitat include channel dredging, intakes, fish barriers, access roads, and construction of  
14 transmission lines. Permanent losses of nesting habitat would primarily consist of channel  
15 enlargement at the Sacramento River and Meadows Slough. Temporary losses would occur  
16 primarily along Middle River between Victoria Canal and Mildred Island, where large dredging  
17 work areas and operable barrier work areas would be placed. The riparian habitat in these areas  
18 is composed of very small patches or stringers bordering waterways, which include valley oak  
19 and scrub vegetation. Permanent impacts on foraging habitat would occur from the construction  
20 of the canals in CZ 8 east and south of Clifton Court Forebay and other conveyance structures in  
21 CZ 4, 5, 6, 7, and 8. Temporary impacts would primarily occur from borrow and spoil areas and  
22 temporary work areas. The CM1 footprint does not overlap with any occurrences of white-tailed  
23 kite. However, the implementation of *AMM18 Swainson's Hawk and White-Tailed Kite* would  
24 minimize effects on white-tailed kites if they were to nest within or adjacent to the construction  
25 footprint. Refer to the Terrestrial Biology Map Book for a detailed view of Alternative 9  
26 construction locations.
- 27 • *CM2 Yolo Bypass Fisheries Enhancement:* Construction of the Yolo bypass fisheries enhancement  
28 would result in the combined permanent and temporary loss of up to 170 acres of nesting  
29 habitat (82 acres of permanent loss, 88 acres of temporary loss) in the Yolo Bypass in CZ 2. In  
30 addition, 1,525 acres of foraging habitat would be removed (1,008 acres of permanent loss, 516  
31 acres of temporary loss). Activities through CM2 could involve excavation and grading in  
32 valley/foothill riparian areas to improve passage of fish through the bypasses. Most of the  
33 riparian losses would occur at the north end of Yolo Bypass where major fish passage  
34 improvements are planned. Excavation to improve water movement in the Toe Drain and in the  
35 Sacramento Weir would also remove white-tailed kite habitat. The loss is expected to occur  
36 during the first 10 years of Alternative 9 implementation.
- 37 • *CM4 Tidal Natural Communities Restoration:* Tidal habitat restoration site preparation and  
38 inundation would permanently remove an estimated 383 acres of white-tailed kite nesting  
39 habitat and 41,625 acres of foraging habitat. The majority of the acres lost would consist of  
40 cultivated lands in CZs 1, 2, 4, 5, 6, and/or 7. Grassland losses would likely occur in the vicinity  
41 of Cache Slough, on Decker Island in the West Delta ROA, on the upslope fringes of Suisun Marsh,  
42 and along narrow bands adjacent to waterways in the South Delta ROA. Tidal restoration would  
43 directly impact and fragment grassland just north of Rio Vista in and around French and  
44 Prospect Islands, and in an area south of Rio Vista around Threemile Slough. Losses of alkali  
45 seasonal wetland complex habitat would likely occur in the south end of the Yolo Bypass and on  
46 the northern fringes of Suisun Marsh. The conversion of cultivated lands to tidal wetlands over

1 fairly broad areas within the tidal restoration footprints could result in the removal or  
2 abandonment of nesting territories that occur within or adjacent to the restoration areas. Trees  
3 would not be actively removed but tree mortality would be expected over time as areas became  
4 tidally inundated. Depending on the extent and value of remaining habitat, this could reduce the  
5 local nesting population.

- 6 • *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore  
7 seasonally inundated floodplain and riparian restoration actions would remove approximately  
8 75 acres of white-tailed kite nesting habitat (42 acres of permanent loss, 33 acres of temporary  
9 loss) and 2,675 acres of foraging habitat (1,706 acres of permanent loss, 968 acres of temporary  
10 loss). These losses would be expected after the first 10 years of Alternative 9 implementation  
11 along the San Joaquin River and other major waterways in CZ 7.
- 12 • *CM7 Riparian Natural Community Restoration*: Riparian restoration would permanently remove  
13 approximately 971 acres of white-tailed kite foraging habitat as part of tidal restoration and  
14 3,991 acres as part of seasonal floodplain restoration through CM7.
- 15 • *CM8 Grassland Natural Community Restoration*: Restoration of grassland is expected to be  
16 implemented on agricultural lands and would result in the conversion of 1,849 acres of white-  
17 tailed kite agricultural foraging habitat to grassland foraging habitat in CZs 1, 2, 4, 5, 7, 8, and 11.  
18 If agricultural lands supporting higher value foraging habitat than the restored grassland were  
19 removed, there would be a loss of white-tailed kite foraging habitat value.
- 20 • *CM10 Nontidal Marsh Restoration*: Restoration and creation of nontidal freshwater marsh  
21 (CM10) would result in the permanent conversion of 1,440 acres of cultivated lands to nontidal  
22 marsh in CZ 2 and CZ 4. This would not result in a loss of foraging habitat as both natural  
23 communities are foraging habitat for white-tailed kite. Small patches of riparian vegetation that  
24 support White-tailed kite nesting habitat may develop along the margins of restored nontidal  
25 marsh restoration would also provide foraging habitat for the species.
- 26 • *CM11 Natural Communities Enhancement and Management*: Habitat management- and  
27 enhancement-related activities could disturb white-tailed kite nests if they were present near  
28 work sites. A variety of habitat management actions that are designed to enhance wildlife values  
29 in BDCP-protected habitats may result in localized ground disturbances that could temporarily  
30 remove small amounts of white-tailed kite habitat and reduce the functions of habitat until  
31 restoration is complete. Ground-disturbing activities, such as removal of nonnative vegetation  
32 and road and other infrastructure maintenance, are expected to have minor effects on available  
33 white-tailed kite habitat and are expected to result in overall improvements to and maintenance  
34 of habitat values over the term of the BDCP. These effects cannot be quantified, but are expected  
35 to be minimal and would be avoided and minimized by the AMMs listed below. CM11 would also  
36 include the construction of recreational-related facilities including trails, interpretive signs, and  
37 picnic tables (BDCP Chapter 4, *Covered Activities and Associated Federal Actions*). The  
38 construction of trailhead facilities, signs, staging areas, picnic areas, bathrooms, etc. would be  
39 placed on existing, disturbed areas when and where possible. However, approximately 50 acres  
40 of white-tailed kite grassland foraging habitat would be lost from the construction of trails and  
41 facilities.
- 42 • *CM18 Conservation Hatcheries*: Implementation of CM18 would remove up to 35 acres of high-  
43 white-tailed kite foraging habitat for the development of a delta and longfin smelt conservation  
44 hatchery in CZ 1. The loss is expected to occur during the first 10 years of Plan implementation.

1 Permanent and temporary white-tailed kite nesting habitat losses from the above conservation  
2 measures, would primarily consist of small, fragmented riparian stands. Temporarily affected  
3 nesting habitat would be restored as riparian habitat within 1 year following completion of  
4 construction activities. The restored riparian habitat would require 1 to several decades to  
5 functionally replace habitat that has been affected and for trees to attain sufficient size and  
6 structure suitable for nesting by white-tailed kite. *AMM18 Swainson's Hawk and White-Tailed*  
7 *Kite* contains actions described below to reduce the effect of temporal loss of nesting habitat,  
8 including the transplanting of mature trees and planting of trees near high-value foraging  
9 habitat. The functions of agricultural and grassland communities that provide foraging habitat  
10 for white-tailed kite are expected to be restored relatively quickly.

- 11 ● Operations and Maintenance: Postconstruction operation and maintenance of the above-ground  
12 water conveyance facilities and restoration infrastructure could result in ongoing but periodic  
13 disturbances that could affect white-tailed kite use of the surrounding habitat. Maintenance  
14 activities would include vegetation management, levee and structure repair, and re-grading of  
15 roads and permanent work areas. These effects, however, would be reduced by AMM1–AMM7  
16 and *AMM18 Swainson's Hawk and White-Tailed Kite* in addition to conservation actions as  
17 described below.
- 18 ● Injury and Direct Mortality: Construction-related activities would not be expected to result in  
19 direct mortality of adult or fledged white-tailed kite if they were present in the study area,  
20 because they would be expected to avoid contact with construction and other equipment.  
21 However, if white-tailed kite were to nest in the construction area, construction-related  
22 activities, including equipment operation, noise and visual disturbances could affect nests or  
23 lead to their abandonment, potentially resulting in mortality of eggs and nestlings. These effects  
24 would be avoided and minimized with the incorporation of *AMM18 Swainson's Hawk and White-*  
25 *Tailed Kite* into the BDCP.

26 The following paragraphs summarize the combined effects discussed above and describe other  
27 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also  
28 included.

### 29 ***Near-Term Timeframe***

30 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
31 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
32 provide sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that  
33 the effect of construction would not be adverse under NEPA. Alternative 9 would remove 532 acres  
34 (355 acres of permanent loss, 177 acres of temporary loss) of white-tailed kite nesting habitat in the  
35 study area in the near-term. These effects would result from the construction of the water  
36 conveyance facilities (CM1, 132 acres), and implementing other conservation measures (*CM2 Yolo*  
37 *Bypass Fisheries Enhancement*, *CM4 Tidal Natural Communities Restoration*, and *CM5 Seasonally*  
38 *Inundated Floodplain Restoration*—400 acres). In addition, 12,155 acres of white-tailed kite foraging  
39 habitat would be removed or converted in the near-term (CM1, 2,916 acres; *CM2 Yolo Bypass*  
40 *Fisheries Enhancement*, *CM4 Tidal Natural Communities Restoration*, *CM5 Seasonally Inundated*  
41 *Floodplain Restoration*, *CM7 Riparian Natural Community Restoration*, *CM8 Grassland Natural*  
42 *Community Restoration*, *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*, *CM11*  
43 *Natural Communities Enhancement and Management* and *CM18 Conservation Hatcheries*—9,239  
44 acres).

1 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by  
2 CM1 and that are identified in the biological goals and objectives for white-tailed kite in Chapter 3 of  
3 the BDCP would be 1:1 for restoration/creation and 1:1 protection of valley/foothill riparian habitat  
4 for nesting habitat, and 1:1 protection for foraging habitat. Using these ratios would indicate that  
5 132 acres of nesting habitat should be restored/created and 132 acres should be protected to  
6 mitigate the CM1 losses of white-tailed kite nesting habitat. In addition, 2,916 acres should be  
7 protected to compensate for the CM1 losses of white-tailed kite foraging habitat. The near-term  
8 effects of other conservation actions would remove 400 acres of modeled nesting habitat, and  
9 therefore require 400 acres of restoration and 400 acres of protection of nesting habitat. Similarly,  
10 the near-term effects of other conservation actions would result in the loss or conversion of 9,239  
11 acres of modeled foraging habitat, and therefore require 9,239 acres of protection of foraging  
12 habitat using the same typical NEPA and CEQA ratios (1:1 for restoration and 1:1 for protection of  
13 nesting habitat; 1:1 for restoration and 1:1 for protection of foraging habitat).

14 The BDCP has committed to near-term goals of protecting 750 acres and restoring 800 acres of  
15 valley/foothill riparian natural community, protecting 2,000 acres and restoring 1,140 acres of  
16 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of  
17 alkali seasonal wetland complex, protecting 4,800 acres of managed wetland natural community,  
18 protecting 15,400 acres of non-rice cultivated lands, protecting 900 acres of rice or rice equivalent  
19 habitat, and restoring 19,150 acres of tidal wetlands (Table 3-4 in Chapter 3, *Description of*  
20 *Alternatives*). These conservation actions are associated with CM3, CM4, CM7, and CM8 and would  
21 occur in the same timeframe as the construction and early restoration losses.

22 The majority of riparian protection and restoration acres would occur in CZ 7 as part of a reserve  
23 system with extensive wide bands or large patches of valley/foothill riparian natural community  
24 (Objectives VFRNC1.1 and VFRNC1.2, BDCP Chapter 3, *Conservation Strategy*). Riparian restoration  
25 would expand the patches of existing riparian forest in order to support nesting habitat for the  
26 species. White-tailed kite is excluded from narrow bands of riparian vegetation by Swainson's  
27 hawks and therefore requires wide patches of nesting habitat where its range overlaps with  
28 Swainson's hawk. The distribution and abundance of potential white-tailed kite nest trees would be  
29 increased by planting and maintaining native trees along roadsides and field borders within  
30 protected cultivated lands at a rate of one tree per 10 acres (Objective SWHA2.1). In addition, small  
31 but essential nesting habitat associated with cultivated lands would also be maintained and  
32 protected such as isolated trees, tree rows along field borders or roads, or small clusters of trees in  
33 farmyards or at rural residences (Objective CLNC1.3).

34 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1  
35 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali  
36 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous  
37 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would  
38 provide foraging habitat for white-tailed kite and reduce the effects of current levels of habitat  
39 fragmentation. Small mammal populations would also be increased on protected lands, enhancing  
40 the foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4).  
41 Foraging opportunities would also be improved by enhancing prey populations through the  
42 establishment of 20- to 30-foot-wide hedgerows along field borders and roadsides within protected  
43 cultivated lands (Objective SWHA2.2). Remnant patches of grassland or other uncultivated areas  
44 would also be protected and maintained as part of the cultivated lands reserve system which would  
45 provide additional foraging habitat and a source of rodent prey that could recolonize cultivated

1 fields (Objective CLNC1.3). The protection of managed wetlands (including upland grassland  
2 components) that dry during the spring would also serve as foraging habitat for white-tailed kite as  
3 prey species recolonize the fields (Objective MWNC1.1). In addition, the restoration of 19,150 acres  
4 of tidal natural communities, including transitional uplands would provide high-value foraging  
5 habitat for the white-tailed kite. At least 15,400 acres of cultivated lands that provide habitat for  
6 covered and other native wildlife species would be protected in the near-term time period  
7 (Objective CLNC1.1). These biological goals and objectives would inform the near-term protection  
8 and restoration efforts and represent performance standards for considering the effectiveness of  
9 restoration actions. The acres of restoration and protection contained in the near-term Plan goals  
10 and the additional detail in the biological objectives satisfy the typical mitigation that would be  
11 applied to the project-level effects of CM1 on white-tailed kite foraging habitat, as well as mitigate  
12 the near-term effects of the other conservation measures.

13 The 750 acres of protection and 800 acres of restoration contained in the near-term Plan goals  
14 satisfy the typical mitigation ratios that would be applied to the project-level effects of CM1 and  
15 other near-term impacts on white-tailed kite nesting habitat. The 800 acres of restored riparian  
16 habitat would be initiated in the near-term to offset the loss of modeled nesting habitat, but would  
17 require one to several decades to functionally replace habitat that has been affected and for trees to  
18 attain sufficient size and structure suitable for nesting by white-tailed kites. This time lag between  
19 the removal and restoration of nesting habitat could have a substantial impact on white-tailed kite  
20 in the near-term time period. Nesting habitat is limited throughout much of the study area,  
21 consisting mainly of intermittent riparian, isolated trees, small groves, tree rows along field borders,  
22 roadside trees, and ornamental trees near rural residences. The removal of nest trees or nesting  
23 habitat would further reduce this limited resource and could reduce or restrict the number of active  
24 white-tailed kite nests within the study area until restored riparian habitat is sufficiently developed.

25 *AMM18 Swainson's Hawk and White-Tailed Kite* would implement a program to plant large mature  
26 trees, including transplanting trees scheduled for removal. These would be supplemented with  
27 additional saplings and would be expected to reduce the temporal effects of loss of nesting habitat.  
28 The plantings would occur prior to or concurrent with (in the case of transplanting) the loss of trees.  
29 In addition, at least five trees (5-gallon container size) would be planted within the BDCP reserve  
30 system for every tree 20 feet or taller anticipated to be removed by construction during the near-  
31 term period. A variety of native tree species would be planted to provide trees with differing growth  
32 rates, maturation, and life span. Trees would be planted within the BDCP reserve system in areas  
33 that support high value foraging habitat in clumps of at least three trees each at appropriate sites  
34 within or adjacent to conserved cultivated lands, or they could be incorporated as a component of  
35 the riparian restoration (CM5, CM7) where they are in close proximity to suitable foraging habitat.  
36 Replacement trees that were incorporated into the riparian restoration would not be clustered in a  
37 single region of the study area, but would be distributed throughout the lands protected as foraging  
38 habitat for white-tailed kite. With this program in place, Alternative 9 would not have a substantial  
39 adverse effect on white-tailed kite in the near-term timeframe, either through direct mortality or  
40 through habitat modifications.

41 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
42 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
43 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
44 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
45 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or

1 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
2 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

3 ***Late Long-Term Timeframe***

4 The study area supports approximately 14,069 acres of modeled nesting habitat and 507,922 acres  
5 of modeled foraging habitat for white-tailed kite. Alternative 9 as a whole would result in the  
6 permanent loss of and temporary effects on 760 acres of potential nesting habitat (5% of the  
7 potential nesting habitat in the study area) and the loss or conversion of 57,075 acres of foraging  
8 habitat (11% of the foraging habitat in the study area). The locations of these losses are described  
9 above in the analyses of individual conservation measures.

10 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*  
11 *Restoration*, *CM4 Tidal Natural Communities Restoration*, *CM5 Seasonally Inundated Floodplain*  
12 *Restoration*, *CM7 Riparian Natural Community Restoration*, and *CM8 Grassland Natural Community*  
13 *Restoration* to restore or create at least 5,000 acres and protect at least 750 acres of valley/foothill  
14 riparian natural community, protect 8,000 acres and restore 2,000 acres of grassland natural  
15 community, protect 600 acres of vernal pool complex, protect 150 acres of alkali seasonal wetland  
16 complex, protect 8,100 acres of managed wetland, protect 48,625 acres of cultivated lands that  
17 provide suitable habitat for native wildlife species, and restore at least 65,000 acres of tidal  
18 wetlands (Table 3-4 in Chapter 3, *Description of Alternatives*).

19 The majority of riparian protection and restoration acres would occur in CZ 7 as part of a reserve  
20 system with extensive wide bands or large patches of valley/foothill riparian natural community  
21 (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*). Riparian  
22 restoration would expand the patches of existing riparian forest in order to support nesting habitat  
23 for the species. White-tailed kite is excluded from narrow bands of riparian vegetation by  
24 Swainson's hawks and therefore requires wide patches of nesting habitat where its range overlaps  
25 with Swainson's hawk. The distribution and abundance of potential white-tailed kite nest trees  
26 would be increased by planting and maintaining native trees along roadsides and field borders  
27 within protected cultivated lands at a rate of one tree per 10 acres (Objective SWHA2.1). In addition,  
28 small but essential nesting habitat associated with cultivated lands would also be maintained and  
29 protected such as isolated trees, tree rows along field borders or roads, or small clusters of trees in  
30 farmyards or at rural residences (Objective CLNC1.3).

31 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1  
32 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali  
33 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous  
34 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would  
35 provide foraging habitat for white-tailed kite and reduce the effects of current levels of habitat  
36 fragmentation. Small mammal populations would also be increased on protected lands, enhancing  
37 the foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4).  
38 Foraging opportunities would also be improved by enhancing prey populations through the  
39 establishment of 20- to 30-foot-wide hedgerows along field borders and roadsides within protected  
40 cultivated lands (Objective SWHA2.2). Remnant patches of grassland or other uncultivated areas  
41 would also be protected and maintained as part of the cultivated lands reserve system which would  
42 provide additional foraging habitat and a source of rodent prey that could recolonize cultivated  
43 fields (Objective CLNC1.3). The protection of managed wetlands (including upland grassland  
44 components) that dry during the spring would also serve as foraging habitat for white-tailed kite as

1 prey species recolonize the fields (Objective MWNC1.1). In addition, the restoration of at least  
2 65,000 acres of tidal natural communities, including transitional uplands would provide high-value  
3 foraging habitat for the white-tailed kite. At least 45,405 acres of cultivated lands that provide  
4 foraging habitat for white-tailed kite would be protected by the late long-term time period  
5 (Objective CLNC1.1).

6 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*  
7 *Plant Species*) estimates that the restoration and protection actions discussed above could result in  
8 the restoration of 3,800 acres and the protection of 570 acres of nesting habitat and the restoration  
9 of 49,875 acres and the protection of 2,050 acres of foraging habitat for white-tailed kite.

10 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
11 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
12 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
13 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
14 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
15 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
16 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

17 **NEPA Effects:** The loss of white-tailed kite habitat and potential direct mortality of this special-  
18 status species under Alternative 9 would represent an adverse effect in the absence of other  
19 conservation actions. With habitat protection and restoration associated with CM3, CM5, CM7, CM8,  
20 CM9, and CM11, guided by biological goals and objectives and by AMM1–AMM7 and *AMM18*  
21 *Swainson's Hawk and White-Tailed Kite*, which would be in place throughout the construction period,  
22 the effects of habitat loss and potential mortality on white-tailed kite under Alternative 9 would not  
23 be adverse.

#### 24 **CEQA Conclusion:**

##### 25 **Near-Term Timeframe**

26 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
27 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
28 provide sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that  
29 the effect of construction would be less than significant under CEQA. Alternative 9 would remove  
30 532 acres (355 acres of permanent loss, 177 acres of temporary loss) of white-tailed kite nesting  
31 habitat in the study area in the near-term. These effects would result from the construction of the  
32 water conveyance facilities (CM1, 132 acres), and implementing other conservation measures (*CM2*  
33 *Yolo Bypass Fisheries Enhancement*, *CM4 Tidal Natural Communities Restoration*, and *CM5 Seasonally*  
34 *Inundated Floodplain Restoration—400 acres*). In addition, 12,155 acres of white-tailed kite foraging  
35 habitat would be removed or converted in the near-term (CM1, 2,916 acres; *CM2 Yolo Bypass*  
36 *Fisheries Enhancement*, *CM4 Tidal Natural Communities Restoration*, *CM5 Seasonally Inundated*  
37 *Floodplain Restoration*, *CM7 Riparian Natural Community Restoration*, *CM8 Grassland Natural*  
38 *Community Restoration*, *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*, *CM11*  
39 *Natural Communities Enhancement and Management*, and *CM18 Conservation Hatcheries—9,239*  
40 acres).

41 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by  
42 CM1 and that are identified in the biological goals and objectives for white-tailed kite in Chapter 3 of  
43 the BDCP would be 1:1 for restoration/creation and 1:1 protection of valley/foothill riparian habitat

1 for nesting habitat, and 1:1 protection for foraging habitat. Using these ratios would indicate that  
2 132 acres of nesting habitat should be restored/created and 132 acres should be protected to  
3 mitigate the CM1 losses of white-tailed kite nesting habitat. In addition, 2,916 acres should be  
4 protected to compensate for the CM1 losses of white-tailed kite foraging habitat. The near-term  
5 effects of other conservation actions would remove 400 acres of modeled nesting habitat, and  
6 therefore require 400 acres of restoration and 400 acres of protection of nesting habitat. Similarly,  
7 the near-term effects of other conservation actions would result in the loss or conversion of 9,239  
8 acres of modeled foraging habitat, and therefore require 9,239 acres of protection of foraging  
9 habitat using the same typical NEPA and CEQA ratios (1:1 for restoration and 1:1 for protection of  
10 nesting habitat; 1:1 for restoration and 1:1 for protection of foraging habitat).

11 The BDCP has committed to near-term goals of protecting 750 acres and restoring 800 acres of  
12 valley/foothill riparian natural community, protecting 2,000 acres and restoring 1,140 acres of  
13 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of  
14 alkali seasonal wetland complex, protecting 4,800 acres of managed wetland natural community,  
15 protecting 15,400 acres of non-rice cultivated lands, protecting 900 acres of rice or rice equivalent  
16 habitat, and restoring 19,150 acres of tidal wetlands (Table 3-4 in Chapter 3, *Description of*  
17 *Alternatives*). These conservation actions are associated with CM3, CM4, CM7, and CM8 and would  
18 occur in the same timeframe as the construction and early restoration losses.

19 The majority of riparian protection and restoration acres would occur in CZ 7 as part of a reserve  
20 system with extensive wide bands or large patches of valley/foothill riparian natural community  
21 (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*). Riparian  
22 restoration would expand the patches of existing riparian forest in order to support nesting habitat  
23 for the species. White-tailed kite is excluded from narrow bands of riparian vegetation by  
24 Swainson's hawks and therefore requires wide patches of nesting habitat where its range overlaps  
25 with Swainson's hawk. The distribution and abundance of potential white-tailed kite nest trees  
26 would be increased by planting and maintaining native trees along roadsides and field borders  
27 within protected cultivated lands at a rate of one tree per 10 acres (Objective SWHA2.1). In addition,  
28 small but essential nesting habitat associated with cultivated lands would also be maintained and  
29 protected such as isolated trees, tree rows along field borders or roads, or small clusters of trees in  
30 farmyards or at rural residences (Objective CLNC1.3).

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33 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous  
34 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would  
35 provide foraging habitat for white-tailed kite and reduce the effects of current levels of habitat  
36 fragmentation. Small mammal populations would also be increased on protected lands, enhancing  
37 the foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4).  
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39 establishment of 20- to 30-foot-wide hedgerows along field borders and roadsides within protected  
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41 would also be protected and maintained as part of the cultivated lands reserve system which would  
42 provide additional foraging habitat and a source of rodent prey that could recolonize cultivated  
43 fields (Objective CLNC1.3). The protection of managed wetlands (including upland grassland  
44 components) that dry during the spring would also serve as foraging habitat for white-tailed kite as  
45 prey species recolonize the fields (Objective MWNC1.1). In addition, the restoration of 19,150 acres

1 of tidal natural communities, including transitional uplands would provide high-value foraging  
2 habitat for the white-tailed kite. At least 15,400 acres of cultivated lands that provide habitat for  
3 covered and other native wildlife species would be protected in the near-term time period  
4 (Objective CLNC1.1). These biological goals and objectives would inform the near-term protection  
5 and restoration efforts and represent performance standards for considering the effectiveness of  
6 restoration actions. The acres of restoration and protection contained in the near-term Plan goals  
7 and the additional detail in the biological objectives satisfy the typical mitigation that would be  
8 applied to the project-level effects of CM1 on white-tailed kite foraging habitat, as well as mitigate  
9 the near-term effects of the other conservation measures.

10 The 750 acres of protection and 800 acres of restoration contained in the near-term Plan goals  
11 satisfy the typical mitigation ratios that would be applied to the project-level effects of CM1 and  
12 other near-term impacts on white-tailed kite nesting habitat. The 800 acres of restored riparian  
13 habitat would be initiated in the near-term to offset the loss of modeled nesting habitat, but would  
14 require one to several decades to functionally replace habitat that has been affected and for trees to  
15 attain sufficient size and structure suitable for nesting by white-tailed kites. This time lag between  
16 the removal and restoration of nesting habitat could have a substantial impact on white-tailed kite  
17 in the near-term time period. Nesting habitat is limited throughout much of the study area,  
18 consisting mainly of intermittent riparian, isolated trees, small groves, tree rows along field borders,  
19 roadside trees, and ornamental trees near rural residences. The removal of nest trees or nesting  
20 habitat would further reduce this limited resource and could reduce or restrict the number of active  
21 white-tailed kite nests within the study area until restored riparian habitat is sufficiently developed.

22 *AMM18 Swainson's Hawk and White-Tailed Kite* would implement a program to plant large mature  
23 trees, including transplanting trees scheduled for removal. These would be supplemented with  
24 additional saplings and would be expected to reduce the temporal effects of loss of nesting habitat.  
25 The plantings would occur prior to or concurrent with (in the case of transplanting) the loss of trees.  
26 In addition, at least five trees (5-gallon container size) would be planted within the BDCP reserve  
27 system for every tree 20 feet or taller anticipated to be removed by construction during the near-  
28 term period. A variety of native tree species would be planted to provide trees with differing growth  
29 rates, maturation, and life span. Trees would be planted within the BDCP reserve system in areas  
30 that support high value foraging habitat in clumps of at least three trees each at appropriate sites  
31 within or adjacent to conserved cultivated lands, or they could be incorporated as a component of  
32 the riparian restoration (CM5, CM7) where they are in close proximity to suitable foraging habitat.  
33 Replacement trees that were incorporated into the riparian restoration would not be clustered in a  
34 single region of the study area, but would be distributed throughout the lands protected as foraging  
35 habitat for white-tailed kite. With this program in place, Alternative 9 would not have a substantial  
36 adverse effect on white-tailed kite in the near-term timeframe, either through direct mortality or  
37 through habitat modifications.

38 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
39 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
40 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
41 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
42 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
43 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
44 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

1 **Late Long-Term Timeframe**

2 The study area supports approximately 14,069 acres of modeled nesting habitat and 507,922 acres  
3 of modeled foraging habitat for white-tailed kite. Alternative 9 as a whole would result in the  
4 permanent loss of and temporary effects on 760 acres of potential nesting habitat (5% of the  
5 potential nesting habitat in the study area) and the loss or conversion of 57,075 acres of foraging  
6 habitat (11% of the foraging habitat in the study area).

7 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*  
8 *Restoration*, *CM4 Tidal Natural Communities Restoration*, *CM5 Seasonally Inundated Floodplain*  
9 *Restoration*, *CM7 Riparian Natural Community Restoration*, and *CM8 Grassland Natural Community*  
10 *Restoration* to restore or create at least 5,000 acres and protect at least 750 acres of valley/foothill  
11 riparian natural community, protect 8,000 acres and restore 2,000 acres of grassland natural  
12 community, protect 600 acres of vernal pool complex, protect 150 acres of alkali seasonal wetland  
13 complex, protect 8,100 acres of managed wetland, protect 48,625 acres of cultivated lands that  
14 provide suitable habitat for native wildlife species, and restore at least 65,000 acres of tidal  
15 wetlands (Table 3-4 in Chapter 3, *Description of Alternatives*).

16 The majority of riparian protection and restoration acres would occur in CZ 7 as part of a reserve  
17 system with extensive wide bands or large patches of valley/foothill riparian natural community  
18 (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*). Riparian  
19 restoration would expand the patches of existing riparian forest in order to support nesting habitat  
20 for the species. White-tailed kite is excluded from narrow bands of riparian vegetation by  
21 Swainson's hawks and therefore requires wide patches of nesting habitat where its range overlaps  
22 with Swainson's hawk. The distribution and abundance of potential white-tailed kite nest trees  
23 would be increased by planting and maintaining native trees along roadsides and field borders  
24 within protected cultivated lands at a rate of one tree per 10 acres (Objective SWHA2.1). In addition,  
25 small but essential nesting habitat associated with cultivated lands would also be maintained and  
26 protected such as isolated trees, tree rows along field borders or roads, or small clusters of trees in  
27 farmyards or at rural residences (Objective CLNC1.3).

28 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1  
29 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali  
30 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous  
31 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would  
32 provide foraging habitat for white-tailed kite and reduce the effects of current levels of habitat  
33 fragmentation. Small mammal populations would also be increased on protected lands, enhancing  
34 the foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4).  
35 Foraging opportunities would also be improved by enhancing prey populations through the  
36 establishment of 20- to 30-foot-wide hedgerows along field borders and roadsides within protected  
37 cultivated lands (Objective SWHA2.2). Remnant patches of grassland or other uncultivated areas  
38 would also be protected and maintained as part of the cultivated lands reserve system which would  
39 provide additional foraging habitat and a source of rodent prey that could recolonize cultivated  
40 fields (Objective CLNC1.3). The protection of managed wetlands (including upland grassland  
41 components) that dry during the spring would also serve as foraging habitat for white-tailed kite as  
42 prey species recolonize the fields (Objective MWNC1.1). In addition, the restoration of at least  
43 65,000 acres of tidal natural communities, including transitional uplands would provide high-value  
44 foraging habitat for the white-tailed kite. At least 45,405 acres of cultivated lands that provide

1 foraging habitat for white-tailed kite would be protected by the late long-term time period  
2 (Objective CLNC1.1).

3 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*  
4 *Plant Species*) estimates that the restoration and protection actions discussed above could result in  
5 the restoration of 3,800 acres and the protection of 570 acres of nesting habitat and the restoration  
6 of 49,875 acres and the protection of 2,050 acres of foraging habitat for white-tailed kite.

7 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*  
8 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*  
9 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
10 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
11 *Material, and AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
12 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
13 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

14 Considering Alternative 9's protection and restoration provisions, which would provide acreages of  
15 new or enhanced habitat in amounts greater than necessary to compensate for the time lag of  
16 restoring riparian and foraging habitats lost to construction and restoration activities, and with  
17 implementation of AMM1-AMM7 and *AMM18 Swainson's Hawk and White-Tailed Kite*, the loss of  
18 habitat or direct mortality through implementation of Alternative 9 would not result in a substantial  
19 adverse effect through habitat modifications and would not substantially reduce the number or  
20 restrict the range of the species. In particular, 95% of the loss of foraging habitat effects involve the  
21 conversion from one habitat type to another form of suitable foraging habitat. Therefore, the loss of  
22 habitat or potential mortality under this alternative would have a less-than-significant impact on  
23 white-tailed kite.

#### 24 **Impact BIO-101: Effects on White-Tailed Kite Associated with Electrical Transmission** 25 **Facilities**

26 New transmission lines would increase the risk that white-tailed kites could be subject to power line  
27 strikes and/or electrocution, which could result in injury or mortality of individuals. This species  
28 would be at low risk of bird strike mortality based on its general maneuverability, its keen eyesight,  
29 and lack of flocking behavior (BDCP Attachment 5J.C, *Analysis of Potential Bird Collisions at Proposed*  
30 *BDCP Transmission Lines*). *AMM20 Greater Sandhill Crane* would further reduce any potential effects.

31 **NEPA Effects:** New transmission lines would minimally increase the risk for white-tailed kite power  
32 line strikes. However, the species would be at a low risk of bird strike mortality based on its general  
33 maneuverability, its keen eyesight and lack of flocking behavior. With the implementation of *AMM20*  
34 *Greater Sandhill Crane* the potential effect of the construction of new transmission lines on white-  
35 tailed kite would not be adverse.

36 **CEQA Conclusion:** New transmission lines would increase the risk for white-tailed kite power line  
37 strikes and/or electrocution. However, the species would be at a low risk of bird strike mortality  
38 based on its general maneuverability, its keen eyesight and lack of flocking behavior. *AMM20 Greater*  
39 *Sandhill Crane* would further reduce any potential impact of the construction of new transmission  
40 lines on white-tailed kite to a less-than-significant level.

1 **Impact BIO-102: Indirect Effects of Plan Implementation on White-Tailed Kite**

2 White-tailed kite nesting habitat within the vicinity of proposed construction areas could be  
3 indirectly affected by construction activities. Construction noise above background noise levels  
4 (greater than 50 dBA) could extend 1,900 to 5,250 feet from the edge of construction activities  
5 (BDCP Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of the BDCP Conveyance*  
6 *Facility on Sandhill Crane*, Table 4), although there are no available data to determine the extent to  
7 which these noise levels could affect white-tailed kite. Indirect effects associated with construction  
8 include noise, dust, and visual disturbance caused by grading, filling, contouring, and other ground-  
9 disturbing operations outside the project footprint but within 1,300 feet from the construction edge.  
10 If white-tailed kite were to nest in or adjacent to work areas, construction and subsequent  
11 maintenance-related noise and visual disturbances could mask calls, disrupt foraging and nesting  
12 behaviors, and reduce the functions of suitable nesting habitat for these species. *AMM18 Swainson's*  
13 *Hawk and White-Tailed Kite* would require preconstruction surveys, and if detected, 200-yard no-  
14 disturbance buffers would be established around active nests. The use of mechanical equipment  
15 during water conveyance facilities construction could cause the accidental release of petroleum or  
16 other contaminants that could affect white-tailed kite in the surrounding habitat. The inadvertent  
17 discharge of sediment or excessive dust adjacent to white-tailed kite habitat could also affect the  
18 species. AMM1–AMM7, including *AMM2 Construction Best Management Practices and Monitoring*,  
19 would minimize the likelihood of such spills and ensure that measures are in place to prevent runoff  
20 from the construction area and negative effects of dust on active nests.

21 **Methylmercury Exposure:** Covered activities have the potential to exacerbate bioaccumulation of  
22 mercury in avian species, including white-tailed kite. Marsh (tidal and nontidal) and floodplain  
23 restoration also have the potential to increase exposure to methylmercury. Mercury is transformed  
24 into the more bioavailable form of methylmercury in aquatic systems, especially areas subjected to  
25 regular wetting and drying such as tidal marshes and flood plains (Alpers et al. 2008). Thus, BDCP  
26 restoration activities that create newly inundated areas could increase bioavailability of mercury  
27 (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Increased methylmercury  
28 associated with natural community and floodplain restoration may indirectly affect white-tailed kite  
29 (see BDCP Appendix 5.D, *Contaminants*). However, the potential mobilization or creation of  
30 methylmercury within the study area varies with site-specific conditions and would need to be  
31 assessed at the project level. *CM12 Methylmercury Management* includes provisions for project-  
32 specific Mercury Management Plans. Site-specific restoration plans that address the creation and  
33 mobilization of mercury, as well as monitoring and adaptive management as described in *CM12*  
34 would be available to address the uncertainty of methylmercury levels in restored tidal marsh and  
35 potential impacts on white-tailed kite.

36 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in  
37 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,  
38 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,  
39 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz  
40 2009). The effect of selenium toxicity differs widely between species and also between age and sex  
41 classes within a species. In addition, the effect of selenium on a species can be confounded by  
42 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith  
43 2009).

44 The primary source of selenium bioaccumulation in birds is through their diet (Ackerman and  
45 Eagles-Smith 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the

1 trophic level at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At  
2 Kesterson Reservoir in the San Joaquin Valley, selenium concentrations in invertebrates have been  
3 found to be two to six times the levels in rooted plants. Furthermore, bivalves sampled in the San  
4 Francisco Bay contained much higher selenium levels than crustaceans such as copepods (Stewart et  
5 al. 2004). Studies conducted at the Grasslands in Merced County recorded higher selenium levels in  
6 black-necked stilts which feed on aquatic invertebrates than in mallards and pintails, which are  
7 primarily herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which  
8 forage on bivalves) have much higher levels of selenium levels than shorebirds that prey on aquatic  
9 invertebrates (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high  
10 levels of selenium have a higher risk of selenium toxicity.

11 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations  
12 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to  
13 exacerbate bioaccumulation of selenium in avian species, including white-tailed kite. Marsh (tidal  
14 and nontidal) and floodplain restoration have the potential to mobilize selenium, and therefore  
15 increase avian exposure from ingestion of prey items with elevated selenium levels. Thus, BDCP  
16 restoration activities that create newly inundated areas could increase bioavailability of selenium  
17 (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Changes in selenium  
18 concentrations were analyzed in Chapter 8, *Water Quality*, and it was determined that, relative to  
19 Existing Conditions and the No Action Alternative, CM1 would not result in substantial, long-term  
20 increases in selenium concentrations in water in the Delta under any alternative. However, it is  
21 difficult to determine whether the effects of potential increases in selenium bioavailability  
22 associated with restoration-related conservation measures (CM4 and CM5) would lead to adverse  
23 effects on white-tailed kite.

24 Because of the uncertainty that exists at this programmatic level of review, there could be a  
25 substantial effect on white-tailed kite from increases in selenium associated with restoration  
26 activities. This effect would be addressed through the implementation of *AMM27 Selenium*  
27 *Management* (BDCP Appendix 3.C, *Avoidance and Minimization Measures*) which would provide  
28 specific tidal habitat restoration design elements to reduce the potential for bioaccumulation of  
29 selenium and its bioavailability in tidal habitats. Furthermore, the effectiveness of selenium  
30 management to reduce selenium concentrations and/or bioaccumulation would be evaluated  
31 separately for each restoration effort as part of design and implementation. This avoidance and  
32 minimization measure would be implemented as part of the tidal habitat restoration design  
33 schedule.

34 **NEPA Effects:** Noise and visual disturbances from the construction of water conveyance facilities  
35 could reduce white-tailed kite use of modeled habitat adjacent to work areas. Moreover, operation  
36 and maintenance of the water conveyance facilities, including the transmission facilities, could result  
37 in ongoing but periodic postconstruction disturbances that could affect white-tailed kite use of the  
38 surrounding habitat. Noise, potential spills of hazardous materials, increased dust and  
39 sedimentation, and operations and maintenance of the water conveyance facilities under Alternative  
40 9 would not have an adverse effect on white-tailed kite with the implementation of AMM1–AMM7,  
41 and *AMM18 Swainson's Hawk and White-Tailed Kite*. Tidal habitat restoration could result in  
42 increased exposure of white-tailed kite to selenium. This effect would be addressed through the  
43 implementation of *AMM26, Selenium Management* which would provide specific tidal habitat  
44 restoration design elements to reduce the potential for bioaccumulation of selenium and its  
45 bioavailability in tidal habitats. The indirect effects associated with noise and visual disturbances,

1 potential spills of hazardous material, and increased exposure to selenium from Alternative 9  
2 implementation would not have an adverse effect on white-tailed kite. Tidal habitat restoration is  
3 unlikely to have an adverse effect on white-tailed kite through increased exposure to  
4 methylmercury, as kites currently forage in tidal marshes where elevated methylmercury levels  
5 exist. However, it is unknown what concentrations of methylmercury are harmful to the species and  
6 the potential for increased exposure varies substantially within the study area. Site-specific  
7 restoration plans in addition to monitoring and adaptive management, described in CM12  
8 *Methylmercury Management*, would address the uncertainty of methylmercury levels in restored  
9 tidal marsh. The site-specific planning phase of marsh restoration would be the appropriate place to  
10 assess the potential for risk of methylmercury exposure for white-tailed kite, once site specific  
11 sampling and other information could be developed.

12 **CEQA Conclusion:** Noise, the potential for hazardous spills, increased dust and sedimentation, and  
13 operations and maintenance of the water conveyance facilities under Alternative 9 would have a  
14 less-than-significant impact on white-tailed kite with the implementation of *AMM18 Swainson's*  
15 *Hawk and White-Tailed Kite*, and AMMs1-7. Tidal habitat restoration could result in increased  
16 exposure of white-tailed kite to selenium. This effect would be addressed through the  
17 implementation of *AMM26, Selenium Management* which would provide specific tidal habitat  
18 restoration design elements to reduce the potential for bioaccumulation of selenium and its  
19 bioavailability in tidal habitats. The implementation of tidal natural communities restoration or  
20 floodplain restoration could result in increased exposure of white-tailed kite to methylmercury.  
21 However, it is unknown what concentrations of methylmercury are harmful to this species. *CM12*  
22 *Methylmercury Management* includes provisions for project-specific Mercury Management Plans.  
23 Site-specific restoration plans that address the creation and mobilization of mercury, as well as  
24 monitoring and adaptive management as described in CM12, would better inform potential impacts  
25 and address the uncertainty of methylmercury levels in restored tidal marsh in the study area on  
26 white-tailed kite. With these measures in place, the indirect effects associated with noise and visual  
27 disturbances, potential spills of hazardous material, and increased exposure to selenium from  
28 Alternative 9 implementation would have a less-than-significant impact on white-tailed kite.

29 **Impact BIO-103: Periodic Effects of Inundation of White-Tailed Kite Habitat as a Result of**  
30 **Implementation of Conservation Components**

31 Flooding of the Yolo Bypass from Fremont Weir operations (related to *CM2 Yolo Bypass Fisheries*  
32 *Enhancement*) would increase the frequency and duration of inundation on approximately 48-82  
33 acres of modeled white-tailed kite nesting habitat and 3,030-6,651 acres of modeled white-tailed  
34 kite foraging habitat (Table 12-9-41). During inundation years, affected cultivated lands and  
35 grassland would not be available as foraging habitat until prey populations have re-inhabited  
36 inundated areas. This would result in temporary periodic reduction in availability of foraging  
37 habitat. If late-season Fremont Weir operations were to preclude the planting of some crop types,  
38 there could be a further loss of foraging habitat value if the crop type that would have been planted  
39 would provide greater foraging habitat value than the fallowed fields. No known white-tailed kite  
40 nest sites would be affected, and increased periodic flooding is not expected to cause any adverse  
41 effect on nest sites that may be within the inundation area because existing trees already withstand  
42 floods in the area, the increase in inundation frequency and duration is expected to remain within  
43 the range of tolerance of riparian trees, and any nest sites would be located above floodwaters.

1 Based on hypothetical floodplain restoration, CM5 implementation could result in periodic  
2 inundation of up to approximately 230 acres of modeled white-tailed kite nesting habitat and 7,402  
3 acres of modeled white-tailed kite foraging habitat (Table 12-9-41). Inundation of foraging habitat  
4 could result in a periodic reduction of available foraging habitat due to the reduction in available  
5 prey. Following draw-down, inundated habitats are expected to recover and provide suitable  
6 foraging conditions until the following inundation period. Thus, this is considered a periodic impact  
7 that is unlikely to affect white-tailed kite distribution and abundance, or foraging use of the study  
8 area.

9 Periodic inundation of floodplains (through CM2 and CM5) would be expected to restore a more  
10 natural flood regime in support of riparian vegetation types that support white-tailed kite nesting  
11 habitat. No adverse effects of inundation on white-tailed kite riparian habitat are expected because  
12 valley/foothill riparian vegetation is expected to benefit from seasonal inundation.

13 **NEPA Effects:** Although foraging habitat would be periodically unavailable to white-tailed kite  
14 because of CM2 and CM5 implementation, inundated habitats are expected to recover following  
15 draw-down. Any effects are considered short-term and would not result in an adverse effect.

16 **CEQA Conclusion:** Although foraging habitat would be periodically unavailable to white-tailed kite  
17 because of CM2 and CM5 implementation, inundated habitats are expected to recover following  
18 draw-down. Any effects are considered short-term and would be expected to have a less-than-  
19 significant impact on white-tailed kite.

## 20 **Yellow-Breasted Chat**

21 Yellow-breasted chat modeled habitat includes suitable nesting and migratory habitat as those plant  
22 alliances from the valley/foothill riparian modeled habitat that contain a shrub component and an  
23 overstory component. Primary nesting and migratory habitat is qualitatively distinguished from  
24 secondary habitat in Delta areas as those plant associations that support a greater percentage of a  
25 suitable shrub cover, particularly blackberry, and California wild rose, and have an open to  
26 moderately dense overstory canopy, using data from Hickson and Keeler-Wolf (2007). No  
27 distinction is made between primary and secondary habitat for Suisun Marsh/Yolo Basin habitats  
28 because supporting information is lacking. For this reason, the effects analysis only provides the  
29 breakdown between primary and secondary habitat in the habitat loss totals and associated tables,  
30 and does not provide this breakdown in the text by activity or effect type.

31 Construction and restoration associated with Alternative 9 conservation measures would result in  
32 both temporary and permanent losses of yellow-breasted chat modeled habitat as indicated in Table  
33 12-9-42. Full implementation of Alternative 9 would also include the following conservation actions  
34 over the term of the BDCP to benefit the yellow-breasted chat (BDCP Chapter 3, Section 3.3,  
35 *Biological Goals and Objectives*).

- 36 ● Restore or create at least 5,000 acres of valley/foothill riparian natural community, with at least  
37 3,000 acres occurring on restored seasonally inundated floodplain (Objective VFRNC1.1,  
38 associated with CM7).
- 39 ● Protect at least 750 acres of existing valley/foothill riparian natural community in CZ 7 by year  
40 10 (Objective VFRNC1.2, associated with CM3).

- 1       • Restore, maintain and enhance structural heterogeneity with adequate vertical and horizontal  
2       overlap among vegetation components and over adjacent riverine channels, freshwater  
3       emergent wetlands, and grasslands (Objective VFRNC2.1, associated with CM7).
- 4       • Maintain at least 1,000 acres of early- to mid-successional vegetation with a well-developed  
5       understory of dense shrubs on restored seasonally inundated floodplain (Objective VFRNC2.2,  
6       associated with CM7).

7       As explained below, with the restoration or protection of these amounts of habitat, in addition to  
8       management activities that would enhance these natural communities for the species and  
9       implementation of AMM1–AMM7 and *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least*  
10      *Bell's Vireo, Western Yellow-Billed Cuckoo*, impacts on yellow-breasted chat would not be adverse for  
11      NEPA purposes and would be less than significant for CEQA purposes.

1  
2

**Table 12-9-42. Changes in Yellow-Breasted Chat Modeled Habitat Associated with Alternative 9 (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Nesting and Migratory Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	<i>Primary</i>	31	31	63	63	NA	NA
	<i>Secondary</i>	18	18	171	171	NA	NA
	<i>Suisun Marsh/Upper Yolo Bypass</i>	0	0	0	0	NA	NA
<b>Total Impacts CM1</b>		<b>49</b>	<b>49</b>	<b>234</b>	<b>234</b>	<b>NA</b>	<b>NA</b>
CM2-CM18	<i>Primary</i>	96	214	58	73	19-38	92
	<i>Secondary</i>	209	357	0	6	6-18	56
	<i>Suisun Marsh/Upper Yolo Bypass</i>	76	85	29	29	23-32	0
<b>Total Impacts CM2-CM18</b>		<b>381</b>	<b>656</b>	<b>87</b>	<b>108</b>	<b>48-88</b>	<b>148</b>
<b>Total Primary</b>		<b>127</b>	<b>245</b>	<b>121</b>	<b>136</b>		
<b>Total Secondary</b>		<b>227</b>	<b>375</b>	<b>171</b>	<b>177</b>		
<b>Total Suisun Marsh/Upper Yolo Bypass</b>		<b>76</b>	<b>85</b>	<b>29</b>	<b>29</b>		
<b>TOTAL IMPACTS</b>		<b>430</b>	<b>705</b>	<b>321</b>	<b>342</b>		

<sup>a</sup> See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-104: Loss or Conversion of Habitat for and Direct Mortality of Yellow-Breasted**  
5 **Chat**

6 Alternative 9 conservation measures would result in the combined permanent and temporary loss  
7 of up to 1,047 acres of modeled habitat for yellow-breasted chat (Table 12-9-42). Conservation  
8 measures that would result in these losses are conveyance facilities and transmission line  
9 construction, and establishment and use of borrow and spoil areas (CM1), Yolo Bypass fisheries  
10 improvements (CM2), tidal habitat restoration (CM4), and floodplain restoration (CM5). Habitat  
11 enhancement and management activities (CM11) which include ground disturbance or removal of  
12 nonnative vegetation, could result in local adverse habitat effects. In addition, maintenance activities  
13 associated with the long-term operation of the water conveyance facilities and other BDCP physical

1 facilities could degrade or eliminate yellow-breasted chat habitat. Each of these individual activities  
2 is described below. A summary statement of the combined impacts and NEPA effects, and a CEQA  
3 conclusion follow the individual conservation measure discussions.

- 4 • *CM1 Water Facilities and Operation:* Construction of Alternative 9 conveyance facilities would  
5 result in the combined permanent and temporary loss of up to 283 acres of modeled yellow-  
6 breasted chat habitat (94 acres of primary nesting habitat, 189 acres of secondary habitat) from  
7 CZs 4, 5, 6, 7, and 8 (Table 12-9-42). Most of the permanent loss would occur as wider and  
8 deeper channels are dredged in Middle River and Victoria Canal, and as operable barriers and  
9 new Sacramento River diversions are constructed in various waterways across the Delta.  
10 Temporary losses of habitat would occur primarily along Middle River between Victoria Canal  
11 and Mildred Island, where large dredging work areas and operable barrier work areas would be  
12 placed. Some of this vegetation may be temporarily removed as dredging progresses, while  
13 other areas could remain in place but be temporarily affected by sedimentation and equipment  
14 movement associated with dredging. The CM1 construction footprint overlaps with 6  
15 occurrences of yellow-breasted chat. Six occurrences detected on inchannel islands (south of  
16 Mildred Island) intersect with temporary dredging work areas, and 3 intersect with a temporary  
17 operable barrier work area on north Mandeville Island. Preconstruction surveys under *AMM22*  
18 *Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo*  
19 would minimize potential effects on nesting yellow-breasted chat in the study area. Refer to the  
20 Terrestrial Biology Map Book for a detailed view of Alternative 9 construction locations.
- 21 • *CM2 Yolo Bypass Fisheries Enhancement:* Construction of the Yolo bypass fisheries enhancement  
22 would permanently remove approximately 83 acres and temporarily remove 88 acres of yellow-  
23 breasted chat habitat in the Yolo Bypass in CZ 2. The loss is expected to occur during the first 10  
24 years of Alternative 9 implementation.
- 25 • *CM4 Tidal Natural Communities Restoration:* Tidal habitat restoration site preparation and  
26 inundation would permanently remove an estimated 545 acres of modeled yellow-breasted chat  
27 habitat in CZ 1, 2, 6, and 11. This total is composed of an estimated 182 acres of primary nesting  
28 and migratory habitat, 349 acres of secondary nesting and migratory habitat, and 14 acres of  
29 nesting and migratory habitat in the Suisun Marsh and upper Yolo Bypass areas.
- 30 • *CM5 Seasonally Inundated Floodplain Restoration:* Construction of setback levees to restore  
31 seasonally inundated floodplain would permanently and temporarily remove approximately 49  
32 acres of modeled yellow-breasted chat habitat in CZ 7. This total is comprised of 28 acres of  
33 primary nesting and migratory habitat and 21 acres of secondary nesting and migratory habitat.  
34 Based on the riparian habitat restoration assumptions, approximately 3,000 acres of  
35 valley/foothill riparian habitat would be restored as a component of seasonally inundated  
36 floodplain restoration actions. The actual number of acres that would be restored may differ  
37 from these estimates, depending on how closely the outcome of seasonally inundated floodplain  
38 restoration approximates the assumed outcome. Once this restored riparian vegetation has  
39 developed habitat functions, a portion of it would be suitable to support yellow-breasted chat  
40 habitat.
- 41 • *CM11 Natural Communities Enhancement and Management:* Habitat protection and management  
42 activities that could be implemented in protected yellow-breasted chat habitats would be  
43 expected to maintain and improve the functions of the habitat over the term of the BDCP.  
44 Yellow-breasted chat would be expected to benefit from the increase in protected habitat, which  
45 would maintain conditions favorable for the chat's use of the study area.

1 Habitat management- and enhancement-related activities could disturb yellow-breasted chat  
2 nests if they are present near work sites. Equipment operation could destroy nests, and noise  
3 and visual disturbances could lead to their abandonment, resulting in mortality of eggs and  
4 nestlings. *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-*  
5 *Billed Cuckoo* would ensure that these activities do not result in direct mortality of yellow-  
6 breasted chat or other adverse effects.

7 Occupied habitat would be monitored to determine if there is a need to implement controls on  
8 brood parasites (brown-headed cowbird) or nest predators. If implemented, these actions  
9 would be expected to benefit the yellow-breasted chat by removing a potential stressor that  
10 could, if not addressed, adversely affect the stability of newly established populations.

11 A variety of habitat management actions included in *CM11 Natural Communities Enhancement*  
12 *and Management* that are designed to enhance wildlife values in restored riparian habitats may  
13 result in localized ground disturbances that could temporarily remove small amounts of yellow-  
14 breasted chat habitat. Ground-disturbing activities, such as removal of nonnative vegetation and  
15 road and other infrastructure maintenance activities, are expected to have minor adverse effects  
16 on available yellow-breasted chat habitat and are expected to result in overall improvements to  
17 and maintenance of yellow-breasted chat habitat values over the term of the BDCP.

- 18 ● Operations and Maintenance: Postconstruction operation and maintenance of the above-ground  
19 water conveyance facilities and restoration infrastructure could result in ongoing but periodic  
20 disturbances that could affect least Bell's vireo and yellow warbler use of the surrounding  
21 habitat. Maintenance activities would include vegetation management, levee and structure  
22 repair, and re-grading of roads and permanent work areas. These effects, however, would be  
23 reduced by AMMs and conservation actions as described below.
- 24 ● Injury and Direct Mortality: Construction is not expected to result in direct mortality of yellow-  
25 breasted chat because adults and fledged young are expected to occur only in very small  
26 numbers and, if present, would avoid contact with construction and other equipment. If yellow-  
27 breasted chat were to nest in the vicinity of construction activities, equipment operation could  
28 destroy nests and noise and visual disturbances could lead to nest abandonment. *AMM22 Suisun*  
29 *Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo* would avoid  
30 and minimize this effect.
- 31 ● Permanent and temporary habitat losses from the above CMs, would primarily consist of small,  
32 fragmented riparian stands in CZ 2–CZ 8 that do not provide high-value habitat for the species.  
33 Temporarily affected areas would be restored as riparian habitat within 1 year following  
34 completion of construction activities. Although the effects are considered temporary, the  
35 restored riparian habitat would require 5 years to several decades, for ecological succession to  
36 occur and for restored riparian habitat to functionally replace habitat that has been affected. The  
37 majority of the riparian vegetation to be temporarily removed is early- to mid-successional;  
38 therefore, the replaced riparian vegetation would be expected to have structural components  
39 comparable to the temporarily removed vegetation within the first 5 to 10 years after the initial  
40 restoration activities are complete.

41 The following paragraphs summarize the combined effects discussed above and describe other  
42 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also  
43 included.

1 **Near-Term Timeframe**

2 Because the water conveyance facilities construction is being evaluated at the project level, the near-  
3 term BDCP conservation strategy has been evaluated to determine whether it would provide  
4 sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that the  
5 effects of construction would not be adverse under NEPA. Alternative 9 would remove 751 acres of  
6 modeled habitat for yellow-breasted chat in the study area in the near-term. These effects would  
7 result from the construction of the water conveyance facilities (CM1, 283 acres of modeled nesting  
8 and migratory habitat), and implementing other conservation measures (CM2 *Yolo Bypass Fisheries*  
9 *Enhancement*, CM4 *Tidal Natural Communities Restoration*, and CM5 *Seasonally Inundated Floodplain*  
10 *Restoration*—468 acres of modeled nesting and migratory habitat). These habitat losses would  
11 primarily consist of small, fragmented riparian stands in CZ 2-CZ 8 that do not provide high-value  
12 habitat for the species.

13 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by  
14 CM1 and that are identified in the biological goals and objectives for yellow-breasted chat in Chapter  
15 3 of the BDCP would be 1:1 for restoration/creation and 1:1 protection of valley/foothill riparian  
16 habitat. Using these ratios would indicate that 283 acres of valley/foothill riparian habitat should be  
17 restored/created and 283 acres should be protected to compensate for the CM1 losses of yellow-  
18 breasted chat habitat. The near-term effects of other conservation actions would remove 468 acres  
19 of modeled habitat, and therefore require 468 acres of restoration and 468 acres of protection of  
20 valley/foothill riparian using the same typical NEPA and CEQA ratios (1:1 for restoration and 1:1 for  
21 protection).

22 The BDCP has committed to near-term goals of protecting 750 acres and restoring 800 acres of the  
23 valley/foothill riparian natural community in the study area (Table 3-4 in Chapter 3, *Description of*  
24 *Alternatives*). These conservation actions are associated with CM3 and CM7 and would occur in the  
25 same timeframe as the construction and early restoration losses, thereby avoiding adverse effects of  
26 habitat loss on yellow-breasted chat. The majority of the riparian restoration acres would occur in  
27 CZ 7 as part of a reserve system with extensive wide bands or large patches of valley/foothill  
28 riparian natural community (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation*  
29 *Strategy*). Goals and objectives in the Plan for riparian restoration also include the restoration,  
30 maintenance and enhancement of structural heterogeneity with adequate vertical and horizontal  
31 overlap among vegetation components and over adjacent riverine channels, freshwater emergent  
32 wetlands, and grasslands (Objective VFRNC2.1). The yellow-breasted chat has specific structural  
33 habitat requirements, so only the early- to mid-successional portions of the restored and protected  
34 riparian natural would be expected to provide suitable habitat characteristics for the species. These  
35 natural community biological goals and objectives would inform the near-term protection and  
36 restoration efforts and represent performance standards for considering the effectiveness of  
37 conservation actions for the species.

38 The acres of protection contained in the near-term Plan goals and the additional detail in the  
39 biological objectives for yellow-breasted chat satisfy the typical mitigation ratios that would be  
40 applied to the project-level effects of CM1, as well as mitigate the near-term effects of the other  
41 conservation measures. The restored riparian habitat could require 5 years to several decades, for  
42 ecological succession to occur and for restored riparian habitat to functionally replace habitat that  
43 has been affected. However, because the modeled habitat impacted largely consists of small patches  
44 of blackberry, willow, and riparian scrub, BDCP actions would not be expected to have an adverse  
45 population-level effect on the species in the near-term time period.

1 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*  
2 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*  
3 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
4 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
5 *Material, AMM7 Barge Operations Plan, and AMM22 Suisun Song Sparrow, Yellow-Breasted Chat,*  
6 *Least Bell's Vireo, Western Yellow-Billed Cuckoo.* All of these AMMs include elements that would  
7 avoid or minimize the risk of affecting individuals and species habitats adjacent to work areas and  
8 storage sites. The AMMs are described in detail in BDCP Appendix 3.C, *Avoidance and Minimization*  
9 *Measures.*

#### 10 **Late Long-Term Timeframe**

11 The habitat model indicates that the study area supports approximately 14,547 acres of modeled  
12 nesting and migratory habitat for yellow-breasted chat. Alternative 9 as a whole would result in the  
13 permanent loss of and temporary effects on 1,047 acres of modeled habitat (7% of the modeled  
14 habitat in the study area). These losses would occur from the construction of the water conveyance  
15 facilities (CM1) and from *CM2 Yolo Bypass Fisheries Enhancement, CM4 Tidal Natural Communities*  
16 *Restoration, and CM5 Seasonally Inundated Floodplain Restoration.* The locations of these losses  
17 would be in fragmented riparian habitat throughout the study area.

18 The Plan includes conservation commitments through *CM7 Riparian Natural Community Restoration*  
19 and *CM3 Natural Communities Protection and Restoration* to restore or create at least 5,000 acres  
20 and protect at least 750 acres of valley/foothill riparian woodland. Of the 5,000 acres of restored  
21 riparian natural communities, a minimum of 3,000 acres of valley/foothill riparian would be  
22 restored within the seasonally inundated floodplain, and 1,000 acres would be managed as dense  
23 early to mid-successional riparian forest (Objectives VFRNC1.1 and VFRNC1.2). The yellow-breasted  
24 chat has specific structural habitat requirements, so only the early- to mid-successional portions of  
25 the restored and protected riparian natural would be expected to provide suitable habitat  
26 characteristics for the species. Fluvial disturbance in restored riparian floodplains would help to  
27 maintain early- to mid-successional vegetation. The resulting riparian systems would be subject to  
28 natural erosion and deposition, which would provide conditions conducive to the establishment of  
29 dense willow stands that are preferred by yellow-breasted chat for nesting. In addition, if  
30 monitoring determined that cowbird parasitism was having an effect on the yellow-breasted  
31 population in the study area, a cowbird control program would be implemented through *CM11*  
32 *Natural Communities Enhancement and Management.* Goals and objectives in the Plan for riparian  
33 restoration also include the maintenance and enhancement of structural heterogeneity (Objective  
34 VFRNC2.1) which would provide suitable habitat for yellow-breasted chat.

35 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*  
36 *Plant Species*) estimates that the restoration and protection actions discussed above could result in  
37 the restoration of 2,683 acres and the protection of 594 acres of habitat for the yellow-breasted  
38 chat.

39 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*  
40 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*  
41 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
42 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
43 *Material, AMM7 Barge Operations Plan, and AMM22 Suisun Song Sparrow, Yellow-Breasted Chat,*  
44 *Least Bell's Vireo, Western Yellow-Billed Cuckoo.* All of these AMMs include elements that would

1 avoid or minimize the risk of affecting individuals and species habitats adjacent to work areas and  
2 storage sites. The AMMs are described in detail in BDCP Appendix 3.C, *Avoidance and Minimization*  
3 *Measures*.

4 **NEPA Effects:** The loss of yellow-breasted chat habitat and potential direct mortality of this special-  
5 status species would represent an adverse effect in the absence of other conservation actions. The  
6 restored riparian habitat would require 5 years to several decades for ecological succession to occur  
7 and for restored riparian habitat to functionally replace habitat that has been affected. However, the  
8 habitat that would be lost consists of small, fragmented riparian stands that do not provide high-  
9 value habitat for the species. And because the nesting and migratory habitat that would be lost is  
10 small relative to the species range throughout California and North America, BDCP actions would  
11 not be expected to have an adverse population-level effect on the species. With habitat protection  
12 and restoration associated with CM3, CM7, and CM11, guided by biological goals and objectives and  
13 by *AMM1 Worker Awareness Training*, *AMM2 Construction Best Management Practices and*  
14 *Monitoring*, *AMM3 Stormwater Pollution Prevention Plan*, *AMM4 Erosion and Sediment Control Plan*,  
15 *AMM5 Spill Prevention, Containment, and Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*,  
16 *Reusable Tunnel Material, and Dredged Material*, *AMM7 Barge Operations Plan*, and *AMM22 Suisun*  
17 *Song Sparrow*, *Yellow-Breasted Chat*, *Least Bell's Vireo*, *Western Yellow-Billed Cuckoo*, which would be  
18 in place throughout the construction period, the effects of habitat loss and potential mortality on  
19 yellow-breasted chat under Alternative 9 would not be adverse.

20 **CEQA Conclusion:**

21 **Near-Term Timeframe**

22 Because the water conveyance facilities construction is being evaluated at the project level, the near-  
23 term BDCP conservation strategy has been evaluated to determine whether it would provide  
24 sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that the  
25 impact of construction would be less than significant under CEQA. Alternative 9 would remove 751  
26 acres of modeled habitat for yellow-breasted chat in the study area in the near-term. These effects  
27 would result from the construction of the water conveyance facilities (CM1, 283 acres of modeled  
28 nesting and migratory habitat), and implementing other conservation measures (*CM2 Yolo Bypass*  
29 *Fisheries Enhancement*, *CM4 Tidal Natural Communities Restoration*, and *CM5 Seasonally Inundated*  
30 *Floodplain Restoration*—468 acres of modeled nesting and migratory habitat). These habitat losses  
31 would primarily consist of small, fragmented riparian stands in CZ 2-CZ 8 that do not provide high-  
32 value habitat for the species.

33 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by  
34 CM1 and that are identified in the biological goals and objectives for yellow-breasted chat in Chapter  
35 3 of the BDCP would be 1:1 for restoration/creation and 1:1 protection of valley/foothill riparian  
36 habitat. Using these ratios would indicate that 283 acres of valley/foothill riparian habitat should be  
37 restored/created and 283 acres should be protected to compensate for the CM1 losses of yellow-  
38 breasted chat habitat. The near-term effects of other conservation actions would remove 468 acres  
39 of modeled habitat, and therefore require 468 acres of restoration and 468 acres of protection of  
40 valley/foothill riparian using the same typical NEPA and CEQA ratios (1:1 for restoration and 1:1 for  
41 protection).

42 The BDCP has committed to near-term goals of protecting 750 acres and restoring 800 acres of the  
43 valley/foothill riparian natural community in the study area (Table 3-4 in Chapter 3, *Description of*

1 *Alternatives*). These conservation actions are associated with CM3 and CM7 and would occur in the  
2 same timeframe as the construction and early restoration losses, thereby avoiding adverse effects of  
3 habitat loss on yellow-breasted chat. The majority of the riparian restoration acres would occur in  
4 CZ 7 as part of a reserve system with extensive wide bands or large patches of valley/foothill  
5 riparian natural community (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation*  
6 *Strategy*). Goals and objectives in the Plan for riparian restoration also include the restoration,  
7 maintenance and enhancement of structural heterogeneity with adequate vertical and horizontal  
8 overlap among vegetation components and over adjacent riverine channels, freshwater emergent  
9 wetlands, and grasslands (Objective VFRNC2.1). The yellow-breasted chat has specific structural  
10 habitat requirements, so only the early- to mid-successional portions of the restored and protected  
11 riparian natural would be expected to provide suitable habitat characteristics for the species. These  
12 natural community biological goals and objectives would inform the near-term protection and  
13 restoration efforts and represent performance standards for considering the effectiveness of  
14 conservation actions for the species.

15 The acres of protection contained in the near-term Plan goals and the additional detail in the  
16 biological objectives for yellow-breasted chat satisfy the typical mitigation ratios that would be  
17 applied to the project-level effects of CM1, as well as mitigate the near-term effects of the other  
18 conservation measures. The restored riparian habitat could require 5 years to several decades, for  
19 ecological succession to occur and for restored riparian habitat to functionally replace habitat that  
20 has been affected. However, because the modeled habitat impacted largely consists of small patches  
21 of blackberry, willow, and riparian scrub, BDCP actions would not be expected to have a significant  
22 population-level impact on the species in the near-term time period.

23 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
24 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
25 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
26 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
27 *Material*, *AMM7 Barge Operations Plan*, and *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat,*  
28 *Least Bell's Vireo, Western Yellow-Billed Cuckoo*. All of these AMMs include elements that would  
29 avoid or minimize the risk of affecting individuals and species habitats adjacent to work areas and  
30 storage sites. The AMMs are described in detail in BDCP Appendix 3.C, *Avoidance and Minimization*  
31 *Measures*.

### 32 **Late Long-Term Timeframe**

33 The habitat model indicates that the study area supports approximately 14,547 acres of modeled  
34 nesting and migratory habitat for yellow-breasted chat. Alternative 9 as a whole would result in the  
35 permanent loss of and temporary effects on 1,047 acres of modeled habitat (7% of the modeled  
36 habitat in the study area). These losses would occur from the construction of the water conveyance  
37 facilities (CM1) and from *CM2 Yolo Bypass Fisheries Enhancement*, *CM4 Tidal Natural Communities*  
38 *Restoration*, and *CM5 Seasonally Inundated Floodplain Restoration*. The locations of these losses  
39 would be in fragmented riparian habitat throughout the study area.

40 The Plan includes conservation commitments through *CM7 Riparian Natural Community Restoration*  
41 and *CM3 Natural Communities Protection and Restoration* to restore or create at least 5,000 acres  
42 and protect at least 750 acres of valley/foothill riparian woodland. Of the 5,000 acres of restored  
43 riparian natural communities, a minimum of 3,000 acres of valley/foothill riparian would be  
44 restored within the seasonally inundated floodplain, and 1,000 acres would be managed as dense

1 early to mid-successional riparian forest (Objectives VFRNC1.1 and VFRNC1.2). The yellow-breasted  
2 chat has specific structural habitat requirements, so only the early- to mid-successional portions of  
3 the restored and protected riparian natural would be expected to provide suitable habitat  
4 characteristics for the species. Fluvial disturbance in restored riparian floodplains would help to  
5 maintain early- to mid-successional vegetation. The resulting riparian systems would be subject to  
6 natural erosion and deposition, which would provide conditions conducive to the establishment of  
7 dense willow stands that are preferred by yellow-breasted chat for nesting. In addition, if  
8 monitoring determined that cowbird parasitism was having an effect on the yellow-breasted  
9 population in the study area, a cowbird control program would be implemented through *CM11*  
10 *Natural Communities Enhancement and Management*. Goals and objectives in the Plan for riparian  
11 restoration also include the maintenance and enhancement of structural heterogeneity (Objective  
12 VFRNC2.1) which would provide suitable habitat for yellow-breasted chat.

13 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*  
14 *Plant Species*) estimates that the restoration and protection actions discussed above could result in  
15 the restoration of 2,683 acres and the protection of 594 acres of habitat for the yellow-breasted  
16 chat.

17 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
18 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
19 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
20 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
21 *Material*, *AMM7 Barge Operations Plan*, and *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat,*  
22 *Least Bell's Vireo, Western Yellow-Billed Cuckoo*. All of these AMMs include elements that would  
23 avoid or minimize the risk of affecting individuals and species habitats adjacent to work areas and  
24 storage sites. The AMMs are described in detail in BDCP Appendix 3.C, *Avoidance and Minimization*  
25 *Measures*.

26 Considering these protection and restoration provisions, which would provide acreages of new or  
27 enhanced habitat in amounts suitable to compensate for habitats lost to construction and  
28 restoration activities, and with implementation of AMM1–AMM7 and *AMM22 Suisun Song Sparrow,*  
29 *Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo*, the loss of habitat or direct  
30 mortality through implementation of Alternative 9 would not result in a substantial adverse effect  
31 through habitat modifications and would not substantially reduce the number or restrict the range  
32 of the species. Therefore, the loss of habitat or potential mortality under this alternative would have  
33 a less-than-significant impact on yellow-breasted chat.

#### 34 **Impact BIO-105: Fragmentation of Yellow-Breasted Chat Habitat as a Result of Constructing** 35 **the Water Conveyance Facilities**

36 Grading, filling, contouring, and other initial ground-disturbing activities for water conveyance  
37 facilities construction may temporarily fragment modeled yellow-breasted chat habitat. This could  
38 temporarily reduce the extent of and functions supported by the affected habitat. Because of the  
39 current infrequent occurrence and small numbers of yellow-breasted chat in the Plan Area, and  
40 because *CM5 Seasonally Inundated Floodplain Restoration* would restore and protect contiguous  
41 high-value riparian habitat in CZ 7, any such habitat fragmentation is expected to have no or  
42 minimal effect on the species.

1 **NEPA Effects:** Temporary fragmentation of habitat would not result in an adverse effect on yellow-  
2 breasted chat. The habitat functions for the species would be significantly improved through the  
3 implementation of CM5, which would restore and protect large contiguous patches of riparian  
4 habitat.

5 **CEQA Conclusion:** Temporary fragmentation of habitat would have a less-than-significant impact on  
6 yellow-breasted chat. The habitat functions for the species would be significantly improved through  
7 the implementation of CM5, which would restore and protect large contiguous patches of riparian  
8 habitat.

### 9 **Impact BIO-106: Effects on Yellow-Breasted Chat Associated with Electrical Transmission** 10 **Facilities**

11 New transmission lines would increase the risk for bird-power line strikes, which could result in  
12 injury or mortality of western yellow-billed cuckoo. Yellow-breasted chats are migratory and  
13 usually arrive at California breeding grounds in April from their wintering grounds in Mexico and  
14 Guatemala. Departure for wintering grounds occurs from August to September. These are periods of  
15 relative high visibility when the risk of powerline collisions will be low. The species' small, relatively  
16 maneuverable body; its foraging behavior; and its presence in the Plan Area during the summer  
17 contribute to a low risk of collision with the proposed transmission lines (BDCP Attachment 5J.C,  
18 *Analysis of Potential Bird Collisions at Proposed BDCP Transmission Lines*). New transmission lines  
19 would therefore not be expected to have an adverse effect on yellow-breasted chat.

20 **NEPA Effects:** The construction and presence of new transmission lines would not result in an  
21 adverse effect on yellow-breasted chat because the risk of bird strike is considered to be minimal  
22 based on the species' small, relatively maneuverable body; its foraging behavior; and its presence in  
23 the Plan Area during the summer during periods of high visibility.

24 **CEQA Conclusion:** The construction and presence of new transmission lines would have a less-than-  
25 significant impact on yellow-breasted chat because the risk of bird strike is considered to be  
26 minimal based on the species' small, relatively maneuverable body; its foraging behavior; and its  
27 presence in the Plan Area during the summer during periods of high visibility.

### 28 **Impact BIO-107: Indirect Effects of Plan Implementation on Yellow-Breasted Chat**

29 Noise and visual disturbances associated with construction-related activities could result in  
30 temporary disturbances that affect yellow-breasted chat use of modeled habitat adjacent to  
31 proposed construction areas. Construction noise above background noise levels (greater than 50  
32 dBA) could extend 1,900 to 5,250 feet from the edge of construction activities (BDCP Appendix 5.J,  
33 Attachment 5J.D, *Indirect Effects of the Construction of the BDCP Conveyance Facility on Sandhill*  
34 *Crane*, Table 4), although there are no available data to determine the extent to which these noise  
35 levels could affect yellow-breasted chat. Indirect effects associated with construction include noise,  
36 dust, and visual disturbance caused by grading, filling, contouring, and other ground-disturbing  
37 operations outside the project footprint but within 1,300 feet from the construction edge. If yellow-  
38 breasted chat were to nest in or adjacent to work areas, construction and subsequent maintenance-  
39 related noise and visual disturbances could mask calls, disrupt foraging and nesting behaviors, and  
40 reduce the functions of suitable nesting habitat for these species. These potential effects would be  
41 minimized with incorporation of *AMM22 Suisun Song Sparrow*, *Yellow-Breasted Chat*, *Least Bell's*  
42 *Vireo*, *Western Yellow-Billed Cuckoo* into the BDCP, which would ensure 250 foot no-disturbance

1 buffers were established around active nests. The use of mechanical equipment during water  
2 conveyance facilities construction could cause the accidental release of petroleum or other  
3 contaminants that could affect yellow-breasted chat in the surrounding habitat. The inadvertent  
4 discharge of sediment or excessive dust adjacent to yellow-breasted chat habitat could also affect  
5 the species. AMM1–AMM7, including *AMM2 Construction Best Management Practices and Monitoring*,  
6 in addition to *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-*  
7 *Billed Cuckoo* would minimize the likelihood of such spills from occurring and ensure that measures  
8 were in place to prevent runoff from the construction area and any adverse effects of dust on active  
9 nests. If present, yellow-breasted chat individuals could be temporarily affected by noise and visual  
10 disturbances adjacent to water conveyance construction sites, reducing the use of an estimated 59  
11 acres of modeled primary nesting and migratory habitat and 119 acres of secondary nesting and  
12 migratory habitat. *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western*  
13 *Yellow-Billed Cuckoo* would avoid and minimize this effect on the species.

14 **NEPA Effects:** The potential for noise and visual disturbance, hazardous spills, increased dust and  
15 sedimentation, and the potential impacts of operations and maintenance of the water conveyance  
16 facilities would not result in an adverse effect on yellow-breasted chat with the incorporation of  
17 AMM1–AMM7 and *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western*  
18 *Yellow-Billed Cuckoo* into the BDCP.

19 **CEQA Conclusion:** The potential for noise and visual disturbance, hazardous spills, increased dust  
20 and sedimentation, and the potential impacts of operations and maintenance of the water  
21 conveyance facilities would have a less-than-significant impact on yellow-breasted chat with the  
22 incorporation of AMM1–AMM7, and *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's*  
23 *Vireo, Western Yellow-Billed Cuckoo* into the BDCP.

#### 24 **Impact BIO-108: Periodic Effects of Inundation of Yellow-Breasted Chat Habitat as a Result of** 25 **Implementation of Conservation Components**

26 Flooding of the Yolo Bypass from Fremont Weir operations (CM2) would increase the frequency and  
27 duration of inundation of approximately 48–88 acres of modeled yellow-breasted chat nesting and  
28 migratory habitat. No adverse effects of increased inundation frequency on yellow-breasted chat or  
29 its habitat are expected because the chat breeding period is outside the period the weir would be  
30 operated. Moreover, riparian vegetation supporting habitat has persisted under the existing Yolo  
31 Bypass flooding regime, and changes to frequency and inundation would be within the tolerance of  
32 these vegetation types.

33 Based on hypothetical floodplain restoration, CM5 could result in periodic inundation of up to 148  
34 acres of modeled yellow-breasted chat habitat. Inundation of restored floodplains is not expected to  
35 affect yellow-breasted chat or its habitat because the chat breeding period is outside the period the  
36 floodplains would likely be inundated. In addition, providing for periodic inundation of floodplains  
37 is expected to restore a more natural flood regime in support of riparian vegetation types that  
38 provide nesting and migratory habitat for yellow-breasted chat. The overall effect of seasonal  
39 inundation in existing riparian natural communities is likely to be beneficial because, historically,  
40 flooding was the main natural disturbance regulating ecological processes in riparian areas, and  
41 flooding promotes the germination and establishment of many native riparian plants.

1 **NEPA Effects:** Increases in the frequency and duration of Yolo Bypass flooding and CM5 floodplain  
2 restoration would be expected to create more natural flood regimes that would support riparian  
3 habitat, which would not result in an adverse effect on yellow breasted chat.

4 **CEQA Conclusion:** By creating more natural flood regimes that would support riparian habitat,  
5 increases in the frequency and duration of Yolo Bypass flooding and CM5 floodplain restoration  
6 would have a beneficial impact on yellow breasted chat.

### 7 **Cooper's Hawk and Osprey**

8 This section describes the effects of Alternative 9, including water conveyance facilities construction  
9 and implementation of other conservation components, on Cooper's hawk and osprey. Although  
10 osprey often nest on manmade structures such as telephone poles, and Cooper's hawk will nest in  
11 more developed landscapes, modeled breeding habitat for these species is restricted to  
12 valley/foothill riparian forest.

13 Construction and restoration associated with Alternative 9 conservation measures would result in  
14 both temporary and permanent losses of Cooper's hawk and osprey modeled habitat as indicated in  
15 Table 12-9-43. The majority of the losses would take place over an extended period of time as tidal  
16 marsh is restored in the study area. Although restoration for the loss of nesting habitat would be  
17 initiated in the same timeframe as the losses, it could take one or more decades for restored habitats  
18 to replace the functions of habitat lost. This time lag between impacts and restoration of habitat  
19 function would be minimized by specific requirements of *AMM18 Swainson's Hawk and White-Tailed*  
20 *Kite*, including the planting of mature trees in the near-term time period. Full implementation of  
21 Alternative 9 would include the following conservation actions over the term of the BDCP that  
22 would also benefit Cooper's hawk and osprey (BDCP Chapter 3, Section 3.3, *Biological Goals and*  
23 *Objectives*).

- 24 ● Restore or create at least 5,000 acres of valley/foothill riparian natural community, with at least  
25 3,000 acres occurring on restored seasonally inundated floodplain (Objective VFRNC1.1,  
26 associated with CM7)
- 27 ● Protect at least 750 acres of existing valley/foothill riparian natural community in CZ 7 by year  
28 10 (Objective VFRNC1.2, associated with CM3).
- 29 ● Plant and maintain native trees along roadsides and field borders within protected cultivated  
30 lands at a rate of one tree per 10 acres (Objective SH2.1, associated with CM11).
- 31 ● Maintain and protect the small patches of important wildlife habitats associated with cultivated  
32 lands within the reserve system including isolated valley oak trees, trees and shrubs along field  
33 borders and roadsides, remnant groves, riparian corridors, water conveyance channels,  
34 grasslands, ponds, and wetlands (Objective CLNC1.3, associated with CM3).

35 As explained below, with the acres of restoration or protection included in the Plan, in addition to  
36 management activities to enhance natural communities for species and implementation of AMM1-  
37 AMM7, *AMM18 Swainson's Hawk and White-Tailed Kite*, and Mitigation Measure BIO-75, impacts on  
38 Cooper's hawk and osprey would not be adverse for NEPA purposes and would be less than  
39 significant for CEQA purposes.

1  
2

**Table 12-9-43. Changes in Cooper’s Hawk and Osprey Modeled Habitat Associated with Alternative 9 (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	Nesting	43	43	89	89	NA	NA
<b>Total Impacts CM1</b>		<b>43</b>	<b>43</b>	<b>89</b>	<b>89</b>	<b>NA</b>	<b>NA</b>
CM2–CM18	Nesting	312	507	88	121	48-82	230
<b>Total Impacts CM2–CM18</b>		<b>312</b>	<b>507</b>	<b>88</b>	<b>121</b>	<b>48-82</b>	<b>230</b>
<b>TOTAL IMPACTS</b>		<b>355</b>	<b>550</b>	<b>177</b>	<b>210</b>	<b>48-82</b>	<b>230</b>

<sup>a</sup> See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-109: Loss or Conversion of Habitat for and Direct Mortality of Cooper’s Hawk and**  
5 **Osprey**

6 Alternative 9 conservation measures would result in the combined permanent and temporary loss  
7 of up to 760 acres of modeled nesting habitat for Cooper’s hawk and osprey (Table 12-9-43).  
8 Conservation measures that would result in these losses are *CM1 Water Facilities and Operations*  
9 (which would involve conveyance facilities and transmission line construction, and establishment  
10 and use of borrow and spoil areas), Yolo Bypass fisheries improvements (CM2), tidal habitat  
11 restoration (CM4), and floodplain restoration (CM5). Habitat enhancement and management  
12 activities (CM11), which include ground disturbance or removal of nonnative vegetation, could  
13 result in local adverse habitat effects. In addition, maintenance activities associated with the long-  
14 term operation of the water conveyance facilities and other BDCP physical facilities could affect  
15 Cooper’s hawk and osprey modeled habitat. Each of these individual activities is described below. A  
16 summary statement of the combined impacts and NEPA and CEQA conclusions follows the  
17 individual conservation measure discussions.

- 18 • *CM1 Water Conveyance Facilities and Operation*: Construction of Alternative 9 water conveyance  
19 facilities would result in the combined permanent and temporary loss of up to 132 acres of  
20 modeled Cooper’s hawk and osprey habitat (Table 12-9-43). Of the 132 acres of modeled habitat  
21 that would be removed for the construction of the conveyance facilities, 43 acres would be a  
22 permanent loss and 89 acres would be a temporary loss of habitat. Activities that would impact  
23 nesting habitat include channel dredging, intakes, fish barriers, access roads, and construction of  
24 transmission lines. Of the 132 acres of nesting habitat that would be removed for the  
25 construction of the conveyance facilities, 43 acres would be a permanent loss and 89 acres

1 would be a temporary loss of habitat. Permanent losses would primarily consist of channel  
2 enlargement at the Sacramento River and Meadows Slough. Temporary losses would occur  
3 primarily along Middle River between Victoria Canal and Mildred Island, where large dredging  
4 work areas and operable barrier work areas would be placed. The riparian habitat in these areas  
5 is composed of very small patches or stringers bordering waterways, which are composed of  
6 valley oak and scrub vegetation. There are no occurrences of Cooper's hawk or osprey that  
7 overlap with the construction footprint for CM1. Mitigation Measure BIO-75, *Conduct*  
8 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would require  
9 preconstruction surveys and the establishment of no-disturbance buffers and would be  
10 available to address potential effects on cooper's hawk and osprey if either species were to nest  
11 in or adjacent to the construction footprint. Refer to the Terrestrial Biology Map Book for a  
12 detailed view of Alternative 9 construction locations. Impacts from CM1 would occur within the  
13 first 10 years of Alternative 9 implementation.

- 14 • *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo bypass fisheries enhancement  
15 would result in the combined permanent and temporary loss of up to 170 acres of Cooper's  
16 hawk and osprey nesting habitat (82 acres of permanent loss, 88 acres of temporary loss) in the  
17 Yolo Bypass in CZ 2. Activities through CM2 could involve excavation and grading in  
18 valley/foothill riparian areas to improve passage of fish through the bypasses. Most of the  
19 riparian losses would occur at the north end of Yolo Bypass where major fish passage  
20 improvements are planned. Excavation to improve water movement in the Toe Drain and in the  
21 Sacramento Weir would also remove potential Cooper's hawk and osprey habitat. The loss is  
22 expected to occur during the first 10 years of Alternative 9 implementation.
- 23 • *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration could permanently  
24 remove up to 383 acres of potential Cooper's hawk and osprey nesting habitat. Trees would not  
25 be actively removed but tree mortality would be expected over time as areas became tidally  
26 inundated.
- 27 • *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore  
28 seasonally inundated floodplain and riparian restoration actions would remove approximately  
29 75 acres of Cooper's hawk and osprey nesting habitat (42 acres of permanent loss, 33 acres of  
30 temporary loss). These losses would be expected after the first 10 years of Alternative 9  
31 implementation along the San Joaquin River and other major waterways in CZ 7.
- 32 • *CM11 Natural Communities Enhancement and Management*: Habitat management- and  
33 enhancement-related activities could disturb Cooper's hawk and osprey nests if they were  
34 present near work sites. A variety of habitat management actions included in *CM11 Natural*  
35 *Communities Enhancement and Management* that are designed to enhance wildlife values in  
36 BDCP-protected habitats may result in localized ground disturbances that could temporarily  
37 remove small amounts of Cooper's hawk and osprey habitat and reduce the functions of habitat  
38 until restoration is complete. Ground-disturbing activities, such as removal of nonnative  
39 vegetation and road and other infrastructure maintenance, are expected to have minor effects  
40 on available Cooper's hawk and osprey habitat and are expected to result in overall  
41 improvements to and maintenance of habitat values over the term of the BDCP. These effects  
42 cannot be quantified, but are expected to be minimal and would be avoided and minimized by  
43 the AMMs listed below.

44 Permanent and temporary habitat losses from the above conservation measures would  
45 primarily consist of fragmented riparian stands. Temporarily affected areas would be restored

1 as riparian habitat within 1 year following completion of construction activities. Although the  
2 effects are considered temporary, the restored riparian habitat would require 1 to several  
3 decades to functionally replace habitat that has been affected and for trees to attain sufficient  
4 size and structure suitable for nesting by Cooper's hawk or osprey. *AMM18 Swainson's Hawk and*  
5 *White-Tailed Kite* contains actions described below to reduce the effect of temporal loss of  
6 nesting habitat, including the transplanting of mature trees.

- 7 • Operations and Maintenance: Postconstruction operation and maintenance of the above-ground  
8 water conveyance facilities and restoration infrastructure could result in ongoing but periodic  
9 disturbances that could affect Cooper's hawk or osprey use of the surrounding habitat.  
10 Maintenance activities would include vegetation management, levee and structure repair, and  
11 re-grading of roads and permanent work areas. These effects, however, would be reduced by  
12 AMM1–AMM7 and conservation actions as described below.
- 13 • Injury and Direct Mortality: Construction-related activities would not be expected to result in  
14 direct mortality of adult or fledged Cooper's hawk or osprey if they were present in the Plan  
15 Area, because they would be expected to avoid contact with construction and other equipment.  
16 If Cooper's hawk or osprey were to nest in the construction area, construction-related activities,  
17 including equipment operation, noise and visual disturbances could affect nests or lead to their  
18 abandonment, potentially resulting in mortality of eggs and nestlings. Mitigation Measure BIO-  
19 75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would  
20 be available to address these effects on Cooper's hawk and osprey.

21 The following paragraphs summarize the combined effects discussed above and describe other  
22 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also  
23 included.

#### 24 **Near-Term Timeframe**

25 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
26 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
27 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
28 effect of construction would not be adverse under NEPA. Alternative 9 would remove 532 acres  
29 (355 acres of permanent loss, 177 acres of temporary loss) of Cooper's hawk and osprey nesting  
30 habitat in the study area in the near-term. These effects would result from the construction of the  
31 water conveyance facilities (CM1, 132 acres), and implementing other conservation measures (CM2  
32 *Yolo Bypass Fisheries Enhancement*, CM4 *Tidal Natural Communities Restoration*, and CM5 *Seasonally*  
33 *Inundated Floodplain Restoration—400 acres of habitat*).

34 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by  
35 CM1 would be 1:1 for restoration/creation and 1:1 protection of valley/foothill riparian habitat.  
36 Using these ratios would indicate that 132 acres of nesting habitat should be restored/created and  
37 132 acres should be protected to compensate for the CM1 losses of modeled Cooper's hawk and  
38 osprey habitat. In addition, The near-term effects of other conservation actions would remove 400  
39 acres of modeled breeding habitat, and therefore require 400 acres of restoration and 400 acres of  
40 protection of modeled Cooper's hawk and osprey using the same typical NEPA and CEQA ratios.

41 The BDCP has committed to near-term goals of protecting 750 acres and restoring 800 acres of  
42 valley/foothill riparian natural community (Table 3-4 in Chapter 3, *Description of Alternatives*).  
43 These conservation actions are associated with CM3, and CM7 and would occur in the same

1 timeframe as the construction and early restoration losses. The majority of riparian protection and  
2 restoration acres would occur in CZ 7 as part of a reserve system with extensive wide bands or large  
3 patches of valley/foothill riparian natural community (Objectives VFRNC1.1 and VFRNC1.2 in BDCP  
4 Chapter 3, *Conservation Strategy*). Riparian restoration would expand the patches of existing  
5 riparian forest in order to support nesting habitat for riparian species. The Plan's objectives would  
6 also benefit Cooper's hawk and osprey by protecting small but essential habitats that occur within  
7 cultivated lands, such as tree rows along field borders or roads, and small clusters of trees in  
8 farmyards or rural residences (Objective CLNC1.3). In addition, the distribution and abundance of  
9 potential nest trees would be increased by planting and maintaining native trees along roadsides  
10 and field borders within protected cultivated lands at a rate of one tree per 10 acres (Objective  
11 SWHA2.1).

12 The 750 acres of protection and 800 acres of restoration contained in the near-term Plan goals  
13 satisfy the typical mitigation ratios that would be applied to the project-level effects of CM1 and  
14 other near-term impacts on Cooper's hawk and osprey nesting habitat. The 800 acres of restored  
15 riparian habitat would be initiated in the near-term to offset the loss of modeled nesting habitat, but  
16 would require one to several decades to functionally replace habitat that has been affected and for  
17 trees to attain sufficient size and structure suitable for nesting by these species. This time lag  
18 between the removal and restoration of nesting habitat could have a substantial impact on nesting  
19 raptors in the near-term time period. Nesting habitat is limited throughout much of the study area,  
20 consisting mainly of intermittent riparian, isolated trees, small groves, tree rows along field borders,  
21 roadside trees, and ornamental trees near rural residences. The removal of nest trees or nesting  
22 habitat would further reduce this limited resource and could reduce or restrict the number of active  
23 nests within the study area until restored riparian habitat is sufficiently developed.

24 *AMM18 Swainson's Hawk and White-Tailed Kite* would implement a program to plant large mature  
25 trees, including transplanting trees scheduled for removal. These would be supplemented with  
26 additional saplings and would be expected to reduce the temporal effects of loss of nesting habitat.  
27 The plantings would occur prior to or concurrent with (in the case of transplanting) the loss of trees.  
28 In addition, at least five trees (5-gallon container size) would be planted within the BDCP reserve  
29 system for every tree 20 feet or taller anticipated to be removed by construction during the near-  
30 term period. A variety of native tree species would be planted to provide trees with differing growth  
31 rates, maturation, and life span. Trees would be planted within the BDCP reserve system in clumps  
32 of at least three trees each at appropriate sites within or adjacent to conserved cultivated lands, or  
33 they could be incorporated as a component of the riparian restoration (CM5, CM7). Replacement  
34 trees that were incorporated into the riparian restoration would not be clustered in a single region  
35 of the study area, but would be distributed throughout the conserved lands.

36 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
37 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
38 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
39 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
40 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
41 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
42 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*. Cooper's hawk and  
43 osprey are not species that are covered under the BDCP. In order for the BDCP to avoid an adverse  
44 effect on individuals, preconstruction surveys for noncovered avian species would be required to  
45 ensure that active nests are detected and avoided. Mitigation Measure BIO-75, *Conduct*

1 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to  
2 address this adverse effect.

3 **Late Long-Term Timeframe**

4 The study area supports approximately 14,069 acres of modeled nesting habitat for Cooper's hawk  
5 and osprey. Alternative 9 as a whole would result in the permanent loss of and temporary effects on  
6 760 acres of potential nesting habitat (5% of the potential nesting habitat in the study area).

7 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*  
8 *Restoration*, *CM5 Seasonally Inundated Floodplain Restoration*, and *CM7 Riparian Natural Community*  
9 *Restoration* to restore or create at least 5,000 acres and protect at least 750 acres of valley/foothill  
10 riparian natural community (Table 3-4 in Chapter 3, *Description of Alternatives*). The majority of  
11 riparian protection and restoration acres would occur in CZ 7 as part of a reserve system with  
12 extensive wide bands or large patches of valley/foothill riparian natural community (Objectives  
13 VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*). Riparian restoration would  
14 expand the patches of existing riparian forest in order to support nesting habitat for riparian  
15 species. The Plan's objectives would also benefit Cooper's hawk and osprey by protecting small but  
16 essential habitats that occur within cultivated lands, such as tree rows along field borders or roads,  
17 and small clusters of trees in farmyards or rural residences(Objective CLNC1.3). In addition, the  
18 distribution and abundance of potential nest trees would be increased by planting and maintaining  
19 native trees along roadsides and field borders within protected cultivated lands at a rate of one tree  
20 per 10 acres (Objective SWHA2.1).

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22 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
23 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
24 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
25 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
26 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
27 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*. Cooper's hawk and  
28 osprey are not species that are covered under the BDCP. In order for the BDCP to avoid an adverse  
29 effect on individuals, preconstruction surveys for noncovered avian species would be required to  
30 ensure that active nests are detected and avoided. Mitigation Measure BIO-75, *Conduct*  
31 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to  
32 address this adverse effect.

33 **NEPA Effects:** The loss of Cooper's hawk and osprey habitat and potential direct mortality of these  
34 special-status species under Alternative 9 would represent an adverse effect in the absence of other  
35 conservation actions. However, with habitat protection and restoration associated with CM3, CM5,  
36 CM7, guided by biological goals and objectives and by AMM1-AMM7 and *AMM18 Swainson's Hawk*  
37 *and White-Tailed Kite*, which would be in place throughout the construction period, the effects of  
38 habitat loss on Cooper's hawk and osprey under Alternative 9 would not be adverse. Cooper's hawk  
39 and osprey are not covered species under the BDCP. For the BDCP to avoid an adverse effect on  
40 individuals, preconstruction surveys for noncovered avian species would be required to ensure that  
41 nests are detected and avoided. Mitigation Measure BIO-75 would be available to address this effect.

42 **CEQA Conclusion:**

1 **Near-Term Timeframe**

2 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
3 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
4 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
5 effect of construction would not be adverse under NEPA. Alternative 9 would remove 532 acres  
6 (355 acres of permanent loss, 177 acres of temporary loss) of Cooper's hawk and osprey nesting  
7 habitat in the study area in the near-term. These effects would result from the construction of the  
8 water conveyance facilities (CM1, 132 acres), and implementing other conservation measures (CM2  
9 *Yolo Bypass Fisheries Enhancement*, CM4 *Tidal Natural Communities Restoration*, and CM5 *Seasonally*  
10 *Inundated Floodplain Restoration*—400 acres of habitat).

11 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by  
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13 Using these ratios would indicate that 132 acres of nesting habitat should be restored/created and  
14 132 acres should be protected to compensate for the CM1 losses of modeled Cooper's hawk and  
15 osprey habitat. In addition, The near-term effects of other conservation actions would remove 400  
16 acres of modeled breeding habitat, and therefore require 400 acres of restoration and 400 acres of  
17 protection of modeled Cooper's hawk and osprey using the same typical NEPA and CEQA ratios.

18 The BDCP has committed to near-term goals of protecting 750 acres and restoring 800 acres of  
19 valley/foothill riparian natural community (Table 3-4 in Chapter 3, *Description of Alternatives*).  
20 These conservation actions are associated with CM3, and CM7 and would occur in the same  
21 timeframe as the construction and early restoration losses. The majority of riparian protection and  
22 restoration acres would occur in CZ 7 as part of a reserve system with extensive wide bands or large  
23 patches of valley/foothill riparian natural community (Objectives VFRNC1.1 and VFRNC1.2 in BDCP  
24 Chapter 3, *Conservation Strategy*). Riparian restoration would expand the patches of existing  
25 riparian forest in order to support nesting habitat for riparian species. The Plan's objectives would  
26 also benefit Cooper's hawk and osprey by protecting small but essential habitats that occur within  
27 cultivated lands, such as tree rows along field borders or roads, and small clusters of trees in  
28 farmyards or rural residences (Objective CLNC1.3). In addition, the distribution and abundance of  
29 potential nest trees would be increased by planting and maintaining native trees along roadsides  
30 and field borders within protected cultivated lands at a rate of one tree per 10 acres (Objective  
31 SWHA2.1).

32 The 750 acres of protection and 800 acres of restoration contained in the near-term Plan goals  
33 satisfy the typical mitigation ratios that would be applied to the project-level effects of CM1 and  
34 other near-term impacts on Cooper's hawk and osprey nesting habitat. The 800 acres of restored  
35 riparian habitat would be initiated in the near-term to offset the loss of modeled nesting habitat, but  
36 would require one to several decades to functionally replace habitat that has been affected and for  
37 trees to attain sufficient size and structure suitable for nesting by these species. This time lag  
38 between the removal and restoration of nesting habitat could have a substantial impact on nesting  
39 raptors in the near-term time period. Nesting habitat is limited throughout much of the study area,  
40 consisting mainly of intermittent riparian, isolated trees, small groves, tree rows along field borders,  
41 roadside trees, and ornamental trees near rural residences. The removal of nest trees or nesting  
42 habitat would further reduce this limited resource and could reduce or restrict the number of active  
43 nests within the study area until restored riparian habitat is sufficiently developed.

1 *AMM18 Swainson's hawk and White-Tailed kite* would implement a program to plant large mature  
2 trees, including transplanting trees scheduled for removal. These would be supplemented with  
3 additional saplings and would be expected to reduce the temporal effects of loss of nesting habitat.  
4 The plantings would occur prior to or concurrent with (in the case of transplanting) the loss of trees.  
5 In addition, at least five trees (5-gallon container size) would be planted within the BDCP reserve  
6 system for every tree 20 feet or taller anticipated to be removed by construction during the near-  
7 term period. A variety of native tree species would be planted to provide trees with differing growth  
8 rates, maturation, and life span. Trees would be planted within the BDCP reserve system in clumps  
9 of at least three trees each at appropriate sites within or adjacent to conserved cultivated lands, or  
10 they could be incorporated as a component of the riparian restoration (CM5, CM7). Replacement  
11 trees that were incorporated into the riparian restoration would not be clustered in a single region  
12 of the study area, but would be distributed throughout the conserved lands.

13 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*  
14 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*  
15 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
16 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
17 *Material, and AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
18 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
19 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*. Cooper's hawk and  
20 osprey are not species that are covered under the BDCP. In order for the BDCP to avoid an adverse  
21 effect on individuals, preconstruction surveys for noncovered avian species would be required to  
22 ensure that active nests are detected and avoided. Implementation of Mitigation Measure BIO-75  
23 would reduce the potential impact on nesting Cooper's hawk and osprey to a less-than-significant  
24 level.

### 25 **Late Long-Term Timeframe**

26 The study area supports approximately 14,069 acres of modeled nesting habitat for Cooper's hawk  
27 and osprey. Alternative 9 as a whole would result in the permanent loss of and temporary effects on  
28 760 acres of potential nesting habitat (5% of the potential nesting habitat in the study area).

29 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*  
30 *Restoration, CM5 Seasonally Inundated Floodplain Restoration, and CM7 Riparian Natural Community*  
31 *Restoration* to restore or create at least 5,000 acres and protect at least 750 acres of valley/foothill  
32 riparian natural community (Table 3-4 in Chapter 3, *Description of Alternatives*). The majority of  
33 riparian protection and restoration acres would occur in CZ 7 as part of a reserve system with  
34 extensive wide bands or large patches of valley/foothill riparian natural community (Objectives  
35 VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*). Riparian restoration would  
36 expand the patches of existing riparian forest in order to support nesting habitat for riparian  
37 species. The Plan's objectives would also benefit Cooper's hawk and osprey by protecting small but  
38 essential habitats that occur within cultivated lands, such as tree rows along field borders or roads,  
39 and small clusters of trees in farmyards or rural residences (Objective CLNC1.3). In addition, the  
40 distribution and abundance of potential nest trees would be increased by planting and maintaining  
41 native trees along roadsides and field borders within protected cultivated lands at a rate of one tree  
42 per 10 acres (Objective SWHA2.1).

43 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*  
44 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*

1 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
2 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
3 *Material, and AMM7 Barge Operations Plan. All of these AMMs include elements that would avoid or*  
4 *minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are*  
5 *described in detail in BDCP Appendix 3.C, Avoidance and Minimization Measures. Cooper's hawk and*  
6 *osprey are not species that are covered under the BDCP. In order for the BDCP to have a less-than-*  
7 *significant impact on individuals, preconstruction surveys for noncovered avian species would be*  
8 *required to ensure that active nests are detected and avoided. Implementation of Mitigation*  
9 *Measure BIO-75, Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting*  
10 *Birds, would reduce this impact to a less-than-significant level.*

11 Considering Alternative 9's protection and restoration provisions, which would provide acreages of  
12 new or enhanced habitat in amounts greater than necessary to compensate for the time lag of  
13 restoring riparian habitats lost to construction and restoration activities, and with implementation  
14 of AMM1-AMM7, AMM18 Swainson's Hawk and White-Tailed Kite, and Mitigation Measure BIO-75,  
15 the loss of habitat or direct mortality through implementation of Alternative 9 would not result in a  
16 substantial adverse effect through habitat modifications and would not substantially reduce the  
17 number or restrict the range of Cooper's hawk and osprey. Therefore, the loss of habitat or potential  
18 mortality under this alternative would have a less-than-significant impact on Cooper's hawk and  
19 osprey.

20 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**  
21 **Disturbance of Nesting Birds**

22 See Mitigation Measure BIO-75 under Impact BIO-75.

23 **Impact BIO-110: Effects on Cooper's Hawk and Osprey Associated with Electrical**  
24 **Transmission Facilities**

25 New transmission lines would increase the risk for bird-power line strikes, which could result in  
26 injury or mortality of Cooper's hawk and osprey. The existing network of transmission lines in the  
27 Plan Area currently poses the same small risk for Cooper's hawk and osprey, and any incremental  
28 risk associated with the new power line corridors would also be expected to be low. AMM20 Greater  
29 Sandhill Crane, which would install flight-diverters on new and selected existing transmission lines  
30 would further reduce any potential effects.

31 **NEPA Effects:** New transmission lines would increase the risk for bird-power line strikes, which  
32 could result in injury or mortality of Cooper's hawk and osprey. With the implementation of AMM20  
33 Greater Sandhill Crane, which would install flight-diverters on new and selected existing  
34 transmission lines, there would not be an adverse effect on Cooper's hawk and osprey.

35 **CEQA Conclusion:** New transmission lines would increase the risk for bird-power line strikes, which  
36 could result in injury or mortality of Cooper's hawk and osprey. AMM20 Greater Sandhill Crane,  
37 which would install flight-diverters on new and selected existing transmission lines, would  
38 minimize this risk would reduce the impact of new transmission lines on Cooper's hawk and osprey  
39 to a less-than-significant level.

1 **Impact BIO-111: Indirect Effects of Plan Implementation on Cooper's Hawk and Osprey**

2 **Indirect construction- and operation-related effects:** Construction noise above background noise  
3 levels (greater than 50 dBA) could extend 1,900 to 5,250 feet from the edge of construction  
4 activities (BDCP Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of the BDCP*  
5 *Conveyance Facility on Sandhill Crane*, Table 4), although there are no available data to determine  
6 the extent to which these noise levels could affect Cooper's hawk or osprey. If Cooper's hawk or  
7 osprey were to nest in or adjacent to work areas, construction and subsequent maintenance-related  
8 noise and visual disturbances could mask calls, disrupt foraging and nesting behaviors, and reduce  
9 the functions of suitable nesting habitat for these species. Mitigation Measure BIO-75, *Conduct*  
10 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would avoid the  
11 potential for adverse effects of construction-related activities on survival and productivity of nesting  
12 Cooper's hawk and osprey. The use of mechanical equipment during water conveyance facilities  
13 construction could cause the accidental release of petroleum or other contaminants that could affect  
14 Cooper's hawk and osprey in the surrounding habitat. The inadvertent discharge of sediment or  
15 excessive dust adjacent to suitable habitat could also have an adverse effect on these species.  
16 AMM1-AMM7, including *AMM2 Construction Best Management Practices and Monitoring*, would  
17 minimize the likelihood of such spills and ensure that measures are in place to prevent runoff from  
18 the construction area and negative effects of dust on active nests.

19 **Methylmercury Exposure:** Covered activities have the potential to exacerbate bioaccumulation of  
20 mercury in avian species, including Cooper's hawk and osprey. Future operational impacts under  
21 CM1 were analyzed using a DSM-2 based model to assess potential effects on mercury concentration  
22 and bioavailability resulting from proposed flows. Subsequently, a regression model was used to  
23 estimate fish-tissue concentrations under these future operational conditions (evaluated starting  
24 operations or ESO). Results indicated that changes in total mercury levels in water and fish tissues  
25 due to ESO were insignificant (see BDCP Appendix 5.D, Tables 5D.4-3, 5D.4-4, and 5D.4-5).

26 Marsh (tidal and nontidal) and floodplain restoration have the potential to increase exposure to  
27 methylmercury. Mercury is transformed into the more bioavailable form of methylmercury in  
28 aquatic systems, especially areas subjected to regular wetting and drying such as tidal marshes and  
29 flood plains (Alpers et al. 2008). Thus, BDCP restoration activities that create newly inundated areas  
30 could increase bioavailability of mercury (see BDCP Chapter 3, *Conservation Strategy*, for details of  
31 restoration). Species sensitivity to methylmercury differs widely and there is a large amount of  
32 uncertainty with respect to species-specific effects. Increased methylmercury associated with  
33 natural community and floodplain restoration could indirectly affect cooper's hawk and osprey, via  
34 uptake in lower trophic levels (as described in the BDCP, Appendix 5.D, *Contaminants*).

35 In addition, the potential mobilization or creation of methylmercury within the Plan Area varies  
36 with site-specific conditions and would need to be assessed at the project level. *CM12 Methylmercury*  
37 *Management* contains provisions for project-specific Mercury Management Plans. Site-specific  
38 restoration plans that address the creation and mobilization of mercury, as well as monitoring and  
39 adaptive management as described in CM12 would be available to address the uncertainty of  
40 methylmercury levels in restored tidal marsh and potential impacts on cooper's hawk and osprey.

41 **NEPA Effects:** Noise and visual disturbances from the construction of water conveyance facilities  
42 could reduce Cooper's hawk and osprey use of modeled habitat adjacent to work areas. Moreover,  
43 operation and maintenance of the water conveyance facilities, including the transmission facilities,  
44 could result in ongoing but periodic postconstruction disturbances that could affect Cooper's hawk

1 and osprey use of the surrounding habitat. Mitigation Measure BIO-75, *Conduct Preconstruction*  
2 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to address adverse  
3 effects on nesting individuals in addition to AMM1–AMM7. The implementation of tidal natural  
4 communities restoration or floodplain restoration could result in increased exposure of Cooper’s  
5 hawk or osprey to methylmercury, through the ingestion of fish or small mammals in tidally  
6 restored areas. However, it is currently unknown what concentrations of methylmercury are  
7 harmful to these species and the potential for increased exposure varies substantially within the  
8 study area. Site-specific restoration plans that address the creation and mobilization of mercury, as  
9 well as monitoring and adaptive management as described in CM12 would better inform potential  
10 impacts and address the uncertainty of methylmercury levels in restored tidal marsh in the study  
11 area on cooper’s hawk and osprey. The site-specific planning phase of marsh restoration would be  
12 the appropriate place to assess the potential for risk of methylmercury exposure for Cooper’s hawk  
13 and osprey, once site specific sampling and other information could be developed.

14 **CEQA Conclusion:** Noise and visual disturbances from the construction of water conveyance  
15 facilities could reduce Cooper’s hawk and osprey use of modeled habitat adjacent to work areas.  
16 Moreover, operation and maintenance of the water conveyance facilities, including the transmission  
17 facilities, could result in ongoing but periodic postconstruction disturbances that could affect  
18 Cooper’s hawk and osprey use of the surrounding habitat. Noise, the potential for hazardous spills,  
19 increased dust and sedimentation, and operations and maintenance of the water conveyance  
20 facilities under Alternative 9 would have a less-than-significant impact on Cooper’s hawk and osprey  
21 with the implementation of Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird*  
22 *Surveys and Avoid Disturbance of Nesting Birds*, and AMM1–AMM7. The implementation of tidal  
23 natural communities restoration or floodplain restoration could result in increased exposure of  
24 Cooper’s hawk or osprey to methylmercury through the ingestion of fish or small mammals in  
25 restored tidal areas. However, it is currently unknown what concentrations of methylmercury are  
26 harmful to these species. Site-specific restoration plans that address the creation and mobilization of  
27 mercury, as well as monitoring and adaptive management as described in CM12, would address the  
28 uncertainty of methylmercury levels in restored tidal marsh in the study area and better inform  
29 potential impacts on Cooper’s hawk and osprey.

30 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**  
31 **Disturbance of Nesting Birds**

32 See Mitigation Measure BIO-75 under Impact BIO-75.

33 **Impact BIO-112: Periodic Effects of Inundation of Cooper’s Hawk and Osprey Nesting Habitat**  
34 **as a Result of Implementation of Conservation Components**

35 Flooding of the Yolo Bypass from Fremont Weir operations (CM2) would increase the frequency and  
36 duration of inundation of approximately 48-82 acres of modeled Cooper’s hawk and osprey  
37 breeding habitat. However, increased periodic flooding is not expected to cause any adverse effect on  
38 breeding habitat because trees in which nest sites are situated already withstand floods, the  
39 increase in inundation frequency and duration is expected to remain within the range of tolerance of  
40 riparian trees, and nest sites are located above floodwaters.

41 Based on hypothetical floodplain restoration, CM5 implementation could result in periodic  
42 inundation of up to 230 acres of breeding habitat for Cooper’s hawk and osprey. The overall effect of  
43 seasonal inundation in existing riparian natural communities is likely to be beneficial for these

1 species, because, historically, flooding was the main natural disturbance regulating ecological  
2 processes in riparian areas, and flooding promotes the germination and establishment of many  
3 native riparian plants.

4 **NEPA Effects:** Increased periodic flooding would not be expected to cause any adverse effect on nest  
5 sites because trees in which nest sites are situated already withstand floods, the increase in  
6 inundation frequency and duration is expected to remain within the range of tolerance of riparian  
7 trees, and nest sites are located above floodwaters. Therefore, increased duration and inundation  
8 from CM2 and CM5 would not have an adverse effect on Cooper's hawk and osprey.

9 **CEQA Conclusion:** Increased periodic flooding would not be expected to cause any adverse effect on  
10 nest sites because trees in which nest sites are situated already withstand floods, the increase in  
11 inundation frequency and duration is expected to remain within the range of tolerance of riparian  
12 trees, and nest sites are located above floodwaters. Therefore, increased duration and inundation  
13 from CM2 and CM5 would have a less-than-significant impact on Cooper's hawk and osprey.

#### 14 **Golden Eagle and Ferruginous Hawk**

15 Modeled foraging habitat for these species consists of grassland, alkali seasonal wetland, vernal pool  
16 complex, alfalfa, grain and hay, pasture, and idle cropland throughout the study area.

17 Construction and restoration associated with Alternative 9 conservation measures would result in  
18 both temporary and permanent losses of golden eagle and ferruginous hawk modeled foraging  
19 habitat as indicated in Table 12-9-44. Full implementation of Alternative 9 would include the  
20 following conservation actions over the term of the BDCP that would benefit golden eagle and  
21 ferruginous hawk (BDCP Chapter 3, Section 3.3, *Biological Goals and Objectives*).

- 22 ● Protect at least 8,000 acres of grassland, with at least 2,000 acres protected in CZ 1, at least  
23 1,000 acres protected in CZ 8, at least 2,000 acres protected in CZ 11, and the remainder  
24 distributed among CZs 1, 2, 4, 5, 7, 8, and 11 (Objective GNC1.1, associated with CM3).
- 25 ● Restore at least 2,000 acres of grasslands (Objective GNC1.2, associated with CM8).
- 26 ● Protect at least 150 acres of alkali seasonal wetland and at least 600 acres of existing vernal pool  
27 complex in CZs 1, 8, and/or 11 (Objectives ASWNC1.1 and VPNC1.1, associated with CM3).
- 28 ● Increase prey availability and accessibility for grassland-foraging species (Objectives ASWNC2.4,  
29 VPNC2.5, and GNC2.4, associated with CM11).
- 30 ● Protect at least 48,625 acres of cultivated lands that provide suitable habitat for covered and  
31 other native wildlife species (Objective CLNC1.1, associated with CM3).
- 32 ● Within the 48,625 acres of protected cultivated lands, protect at least 42,275 acres of cultivated  
33 lands as Swainson's hawk foraging habitat with at least 50% in very high-value habitat in CZs 2,  
34 3, 4, 5, 7, 8, 9, and 11 (Objective SH1.2, associated with CM3).

35 As explained below, with the restoration or protection of these amounts of habitat, in addition to  
36 management activities to enhance natural communities for species and implementation of AMM1-  
37 AMM7, impacts on golden eagle and ferruginous hawk would not be adverse for NEPA purposes and  
38 would be less than significant for CEQA purposes.

39

1 **Table 12-9-44. Changes in Golden Eagle and Ferruginous Hawk Habitat Associated with**  
2 **Alternative 9 (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	Foraging	318	318	1,281	1,281	NA	NA
<b>Total Impacts CM1</b>		<b>318</b>	<b>318</b>	<b>1,281</b>	<b>1,281</b>	<b>NA</b>	<b>NA</b>
CM2–CM18	Foraging	5,450	26,198	376	893	1,158-3,650	3,823
<b>Total Impacts CM2–CM18</b>		<b>5,450</b>	<b>26,198</b>	<b>376</b>	<b>893</b>	<b>1,158-3,650</b>	<b>3,823</b>
<b>TOTAL IMPACTS</b>		<b>5,768</b>	<b>26,516</b>	<b>1,657</b>	<b>2,174</b>	<b>1,158-3,650</b>	<b>3,823</b>

<sup>a</sup> See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-113: Loss or Conversion of Habitat for and Direct Mortality of Golden Eagle and**  
5 **Ferruginous Hawk**

6 Alternative 9 conservation measures would result in the combined permanent and temporary loss  
7 of up to 28,690 acres of modeled foraging habitat for golden eagle and ferruginous hawk (26,516  
8 acres of permanent loss and 2,174 acres of temporary loss, Table 12-9-44). Conservation measures  
9 that would result in these losses are conveyance facilities and transmission line construction, and  
10 establishment and use of borrow and spoil areas (CM1), Yolo Bypass fisheries improvements (CM2),  
11 tidal habitat restoration (CM4), floodplain restoration (CM5), riparian restoration (CM7), grassland  
12 restoration (CM8), vernal pool and wetland restoration (CM9), nontidal marsh restoration (CM10),  
13 and construction of conservation hatcheries (CM18). The majority of habitat loss (20,880 acres)  
14 would result from CM4. Habitat enhancement and management activities (CM11), which include  
15 ground disturbance or removal of nonnative vegetation, and the construction of recreational trails,  
16 signs, and facilities, could result in local adverse habitat effects. In addition, maintenance activities  
17 associated with the long-term operation of the water conveyance facilities and other BDCP physical  
18 facilities could degrade or eliminate golden eagle foraging habitat. Each of these individual activities  
19 is described below. A summary statement of the combined impacts and NEPA effects, and a CEQA  
20 conclusion follows the individual conservation measure discussions.

- 21 • *CM1 Water Facilities and Operation*: Construction of Alternative 9 conveyance facilities would  
22 result in the combined permanent and temporary loss of up to 427 acres of modeled golden  
23 eagle and ferruginous hawk foraging habitat (83 acres of permanent loss, 344 acres of  
24 temporary loss) from CZ 4, 5, 6, 7, and 8. The permanent and temporary losses to habitat would  
25 occur at numerous locations where dredging, construction of operable barriers and canals, and

1 channel enlargement would be undertaken. The CM1 construction footprint does not overlap  
2 with any occurrences of golden eagle or ferruginous hawk. Refer to the Terrestrial Biology Map  
3 Book for a detailed view of Alternative 9 construction locations. Impacts from CM1 would occur  
4 within the first 10 years of Alternative 9 implementation.

- 5 • *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo bypass fisheries enhancement  
6 would result in the combined permanent and temporary loss of up to 1,274 acres of modeled  
7 golden eagle and ferruginous hawk foraging habitat (898 acres of permanent loss, 376 acres of  
8 temporary loss) in the Yolo Bypass in CZ 2. Impacted habitat would consist primarily of  
9 grassland and pasture. Most of the grassland losses would occur at the north end of the bypass  
10 below Fremont Weir, along the Toe Drain/Tule Canal, and along the west side channels.  
11 Realignment of Putah Creek could also involve excavation and grading in alkali seasonal wetland  
12 complex habitat as a new channel is constructed. The loss is expected to occur during the first 10  
13 years of Alternative 9 implementation.
- 14 • *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and  
15 inundation would permanently remove an estimated 20,880 acres of modeled golden eagle and  
16 ferruginous hawk habitat. The majority of the acres lost would consist of cultivated lands in CZs  
17 1, 2, 4, 5, 6, and/or 7. Grassland losses would likely occur in the vicinity of Cache Slough, on  
18 Decker Island in the West Delta ROA, on the upslope fringes of Suisun Marsh, and along narrow  
19 bands adjacent to waterways in the South Delta ROA. Tidal restoration would directly impact  
20 and fragment grassland just north of Rio Vista in and around French and Prospect Islands, and in  
21 an area south of Rio Vista around Threemile Slough. Losses of alkali seasonal wetland complex  
22 habitat would likely occur in the south end of the Yolo Bypass and on the northern fringes of  
23 Suisun Marsh.
- 24 • *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore  
25 seasonally inundated floodplain would permanently and temporarily remove approximately  
26 1,450 acres of modeled golden eagle and ferruginous hawk foraging habitat (933 permanent,  
27 517 temporary). These losses would be expected after the first 10 years of Alternative 9  
28 implementation along the San Joaquin River and other major waterways in CZ 7.
- 29 • *CM8 Grassland Natural Community Restoration and CM9 Vernal Pool and Alkali Seasonal Wetland*  
30 *Complex Restoration*: Temporary construction-related disturbance of grassland habitat would  
31 result from implementation of CM8 and CM9 in CZs 1, 2, 4, 5, 7, 8, and 11. However, all areas  
32 would be restored after the construction periods. Grassland restoration would be implemented  
33 on agricultural lands that also provide foraging habitat for golden eagle and ferruginous hawk  
34 and would result in the conversion of 837 acres of cultivated lands to grassland.
- 35 • *CM10 Nontidal Marsh Restoration*: Implementation of CM10 would result in the permanent  
36 removal of 705 acres of golden eagle and ferruginous hawk foraging habitat.
- 37 • *CM11 Natural Communities Enhancement and Management*: A variety of habitat management  
38 actions included in CM11 that are designed to enhance wildlife values in restored or protected  
39 habitats could result in localized ground disturbances that could temporarily remove small  
40 amounts of golden eagle and ferruginous hawk foraging habitat. Ground-disturbing activities,  
41 such as removal of nonnative vegetation and road and other infrastructure maintenance  
42 activities, would be expected to have minor adverse effects on available habitat for these  
43 species. CM11 would also include the construction of recreational-related facilities including  
44 trails, interpretive signs, and picnic tables (BDCP Chapter 4, *Covered Activities and Associated*

1 *Federal Actions*). The construction of trailhead facilities, signs, staging areas, picnic areas,  
2 bathrooms, etc. would be placed on existing, disturbed areas when and where possible.  
3 However, approximately 50 acres of grassland habitat would be lost from the construction of  
4 trails and facilities.

- 5 • *CM18 Conservation Hatcheries*: Implementation of CM18 would remove up to 35 acres of  
6 modeled golden eagle and ferruginous hawk foraging habitat for the development of a delta and  
7 longfin smelt conservation hatchery in CZ 1.
- 8 • *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground  
9 water conveyance facilities and restoration infrastructure could result in ongoing but periodic  
10 disturbances that could affect golden eagle and ferruginous hawk use of the surrounding habitat.  
11 Maintenance activities would include vegetation management, levee and structure repair, and  
12 re-grading of roads and permanent work areas. These effects, however, would be reduced by  
13 AMM1–AMM7 and conservation actions as described below.
- 14 • *Injury and Direct Mortality*: Construction would not be expected to result in direct mortality of  
15 golden eagle and ferruginous hawk because foraging individuals would be expected to  
16 temporarily avoid the increased noise and activity associated with construction areas.

17 The following paragraphs summarize the combined effects discussed above and describe other  
18 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also  
19 included.

#### 20 ***Near-Term Timeframe***

21 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
22 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
23 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
24 effects of construction would not be adverse under NEPA. Alternative 9 would remove 7,425 acres  
25 (5,768 permanent, 1,657 temporary) of modeled golden eagle and ferruginous hawk foraging  
26 habitat in the study area in the near-term. These effects would result from the construction of the  
27 water conveyance facilities (CM1, 1,599 acres), and implementing other conservation measures  
28 (*CM2 Yolo Bypass Fisheries Enhancement, CM4 Tidal Natural Communities Restoration, CM7 Riparian*  
29 *Natural Community Restoration, CM8 Grassland Natural Community Restoration, CM9 Vernal Pool and*  
30 *Alkali Seasonal Wetland Complex Restoration, CM11 Natural Communities Enhancement and*  
31 *Management and CM18 Conservation Hatcheries—5,826 acres).*

32 The typical NEPA and CEQA project-level mitigation ratio for those natural communities affected  
33 would be 2:1 for protection of habitat. Using this ratio would indicate that 3,198 acres should be  
34 protected to compensate for the CM1 losses of 1,599 acres of golden eagle and ferruginous hawk  
35 foraging habitat. The near-term effects of other conservation actions would remove 5,826 acres of  
36 modeled habitat, and therefore require 11,652 acres of protection of golden eagle and ferruginous  
37 hawk habitat using the same typical NEPA and CEQA ratio (2:1 for protection).

38 The BDCP has committed to near-term goals of protecting 2,000 acres and restoring 1,140 acres of  
39 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of  
40 alkali seasonal wetland complex, and protecting 15,400 acres of non-rice cultivated lands (Table 3-4  
41 in Chapter 3, *Description of Alternatives*). These conservation actions are associated with CM3, CM8,  
42 and CM9 and would occur in the same timeframe as the construction and early restoration losses  
43 thereby avoiding adverse effects of habitat loss on golden eagle and ferruginous hawk foraging in

1 the study area. Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11  
2 (Objectives GNC1.1 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be associated with  
3 vernal pool and alkali seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would  
4 result in a contiguous matrix of grassland, alkali seasonal wetland, and vernal pool natural  
5 communities which would expand golden eagle and ferruginous hawk foraging habitat and reduce  
6 the effects of current levels of habitat fragmentation. Under *CM11 Natural Communities*  
7 *Enhancement and Management*, insect and mammal prey populations would be increased on  
8 protected lands, enhancing the foraging value of these natural communities (Objectives ASWNC2.4,  
9 VPNC2.5, and GNC2.4). Burrow availability would be increased on protected natural communities by  
10 encouraging ground squirrel occupancy and expansion through the creation of berms, mounds,  
11 edges, and through the prohibition of ground squirrel control programs (i.e., poisoning).

12 Cultivated lands that provide habitat for covered and other native wildlife species would provide  
13 approximately 15,400 acres of potential foraging habitat for golden eagle and ferruginous hawk  
14 (Objective CLNC1.1). Approximately 87% of cultivated lands protected by the late long-term time  
15 period would be in alfalfa and pasture crop types (very high- and high-value crop types for  
16 Swainson's hawk (Objective SH1.2) which are also suitable for golden eagle and ferruginous hawk.  
17 This biological objective provides an estimate for the high proportion of cultivated lands protected  
18 in the near-term time period which would be suitable for golden eagle and ferruginous hawk.

19 The acres of restoration and protection contained in the near-term Plan goals and the additional  
20 detail in the biological objectives satisfy the typical mitigation that would be applied to the project-  
21 level effects of CM1 on golden eagle and ferruginous hawk, as well as mitigate the near-term effects  
22 of the other conservation measures with the consideration that some portion of the 15,400 acres of  
23 cultivated lands protected in the near-term timeframe would be managed in suitable crop types to  
24 compensate for the loss of habitat at a ratio of 2:1. Mitigation Measure BIO-113, *Compensate for the*  
25 *Near-Term Loss of Golden Eagle and Ferruginous Hawk Foraging Habitat* would be available to  
26 address the adverse effect of habitat loss in the near-term.

27 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
28 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
29 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
30 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
31 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
32 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
33 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

#### 34 **Late Long-Term Timeframe**

35 Alternative 9 as a whole would result in the permanent loss of and temporary effects on 28,690  
36 acres of modeled golden eagle and ferruginous hawk foraging habitat during the term of the Plan.  
37 The locations of these losses are described above in the analyses of individual conservation  
38 measures. The Plan includes conservation commitments through *CM3 Natural Communities*  
39 *Protection and Restoration*, *CM8 Grassland Natural Community Restoration*, and *CM9 Vernal Pool and*  
40 *Alkali Seasonal Wetland Complex Restoration* to protect 8,000 acres and restore 2,000 acres of  
41 grassland natural community, protect 600 acres of vernal pool complex, protect 150 acres of alkali  
42 seasonal wetland complex and protect 48,625 acres of cultivated lands that provide suitable habitat  
43 for native wildlife species (Table 3-4 in Chapter 3, *Description of Alternatives*). Grassland restoration  
44 and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1 and GNC1.2). Grassland

1 protection in CZs 1, 8, and 11 would be associated with vernal pool and alkali seasonal wetland  
2 complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous matrix of  
3 grassland, alkali seasonal wetland, and vernal pool natural communities which would expand  
4 foraging habitat for golden eagle and ferruginous hawk and reduce the effects of current levels of  
5 habitat fragmentation. Under *CM11 Natural Communities Enhancement and Management*, insect and  
6 small mammal prey populations would be increased on protected lands, enhancing the foraging  
7 value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4). Burrow  
8 availability would be increased on protected natural communities by encouraging ground squirrel  
9 occupancy and expansion through the creation of berms, mounds, edges, and through the  
10 prohibition of ground squirrel control programs (i.e., poisoning). Cultivated lands that provide  
11 habitat for covered and other native wildlife species would provide approximately 15,400 acres of  
12 potential habitat for golden eagle and ferruginous hawk (Objective CLNC1.1). Approximately 42,275  
13 acres of cultivated lands protected would be in alfalfa and pasture crop types (very high- and high-  
14 value crop types for Swainson's hawk (Objective SH1.2) which are also suitable for golden eagle and  
15 ferruginous hawk.

16 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
17 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
18 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
19 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
20 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
21 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
22 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

23 **NEPA Effects:** The loss of golden eagle and ferruginous hawk habitat and potential mortality of these  
24 special-status species under Alternative 9 would represent an adverse effect in the absence of other  
25 conservation actions. With habitat protection and restoration associated with CM3, CM8, CM9, and  
26 CM11, guided by biological goals and objectives and AMM1–AMM7, which would be in place  
27 throughout the construction period, and with implementation of Mitigation Measure BIO-113,  
28 *Compensate for the Near-Term Loss of Golden Eagle and Ferruginous Hawk Foraging Habitat*, the  
29 effects of habitat loss and potential direct mortality on golden eagle and ferruginous hawk under  
30 Alternative 9 would not be adverse.

31 **CEQA Conclusion:**

32 **Near-Term Timeframe**

33 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
34 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
35 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
36 effects of construction would be less than significant under CEQA. Alternative 9 would remove 7,425  
37 acres (5,768 permanent, 1,657 temporary) of modeled golden eagle and ferruginous hawk foraging  
38 habitat in the study area in the near-term. These effects would result from the construction of the  
39 water conveyance facilities (CM1, 1,599 acres), and implementing other conservation measures  
40 (*CM2 Yolo Bypass Fisheries Enhancement*, *CM4 Tidal Natural Communities Restoration*, *CM7 Riparian*  
41 *Natural Community Restoration*, *CM8 Grassland Natural Community Restoration*, *CM9 Vernal Pool and*  
42 *Alkali Seasonal Wetland Complex Restoration*, *CM11 Natural Communities Enhancement and*  
43 *Management* and *CM18 Conservation Hatcheries*—5,826 acres).

1 The typical NEPA and CEQA project-level mitigation ratio for those natural communities affected  
2 would be 2:1 for protection of habitat. Using this ratio would indicate that 3,198 acres should be  
3 protected to compensate for the CM1 losses of 1,599 acres of golden eagle and ferruginous hawk  
4 foraging habitat. The near-term effects of other conservation actions would remove 5,826 acres of  
5 modeled habitat, and therefore require 11,652 acres of protection of golden eagle and ferruginous  
6 hawk habitat using the same typical NEPA and CEQA ratio (2:1 for protection).

7 The BDCP has committed to near-term goals of protecting 2,000 acres and restoring 1,140 acres of  
8 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of  
9 alkali seasonal wetland complex, and protecting 15,400 acres of non-rice cultivated lands (Table 3-4  
10 in Chapter 3). These conservation actions are associated with CM3, CM8, and CM9 and would occur  
11 in the same timeframe as the construction and early restoration losses thereby avoiding significant  
12 impacts of habitat loss on golden eagle and ferruginous hawk foraging in the study area. Grassland  
13 restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1 and  
14 GNC1.2). Grassland protection in CZs 1, 8, and 11 would be associated with vernal pool and alkali  
15 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous  
16 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would  
17 expand golden eagle and ferruginous hawk foraging habitat and reduce the effects of current levels  
18 of habitat fragmentation. Under *CM11 Natural Communities Enhancement and Management*, insect  
19 and mammal prey populations would be increased on protected lands, enhancing the foraging value  
20 of these natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4). Burrow availability  
21 would be increased on protected natural communities by encouraging ground squirrel occupancy  
22 and expansion through the creation of berms, mounds, edges, and through the prohibition of ground  
23 squirrel control programs (i.e., poisoning). Cultivated lands that provide habitat for covered and  
24 other native wildlife species would provide approximately 15,400 acres of potential foraging habitat  
25 for golden eagle and ferruginous hawk (Objective CLNC1.1). Approximately 87% of cultivated lands  
26 protected by the late long-term time period would be in alfalfa and pasture crop types (very high-  
27 and high-value crop types for Swainson's hawk (Objective SH1.2) which are also suitable for golden  
28 eagle and ferruginous hawk. This biological objective provides an estimate for the high proportion of  
29 cultivated lands protected in the near-term time period which would be suitable for golden eagle  
30 and ferruginous hawk.

31 These Plan objectives represent performance standards for considering the effectiveness of  
32 conservation actions. The acres of restoration and protection contained in the near-term Plan goals  
33 and the additional detail in the biological objectives satisfy the typical mitigation that would be  
34 applied to the project-level effects of CM1 on golden eagle and ferruginous hawk, as well as mitigate  
35 the near-term effects of the other conservation measures with the consideration that some portion  
36 of the 15,400 acres of cultivated lands protected in the near-term timeframe would be managed in  
37 suitable crop types to compensate for the loss of habitat at a ratio of 2:1. The implementation of  
38 Mitigation Measure BIO-113, *Compensate for the Near-Term Loss of Golden Eagle and Ferruginous*  
39 *Hawk Foraging Habitat* would reduce the impact of habitat loss in the near-term to a less-than-  
40 significant level.

41 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
42 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
43 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
44 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
45 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or

1 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
2 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

### 3 **Late Long-Term Timeframe**

4 Alternative 9 as a whole would result in the permanent loss of and temporary effects on 28,690  
5 acres of modeled golden eagle and ferruginous hawk foraging habitat during the term of the Plan.  
6 The locations of these losses are described above in the analyses of individual conservation  
7 measures. The Plan includes conservation commitments through *CM3 Natural Communities*  
8 *Protection and Restoration*, *CM8 Grassland Natural Community Restoration*, and *CM9 Vernal Pool and*  
9 *Alkali Seasonal Wetland Complex Restoration* to protect 8,000 acres and restore 2,000 acres of  
10 grassland natural community, protect 600 acres of vernal pool complex, protect 150 acres of alkali  
11 seasonal wetland complex and protect 48,625 acres of cultivated lands that provide suitable habitat  
12 for native wildlife species (Table 3-4 in Chapter 3). Grassland restoration and protection would  
13 occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1 and GNC1.2). Grassland protection in CZs 1, 8,  
14 and 11 would be associated with vernal pool and alkali seasonal wetland complexes (Objectives  
15 ASWNC1.1 and VPNC1.1) and would result in a contiguous matrix of grassland, alkali seasonal  
16 wetland, and vernal pool natural communities which would expand foraging habitat for golden eagle  
17 and ferruginous hawk and reduce the effects of current levels of habitat fragmentation. Under *CM11*  
18 *Natural Communities Enhancement and Management*, insect and small mammal prey populations  
19 would be increased on protected lands, enhancing the foraging value of these natural communities  
20 (Objectives ASWNC2.4, VPNC2.5, and GNC2.4). Burrow availability would be increased on protected  
21 natural communities by encouraging ground squirrel occupancy and expansion through the creation  
22 of berms, mounds, edges, and through the prohibition of ground squirrel control programs (i.e.,  
23 poisoning). Cultivated lands that provide habitat for covered and other native wildlife species would  
24 provide approximately 15,400 acres of potential habitat for golden eagle and ferruginous hawk  
25 (Objective CLNC1.1). Approximately 42,275 acres of cultivated lands protected would be in alfalfa  
26 and pasture crop types. These are very high- and high-value crop types for Swainson's hawk  
27 (Objective SH1.2) which are also suitable for golden eagle and ferruginous hawk.

28 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
29 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
30 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
31 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
32 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
33 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
34 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

35 Considering Alternative 9's protection and restoration provisions, which would provide acreages of  
36 new or enhanced habitat in amounts suitable to compensate for habitats lost to construction and  
37 restoration activities, and with the implementation of AMM1-AMM7, and Mitigation Measure BIO-  
38 113, *Compensate for the Near-Term Loss of Golden Eagle and Ferruginous Hawk Foraging Habitat*, the  
39 loss of habitat or direct mortality through implementation of Alternative 9 would not result in a  
40 substantial adverse effect through habitat modifications and would not substantially reduce the  
41 number or restrict the range of either species. Therefore, the loss of habitat or potential mortality  
42 under this alternative would have a less-than-significant impact on golden eagle and ferruginous  
43 hawk.

1           **Mitigation Measure BIO-113: Compensate for the Near-Term Loss of Golden Eagle and**  
2           **Ferruginous Hawk Foraging Habitat**

3           DWR will manage and protect sufficient acres of cultivated lands such as pasture, grain and hay  
4           crops, or alfalfa to provide golden eagle and ferruginous hawk foraging habitat such that the  
5           total acres of high-value habitat impacted in the near-term timeframe are mitigated at a ratio of  
6           2:1. Additional grassland protection, enhancement, and management may be substituted for the  
7           protection of high-value cultivated lands.

8           **Impact BIO-114: Effects on Golden Eagle and Ferruginous Hawk Associated with Electrical**  
9           **Transmission Facilities**

10          New transmission lines would increase the risk that golden eagles and ferruginous hawks could be  
11          subject to power line strikes, which could result in injury or mortality of these species. Golden eagle  
12          and ferruginous hawk would be at low risk of bird strike mortality based on factors assessed in the  
13          bird strike vulnerability analysis (BDCP Attachment 5J.C, *Analysis of Potential Bird Collisions at*  
14          *Proposed BDCP Transmission Lines*). Factors analyzed include the height of the new transmission  
15          lines and the flight behavior of species. The existing network of transmission lines in the Plan Area  
16          currently poses the same small risk for golden eagle and ferruginous hawk, and any incremental risk  
17          associated with the new power line corridors would also be expected to be low. *AMM20 Greater*  
18          *Sandhill Crane* would further reduce any potential effects.

19          **NEPA Effects:** New transmission lines would minimally increase the risk for golden eagle and  
20          ferruginous hawk power line strikes. With the implementation of *AMM20 Greater Sandhill Crane*, the  
21          potential effect of the construction of new transmission lines on golden eagle and ferruginous hawk  
22          would not be adverse.

23          **CEQA Conclusion:** New transmission lines would minimally increase the risk for golden eagle and  
24          ferruginous hawk power line strikes. *AMM20 Greater Sandhill Crane* would reduce the potential  
25          impact of the construction of new transmission lines on golden eagle and ferruginous hawk to a less-  
26          than-significant level.

27          **Impact BIO-115: Indirect Effects of Plan Implementation on Golden Eagle and Ferruginous**  
28          **Hawk**

29          **Indirect construction-and operation-related effects:** Construction- and subsequent  
30          maintenance-related noise and visual disturbances could disrupt foraging, and reduce the functions  
31          of suitable foraging habitat for golden eagle and ferruginous hawk. Construction noise above  
32          background noise levels (greater than 50 dBA) could extend 1,900 to 5,250 feet from the edge of  
33          construction activities (BDCP Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of*  
34          *the BDCP Conveyance Facility on Sandhill Crane*, Table 4), although there are no available data to  
35          determine the extent to which these noise levels could affect golden eagle or ferruginous hawk.  
36          Indirect effects associated with construction include noise, dust, and visual disturbance caused by  
37          grading, filling, contouring, and other ground-disturbing operations. The use of mechanical  
38          equipment during water conveyance facilities construction could cause the accidental release of  
39          petroleum or other contaminants that could affect these species or their prey in the surrounding  
40          habitat. AMM1–AMM7, including *AMM2 Construction Best Management Practices and Monitoring*,  
41          would minimize the likelihood of such spills from occurring. The inadvertent discharge of sediment  
42          or excessive dust adjacent to golden eagle and ferruginous hawk grassland habitat could also have a

1 negative effect on the species. However, AMM1–AMM7 would also ensure that measures would be in  
2 place to prevent runoff from the construction area and the negative effects of dust on wildlife  
3 adjacent to work areas.

4 **NEPA Effects:** Indirect effects on golden eagle and ferruginous hawk as a result of Alternative 9  
5 implementation could have adverse effects on these species through the modification of habitat.  
6 With the incorporation of AMM1–AMM7 into the BDCP, indirect effects as a result of Alternative 9  
7 implementation would not have an adverse effect on golden eagle and ferruginous hawk.

8 **CEQA Conclusion:** Indirect effects on golden eagle and ferruginous hawk as a result of Alternative 9  
9 implementation could have a significant impact on the species from modification of habitat. With the  
10 incorporation of AMM1–AMM7 into the BDCP, indirect effects as a result of Alternative 9  
11 implementation would have a less-than-significant impact on golden eagle and ferruginous hawk.

### 12 **Impact BIO-116: Periodic Effects of Inundation on Golden Eagle and Ferruginous Hawk** 13 **Habitat as a Result of Implementation of Conservation Components**

14 Flooding of the Yolo Bypass from Fremont Weir operations (*CM2 Yolo Bypass Fisheries*  
15 *Enhancement*) would increase the frequency and duration of inundation on approximately 1,158–  
16 3,650 acres of modeled golden eagle and ferruginous hawk foraging habitat (Table 12-9-44).

17 Based on hypothetical footprints, implementation of *CM5 Seasonally Inundated Floodplain*  
18 *Restoration* could result in the periodic inundation of up to approximately 3,823 acres of modeled  
19 habitat (Table 12-9-44).

20 Golden eagles and ferruginous hawks would not likely use inundated areas for foraging, and  
21 increased inundation frequency and duration of inundation of grassland habitats may affect prey  
22 populations that have insufficient time to recover following inundation events. However,  
23 periodically inundated habitat would not be expected to have an adverse effect on local or migratory  
24 golden eagles or the wintering ferruginous hawk population in the area.

25 **NEPA Effects:** Implementation of CM2 would increase the frequency and duration of inundation on  
26 approximately 1,158–3,650 acres of modeled golden eagle and ferruginous hawk foraging habitat. In  
27 addition, implementation of CM5 could result in the periodic inundation of up to 3,823 acres of  
28 modeled habitat. However, periodic inundation would not be expected to have an adverse effect on  
29 the wintering golden eagle or ferruginous hawk populations in the study area.

30 **CEQA Conclusion:** Implementation of CM2 would increase the frequency and duration of inundation  
31 on approximately 1,158–3,650 acres of modeled golden eagle and ferruginous hawk foraging  
32 habitat. In addition, implementation of CM5 could result in the periodic inundation of up to 3,823  
33 acres of modeled habitat. However, periodic inundation would be expected to have a less-than-  
34 significant impact on the golden eagle and ferruginous hawk populations in the study area.

### 35 **Cormorants, Herons and Egrets**

36 This section describes the effects of Alternative 9, including water conveyance facilities construction  
37 and implementation of other conservation components, on double-crested cormorant, great blue  
38 heron, great egret, snowy egret, and black-crowned night heron. Modeled breeding habitat for these  
39 species consists of valley/foothill riparian forest.

1 Construction and restoration associated with Alternative 9 conservation measures would result in  
2 both temporary and permanent losses of cormorant, heron, and egret modeled habitat as indicated  
3 in Table 12-9-45. The majority of the losses would take place over an extended period of time as  
4 tidal marsh is restored in the study area. Although restoration for the loss of nesting habitat would  
5 be initiated in the same timeframe as the losses, it could take one or more decades for restored  
6 habitats to replace the functions of lost habitat. This time lag between impacts and restoration of  
7 habitat function would be minimized by specific requirements of *AMM18 Swainson's Hawk and*  
8 *White-Tailed Kite*, including the planting of mature trees in the near-term time period. Full  
9 implementation of Alternative 9 would include the following conservation actions over the term of  
10 the BDCP that would also benefit cormorants, herons, and egrets (BDCP Chapter 3, Section 3.3,  
11 *Biological Goals and Objectives*).

- 12 ● Restore or create at least 5,000 acres of valley/foothill riparian natural community, with at least  
13 3,000 acres occurring on restored seasonally inundated floodplain (Objective VFRNC1.1,  
14 associated with CM7).
- 15 ● Protect at least 750 acres of existing valley/foothill riparian natural community in CZ 7 by year  
16 10 (Objective VFRNC1.2, associated with CM3).
- 17 ● Maintain and protect the small patches of important wildlife habitats associated with cultivated  
18 lands within the reserve system, including isolated valley oak trees, trees and shrubs along field  
19 borders and roadsides, remnant groves, riparian corridors, water conveyance channels,  
20 grasslands, ponds, and wetlands (Objective CLNC1.3, associated with CM3).

21 As explained below, with the restoration or protection of these amounts of habitat, in addition to  
22 management activities to enhance natural communities for species and implementation of AMM1-  
23 AMM7, *AMM18 Swainson's Hawk and White-Tailed Kite*, and Mitigation Measure BIO-75, impacts on  
24 cormorants, herons, and egrets would not be adverse for NEPA purposes and would be less than  
25 significant for CEQA purposes.

1 **Table 12-9-45. Changes in Cormorant, Heron and Egret Modeled Habitat Associated with**  
2 **Alternative 9 (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	Nesting (Rookeries)	61	61	248	248	NA	NA
<b>Total Impacts CM1</b>		<b>61</b>	<b>61</b>	<b>248</b>	<b>248</b>	NA	NA
CM2-CM18	Nesting (Rookeries)	387	684	88	123	51-92	266
<b>Total Impacts CM2-CM18</b>		<b>387</b>	<b>684</b>	<b>88</b>	<b>123</b>	<b>51-92</b>	<b>266</b>
<b>TOTAL IMPACTS</b>		<b>448</b>	<b>745</b>	<b>336</b>	<b>371</b>	<b>51-92</b>	<b>266</b>

<sup>a</sup> See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-117: Loss or Conversion of Nesting Habitat for and Direct Mortality of**  
5 **Cormorants, Herons and Egrets**

6 Alternative 9 conservation measures would result in the combined permanent and temporary loss  
7 of up to 1,116 acres of modeled habitat (745 acres of permanent loss, 371 acres of temporary loss)  
8 for double-crested cormorant, great blue heron, great egret, snowy egret, and black-crowned night  
9 heron (Table 12-9-45). Conservation measures that would result in these losses are *CM1 Water*  
10 *Facilities and Operation* (which would involve conveyance facilities and transmission line  
11 construction, and establishment and use of borrow and spoil areas), *CM2 Yolo Bypass Fisheries*  
12 *Enhancement*, *CM4 Tidal Natural Communities Restoration*, and *CM5 Seasonally Inundated Floodplain*  
13 *Restoration*. Habitat enhancement and management activities (CM11), which include ground  
14 disturbance or removal of nonnative vegetation, could result in local adverse habitat effects. In  
15 addition, maintenance activities associated with the long-term operation of the water conveyance  
16 facilities and other BDCP physical facilities could degrade or eliminate cormorant, heron, and egret  
17 modeled habitat. Each of these individual activities is described below. A summary statement of the  
18 combined impacts, NEPA effects, and a CEQA conclusion follow the individual conservation measure  
19 discussions.

- 20 • *CM1 Water Conveyance Facilities and Operation*: Construction of Alternative 9 water conveyance  
21 facilities would result in the combined permanent and temporary loss of up to 309 acres of  
22 modeled Cormorant, heron, and egret habitat (Table 12-9-45). Of the 309 acres of modeled  
23 habitat that would be removed for the construction of the conveyance facilities, 61 acres would  
24 be a permanent loss and 248 acres would be a temporary loss of habitat. Permanent losses

1 would primarily consist of channel enlargement at the Sacramento River and Meadows Slough.  
2 Temporary losses would occur primarily along Middle River between Victoria Canal and  
3 Mildred Island, where large dredging work areas and operable barrier work areas would be  
4 placed. The riparian habitat in these areas is composed of very small patches or stringers  
5 bordering waterways, which are composed of valley oak and scrub vegetation. Impacts from  
6 CM1 would occur within the first 10 years of Alternative 9 implementation.

7 The primary impact of concern regarding double-crested cormorant, great blue heron, great  
8 egret, snowy egret, and black-crowned night heron is the loss of existing known nest trees, and  
9 other large trees associated with known nest sites. The CM1 footprint overlaps with one great  
10 blue heron rookery on an instream island northeast of Woodward Island. This rookery  
11 occurrence was recorded in 2000 by the CNDDDB and was recorded again during DHCCP surveys  
12 in 2009. The CM1 footprint includes dredging of Middle River and inchannel island dredging  
13 that would remove the island on which the rookery is located. In addition, the rookery could be  
14 indirectly affected by the barge facility work area and dredging work area to the west on  
15 Woodward Island. Because the species is highly traditional in their use of rookeries, the  
16 establishment of new nest sites is unpredictable. Therefore to avoid adverse effects on great  
17 blue herons (and cormorants, herons, and egrets, should future surveys detect additional  
18 rookeries), this rookery would have to be avoided. Mitigation Measure BIO-75, *Conduct*  
19 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, and Mitigation  
20 Measure BIO-117, *Avoid Impacts on Rookeries*, would be available to address this adverse effect  
21 on great blue herons. Refer to the Terrestrial Biology Map Book for a detailed view of  
22 Alternative 9 construction locations.

- 23 ● *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo bypass fisheries enhancement  
24 would result in the combined permanent and temporary loss of up to 177 acres of nesting  
25 habitat (89 acres of permanent loss, 88 acres of temporary loss) in the Yolo Bypass in CZ 2.  
26 Activities through CM2 could involve excavation and grading in valley/foothill riparian areas to  
27 improve passage of fish through the bypasses. Most of the riparian losses would occur at the  
28 north end of Yolo Bypass where major fish passage improvements are planned. Excavation to  
29 improve water movement in the Toe Drain and in the Sacramento Weir would also remove  
30 potential nesting habitat. The loss is expected to occur during the first 10 years of Alternative 9  
31 implementation.
- 32 ● *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and  
33 inundation would permanently remove an estimated 552 acres of nesting habitat for  
34 cormorants, herons and egrets. Trees would not be actively removed but tree mortality would  
35 be expected over time as areas became tidally inundated. Depending on the extent and value of  
36 remaining habitat, this could reduce use of these habitats by these species. There is one CNDDDB  
37 occurrence of a great blue heron rookery that overlaps with the hypothetical restoration  
38 footprint for tidal restoration. The occurrence is on Decker Island and tidal restoration could  
39 potentially impact the nest trees from inundation. This potential effect would need to be  
40 addressed within the project-specific analysis for tidal restoration projects.
- 41 ● *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore  
42 seasonally inundated floodplain would permanently remove approximately 43 acres and  
43 temporarily remove approximately 35 acres of potential cormorants, heron, and egret nesting  
44 habitat. These losses would be expected after the first 10 years of Alternative 9 implementation  
45 along the San Joaquin River and other major waterways in CZ 7.

- 1       • *CM11 Natural Communities Enhancement and Management*: Habitat management- and  
2       enhancement-related activities could disturb cormorant, heron, and egret nests if they were  
3       present near work sites. A variety of habitat management actions included in CM11 that are  
4       designed to enhance wildlife values in BDCP-protected habitats may result in localized ground  
5       disturbances that could temporarily remove small amounts of cormorant, heron, and egret  
6       habitat and reduce the functions of habitat until restoration is complete. Ground-disturbing  
7       activities, such as removal of nonnative vegetation and road and other infrastructure  
8       maintenance, are expected to have minor effects on available habitat for these species and are  
9       expected to result in overall improvements to and maintenance of habitat values over the term  
10      of the BDCP. These effects cannot be quantified, but are expected to be minimal and would be  
11      avoided and minimized by the AMMs listed below.
- 12      • Permanent and temporary habitat losses from the above conservation measures would  
13      primarily consist of fragmented riparian stands. Temporarily affected areas would be restored  
14      as riparian habitat within 1 year following completion of construction activities. Although the  
15      effects are considered temporary, the restored riparian habitat would require years to several  
16      decades to functionally replace habitat that has been affected and for trees to attain sufficient  
17      size and structure for established rookeries. *AMM18 Swainson's Hawk and White-Tailed Kite*  
18      contains actions described below to reduce the effect of temporal loss of mature riparian  
19      habitat, including the transplanting of mature trees.
- 20      • Operations and Maintenance: Postconstruction operation and maintenance of the above-ground  
21      water conveyance facilities and restoration infrastructure could result in ongoing but periodic  
22      disturbances that could affect use of the surrounding habitat by cormorants, herons or egrets.  
23      Maintenance activities would include vegetation management, levee and structure repair, and  
24      re-grading of roads and permanent work areas. These effects, however, would be reduced by  
25      AMMs and conservation actions as described below.
- 26      • The primary impact of concern regarding double-crested cormorant, great blue heron, great  
27      egret, snowy egret, and black-crowned night heron is the loss of existing known nest trees, and  
28      other large trees associated with known nest sites. Because these species are highly traditional  
29      in their use of rookeries, the establishment of new nest sites is unpredictable. To avoid adverse  
30      effects on these species, existing known nest sites would have to be avoided. Mitigation Measure  
31      BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*,  
32      would be available to address these potential effects on cormorants, herons, and egrets.
- 33      • Injury and Direct Mortality: Construction-related activities would not be expected to result in  
34      direct mortality of adult or fledged double-crested cormorant, great blue heron, great egret,  
35      snowy egret, and black-crowned night heron if they were present in the Plan Area, because they  
36      would be expected to avoid contact with construction and other equipment. If birds were to nest  
37      in the construction area, construction-related activities, including equipment operation, noise  
38      and visual disturbances could affect nests or lead to their abandonment, potentially resulting in  
39      mortality of eggs and nestlings. Mitigation Measure BIO-75 would be available to address these  
40      effects on cormorants, herons, and egrets.

41      The following paragraphs summarize the combined effects discussed above and describe other  
42      BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also  
43      included.

1 **Near-Term Timeframe**

2 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
3 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
4 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
5 effects of construction would not be adverse under NEPA. Alternative 9 would remove 784 acres of  
6 nesting habitat for cormorants, herons, and egrets in the study area in the near-term. These effects  
7 would result from the construction of the water conveyance facilities (CM1, 309 acres of nesting  
8 habitat), and implementing other conservation measures (*CM2 Yolo Bypass Fisheries Enhancement*,  
9 *CM4 Tidal Natural Communities Restoration*, and *CM5 Seasonally Inundated Floodplain Restoration*—  
10 475 acres of nesting habitat).

11 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by  
12 CM1 would be 1:1 for restoration/creation and 1:1 protection of valley/foothill riparian habitat for  
13 breeding habitat. Using these ratios would indicate that 309 acres of breeding habitat should be  
14 restored/created and 309 acres should be protected to compensate for the CM1 losses of modeled  
15 cormorant, heron, and egret habitat. In addition, the near-term effects of other conservation actions  
16 would remove 475 acres of modeled breeding habitat, and therefore require 475 acres of  
17 restoration and 475 acres of protection of modeled cormorant, heron, and egret habitat using the  
18 same typical NEPA and CEQA ratios.

19 The majority of riparian protection and restoration acres would occur in CZ 7 as part of a reserve  
20 system with extensive wide bands or large patches of valley/foothill riparian natural community  
21 (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*). Riparian  
22 restoration would expand the patches of existing riparian forest in order to support nesting habitat  
23 for these species. In addition, small but essential nesting habitat associated with cultivated lands  
24 would also be maintained and protected such as isolated trees, tree rows along field borders or  
25 roads, or small clusters of trees in farmyards or at rural residences (Objective CLNC1.3).

26 The 750 acres of protection and 800 acres of restoration contained in the near-term Plan goals  
27 satisfy the typical mitigation ratios that would be applied to the project-level effects of CM1 and  
28 other near-term impacts on cormorant, heron, and egret nesting habitat. The 800 acres of restored  
29 riparian habitat would be initiated in the near-term to offset the loss of potential nesting habitat, but  
30 would require years to several decades to functionally replace habitat that has been affected and for  
31 trees to attain sufficient size and structure suitable for established rookeries. This time lag between  
32 the removal and restoration of nesting habitat could have a substantial impact on cormorants,  
33 herons and egrets in the near-term time period.

34 *AMM18 Swainson's Hawk and White-Tailed Kite* would implement a program to plant large mature  
35 trees, including transplanting trees scheduled for removal. These would be supplemented with  
36 additional saplings and would be expected to reduce the temporal effects of loss of nesting habitat.  
37 The plantings would occur prior to or concurrent with (in the case of transplanting) the loss of trees.  
38 In addition, at least five trees (5-gallon container size) would be planted within the BDCP reserve  
39 system for every tree 20 feet or taller anticipated to be removed by construction during the near-  
40 term period. A variety of native tree species would be planted to provide trees with differing growth  
41 rates, maturation, and life span. Replacement trees that were incorporated into the riparian  
42 restoration would not be clustered in a single region of the study area, but would be distributed  
43 throughout protected lands.

1 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*  
2 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*  
3 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
4 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
5 *Material, and AMM7 Barge Operations Plan. All of these AMMs include elements that would avoid or*  
6 *minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are*  
7 *described in detail in BDCP Appendix 3.C, Avoidance and Minimization Measures. Double-crested*  
8 *cormorant, great blue heron, great egret, snowy egret, and black-crowned night heron are not*  
9 *species that are covered under the BDCP. For the BDCP to avoid adverse effects on individuals,*  
10 *existing nests and rookeries would have to be avoided. Mitigation Measure BIO-75, Conduct*  
11 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds, would be available to*  
12 *address adverse effects on nesting cormorants, herons, and egrets.*

### 13 **Late Long-Term Timeframe**

14 Based on modeled habitat, the study area supports approximately 17,966 acres of modeled nesting  
15 habitat for cormorants, herons, and egrets. Alternative 9 as a whole would result in the permanent  
16 loss of and temporary effects on 1,116 acres of potential breeding habitat (6% of the potential  
17 breeding habitat in the study area).

18 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*  
19 *Restoration, CM5 Seasonally Inundated Floodplain Restoration, and CM7 Riparian Natural Community*  
20 *Restoration to restore or create at least 5,000 acres and protect at least 750 acres of valley/foothill*  
21 *riparian natural community (Table 3-4 in Chapter 3, Description of Alternatives). The majority of*  
22 *riparian protection and restoration acres would occur in CZ 7 as part of a reserve system with*  
23 *extensive wide bands or large patches of valley/foothill riparian natural community (Objectives*  
24 *VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, Conservation Strategy). Riparian restoration would*  
25 *expand the patches of existing riparian forest in order to support nesting habitat for riparian*  
26 *species. The Plan's objectives would also benefit cormorants, herons, and egrets by protecting small*  
27 *but essential habitats that occur within cultivated lands, such as tree rows along field borders or*  
28 *roads, and small clusters of trees in farmyards or rural residences(Objective CLNC1.3). In addition,*  
29 *the distribution and abundance of potential nest trees would be increased by planting and*  
30 *maintaining native trees along roadsides and field borders within protected cultivated lands at a*  
31 *rate of one tree per 10 acres (Objective SWHA2.1).*

32 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*  
33 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*  
34 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
35 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
36 *Material, and AMM7 Barge Operations Plan. All of these AMMs include elements that would avoid or*  
37 *minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are*  
38 *described in detail in BDCP Appendix 3.C, Avoidance and Minimization Measures. Double-crested*  
39 *cormorant, great blue heron, great egret, snowy egret, and black-crowned night heron are not*  
40 *species that are covered under the BDCP. These species are highly traditional in their use of nest*  
41 *sites, and, in order for the BDCP to avoid a significant impact on individuals, preconstruction*  
42 *surveys would be required to ensure that nests are detected and any direct and indirect impacts on*  
43 *rookeries are avoided. Mitigation Measure BIO-75, Conduct Preconstruction Nesting Bird Surveys and*

1 *Avoid Disturbance of Nesting Birds* and Mitigation Measure BIO-117, *Avoid Impacts on Rookeries*,  
2 would be available to address adverse effects on nesting cormorants, herons, and egrets.

3 **NEPA Effects:** The loss of cormorant, heron, and egret habitat and potential direct mortality of these  
4 special-status species under Alternative 9 would represent an adverse effect in the absence of other  
5 conservation actions. With habitat protection and restoration associated with CM3, CM5, CM7, CM8,  
6 CM9, and CM11, guided by biological goals and objectives and by AMM1–AMM7 and AMM18  
7 Swainson’s Hawk and White-Tailed Kite, which would be in place throughout the construction  
8 period, the effects of habitat loss and potential mortality on cormorants, herons, and egrets under  
9 Alternative 9 would not be adverse. Double-crested cormorant, great blue heron, great egret, snowy  
10 egret, and black-crowned night heron are not species that are covered under the BDCP.  
11 Preconstruction surveys for noncovered species would be required for the BDCP to avoid an adverse  
12 effect on individuals. Mitigation Measure BIO-75 and Mitigation Measure BIO-117 would be  
13 available to address effects on nesting cormorants, herons, and egrets.

14 **CEQA Conclusion:**

15 **Near-Term Timeframe**

16 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
17 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
18 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
19 effects of construction would be less than significant under NEPA. Alternative 9 would remove 784  
20 acres of nesting habitat for cormorants, herons, and egrets in the study area in the near-term. These  
21 effects would result from the construction of the water conveyance facilities (CM1, 309 acres of  
22 nesting habitat), and implementing other conservation measures (CM2 *Yolo Bypass Fisheries*  
23 *Enhancement*, CM4 *Tidal Natural Communities Restoration*, and CM5 *Seasonally Inundated Floodplain*  
24 *Restoration*—475 acres of nesting habitat).

25 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by  
26 CM1 would be 1:1 for restoration/creation and 1:1 protection of valley/foothill riparian habitat for  
27 breeding habitat. Using these ratios would indicate that 309 acres of breeding habitat should be  
28 restored/created and 309 acres should be protected to compensate for the CM1 losses of modeled  
29 cormorant, heron, and egret habitat. In addition, the near-term effects of other conservation actions  
30 would remove 475 acres of modeled breeding habitat, and therefore require 475 acres of  
31 restoration and 475 acres of protection of modeled cormorant, heron, and egret habitat using the  
32 same typical NEPA and CEQA ratios.

33 The majority of riparian protection and restoration acres would occur in CZ 7 as part of a reserve  
34 system with extensive wide bands or large patches of valley/foothill riparian natural community  
35 (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*). Riparian  
36 restoration would expand the patches of existing riparian forest in order to support nesting habitat  
37 for these species. In addition, small but essential nesting habitat associated with cultivated lands  
38 would also be maintained and protected such as isolated trees, tree rows along field borders or  
39 roads, or small clusters of trees in farmyards or at rural residences (Objective CLNC1.3).

40 The 750 acres of protection and 800 acres of restoration contained in the near-term Plan goals  
41 satisfy the typical mitigation ratios that would be applied to the project-level effects of CM1 and  
42 other near-term impacts on cormorant, heron, and egret nesting habitat. The 800 acres of restored  
43 riparian habitat would be initiated in the near-term to offset the loss of potential nesting habitat, but

1 would require years to several decades to functionally replace habitat that has been affected and for  
2 trees to attain sufficient size and structure suitable for established rookeries. This time lag between  
3 the removal and restoration of nesting habitat could have a substantial impact on cormorants,  
4 herons and egrets in the near-term time period.

5 *AMM18 Swainson's Hawk and White-Tailed Kite* would implement a program to plant large mature  
6 trees, including transplanting trees scheduled for removal. These would be supplemented with  
7 additional saplings and would be expected to reduce the temporal effects of loss of nesting habitat.  
8 The plantings would occur prior to or concurrent with (in the case of transplanting) the loss of trees.  
9 In addition, at least five trees (5-gallon container size) would be planted within the BDCP reserve  
10 system for every tree 20 feet or taller anticipated to be removed by construction during the near-  
11 term period. A variety of native tree species would be planted to provide trees with differing growth  
12 rates, maturation, and life span. Replacement trees that were incorporated into the riparian  
13 restoration would not be clustered in a single region of the study area, but would be distributed  
14 throughout protected lands.

15 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
16 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
17 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
18 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
19 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
20 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
21 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*. Double-crested  
22 cormorant, great blue heron, great egret, snowy egret, and black-crowned night heron are not  
23 species that are covered under the BDCP. For the BDCP to avoid a significant impact on individuals,  
24 preconstruction surveys for noncovered avian species would be required to ensure that nests are  
25 detected and avoided. Implementation of Mitigation Measure BIO-75, *Conduct Preconstruction*  
26 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, and Mitigation Measure BIO-117, *Avoid*  
27 *Impacts on Rookeries*, would reduce this potential impact to a less-than-significant level.

### 28 **Late Long-Term Timeframe**

29 Based on modeled habitat, the study area supports approximately 17,966 acres of modeled nesting  
30 habitat for cormorants, herons, and egrets. Alternative 9 as a whole would result in the permanent  
31 loss of and temporary effects on 1,116 acres of potential breeding habitat (5% of the potential  
32 breeding habitat in the study area).

33 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*  
34 *Restoration*, *CM5 Seasonally Inundated Floodplain Restoration*, and *CM7 Riparian Natural Community*  
35 *Restoration* to restore or create at least 5,000 acres and protect at least 750 acres of valley/foothill  
36 riparian natural community (Table 3-4 in Chapter 3, *Description of Alternatives*). The majority of  
37 riparian protection and restoration acres would occur in CZ 7 as part of a reserve system with  
38 extensive wide bands or large patches of valley/foothill riparian natural community (Objectives  
39 VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*). Riparian restoration would  
40 expand the patches of existing riparian forest in order to support nesting habitat for riparian  
41 species. The Plan's objectives would also benefit cormorants, herons, and egrets by protecting small  
42 but essential habitats that occur within cultivated lands, such as tree rows along field borders or  
43 roads, and small clusters of trees in farmyards or rural residences (Objective CLNC1.3). In addition,  
44 the distribution and abundance of potential nest trees would be increased by planting and

1 maintaining native trees along roadsides and field borders within protected cultivated lands at a  
2 rate of one tree per 10 acres (Objective SWHA2.1).

3 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
4 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
5 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
6 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
7 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
8 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
9 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*. Double-crested  
10 cormorant, great blue heron, great egret, snowy egret, and black-crowned night heron are not  
11 species that are covered under the BDCP. These species are highly traditional in their use of nest  
12 sites and, for the BDCP to avoid a significant impact on individuals, preconstruction surveys would  
13 be required to ensure that nests are detected and any direct and indirect impacts on rookeries are  
14 avoided. Implementation of Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird*  
15 *Surveys and Avoid Disturbance of Nesting Birds*, and Mitigation Measure BIO-117, *Avoid Impacts on*  
16 *Rookeries*, would reduce this potential impact to a less-than-significant level.

17 Considering Alternative 9's protection and restoration provisions, which would provide acreages of  
18 new or enhanced habitat in amounts sufficient to compensate for the loss of riparian habitats lost to  
19 construction and restoration activities, and considering implementation of AMM1-AMM7,  
20 Mitigation Measure BIO-75, and Mitigation Measure BIO-117, the loss of habitat or direct mortality  
21 through implementation of Alternative 9 would not result in a substantial adverse effect through  
22 habitat modifications and would not substantially reduce the number or restrict the range of  
23 cormorants, herons, and egrets. Therefore, the loss of habitat and potential mortality under this  
24 alternative would have a less-than-significant impact on cormorants, herons, and egrets.

25 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**  
26 **Disturbance of Nesting Birds**

27 See Mitigation Measure BIO-75 under Impact BIO-75.

28 **Mitigation Measure BIO-117: Avoid Impacts on Rookeries**

29 Herons, egrets, and cormorants are highly traditional in their use of nest sites (rookeries):  
30 therefore, DWR will avoid all direct and indirect impacts on rookeries.

31 **Impact BIO-118: Effects Associated with Electrical Transmission Facilities on Cormorants,**  
32 **Hérons and Egrets**

33 New transmission lines would increase the risk for bird-power line strikes, which could result in  
34 injury or mortality of cormorants, herons and egrets. *AMM20 Greater Sandhill Crane* would minimize  
35 the risk for bird-power line strikes, for these species. This measure would ensure that conductor and  
36 ground lines are fitted with flight diverters in compliance with the best available practices, such as  
37 those specified in the USFWS Avian Protection Guidelines and would minimize the potential for an  
38 adverse effect.

39 **NEPA Effects:** New transmission lines would increase the risk for bird-power line strikes, which  
40 could result in injury or mortality of cormorants, herons, and egrets. *AMM20 Greater Sandhill Crane*  
41 would reduce the potential for collisions on new and select existing powerlines in the study area.

1 The construction of new transmission lines would not result in an adverse effect on cormorants,  
2 herons, and egrets.

3 **CEQA Conclusion:** New transmission lines would increase the risk for bird-power line strikes, which  
4 could result in injury or mortality of cormorants, herons, and egrets. *AMM20 Greater Sandhill Crane*  
5 would reduce birdstrike on new transmission lines and select existing transmission lines with the  
6 installation of flight diverters. With these in place, new transmission lines would have a less-than-  
7 significant impact on cormorants, herons and egrets.

### 8 **Impact BIO-119: Indirect Effects of Plan Implementation on Cormorants, Herons and Egrets**

9 **Indirect construction- and operation-related effects:** Construction noise above background noise  
10 levels (greater than 50 dBA) could extend 1,900 to 5,250 feet from the edge of construction  
11 activities (BDCP Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of the BDCP*  
12 *Conveyance Facility on Sandhill Crane*, Table 4), although there are no available data to determine  
13 the extent to which these noise levels could affect cormorants, herons, or egrets. If cormorants,  
14 herons or egrets were to nest in or adjacent to work areas, construction and subsequent  
15 maintenance-related noise and visual disturbances could mask calls, disrupt foraging and nesting  
16 behaviors, and reduce the functions of suitable nesting habitat for these species. Mitigation Measure  
17 BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would  
18 avoid the potential for adverse effects of construction-related activities on survival and productivity  
19 of nesting cormorants, herons or egrets. The use of mechanical equipment during water conveyance  
20 facilities construction could cause the accidental release of petroleum or other contaminants that  
21 could affect cormorants, herons or egrets in the surrounding habitat. The inadvertent discharge of  
22 sediment or excessive dust adjacent to suitable habitat could also have an adverse effect on these  
23 species. AMM1–AMM7, including *AMM2 Construction Best Management Practices and Monitoring*,  
24 would minimize the likelihood of such spills and ensure that measures are in place to prevent runoff  
25 from the construction area and negative effects of dust on active nests.

26 **Methylmercury Exposure:** Covered activities have the potential to exacerbate bioaccumulation of  
27 mercury in avian species, including cormorants, herons or egrets. Future operational impacts under  
28 CM1 were analyzed using a DSM-2 based model to assess potential effects on mercury concentration  
29 and bioavailability resulting from proposed flows. Subsequently, a regression model was used to  
30 estimate fish-tissue concentrations under these future operational conditions (evaluated starting  
31 operations or ESO). Results indicated that changes in total mercury levels in water and fish tissues  
32 due to ESO were insignificant (see BDCP Appendix 5.D, Tables 5D.4-3, 5D.4-4, and 5D.4-5).

33 Marsh (tidal and nontidal) and floodplain restoration have the potential to increase exposure to  
34 methylmercury. Mercury is transformed into the more bioavailable form of methylmercury in  
35 aquatic systems, especially areas subjected to regular wetting and drying such as tidal marshes and  
36 flood plains (Alpers et al. 2008). Thus, BDCP restoration activities that create newly inundated areas  
37 could increase bioavailability of mercury (see BDCP Chapter 3, *Conservation Strategy*, for details of  
38 restoration). Species sensitivity to methylmercury differs widely and there is a large amount of  
39 uncertainty with respect to species-specific effects. Increased methylmercury associated with  
40 natural community and floodplain restoration could indirectly effect on cormorants, herons or  
41 egrets, via uptake in lower trophic levels (as described in the BDCP, Appendix 5.D, *Contaminants*).

42 In addition, the potential mobilization or creation of methylmercury within the Plan Area varies  
43 with site-specific conditions and would need to be assessed at the project level. *CM12 Methylmercury*

1 *Management* contains provisions for project-specific Mercury Management Plans. Site-specific  
2 restoration plans that address the creation and mobilization of mercury, as well as monitoring and  
3 adaptive management as described in CM12 would be available to address the uncertainty of  
4 methylmercury levels in restored tidal marsh and potential impacts on cormorants, herons or  
5 egrets.

6 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in  
7 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,  
8 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,  
9 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz  
10 2009). The effect of selenium toxicity differs widely between species and also between age and sex  
11 classes within a species. In addition, the effect of selenium on a species can be confounded by  
12 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith  
13 2009).

14 The primary source of selenium bioaccumulation in birds is through their diet (Ackerman and  
15 Eagles-Smith 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the  
16 trophic level at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At  
17 Kesterson Reservoir in the San Joaquin Valley, selenium concentrations in invertebrates have been  
18 found to be two to six times the levels in rooted plants. Furthermore, bivalves sampled in the San  
19 Francisco Bay contained much higher selenium levels than crustaceans such as copepods (Stewart et  
20 al. 2004). Studies conducted at the Grasslands in Merced County recorded higher selenium levels in  
21 black-necked stilts which feed on aquatic invertebrates than in mallards and pintails, which are  
22 primarily herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which  
23 forage on bivalves) have much higher levels of selenium levels than shorebirds that prey on aquatic  
24 invertebrates (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high  
25 levels of selenium have a higher risk of selenium toxicity.

26 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations  
27 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to  
28 exacerbate bioaccumulation of selenium in avian species, including cormorants, herons, and egrets.  
29 Marsh (tidal and nontidal) and floodplain restoration have the potential to mobilize selenium, and  
30 therefore increase avian exposure from ingestion of prey items with elevated selenium levels. Thus,  
31 BDCP restoration activities that create newly inundated areas could increase bioavailability of  
32 selenium (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Changes in  
33 selenium concentrations were analyzed in Chapter 8, *Water Quality*, and it was determined that,  
34 relative to Existing Conditions and the No Action Alternative, CM1 would not result in substantial,  
35 long-term increases in selenium concentrations in water in the Delta under any alternative.  
36 However, it is difficult to determine whether the effects of potential increases in selenium  
37 bioavailability associated with restoration-related conservation measures (CM4–CM5) would lead to  
38 adverse effects on cormorants, herons, and egrets.

39 Because of the uncertainty that exists at this programmatic level of review, there could be a  
40 substantial effect on cormorants, herons, and egrets from increases in selenium associated with  
41 restoration activities. This effect would be addressed through the implementation of *AMM27*  
42 *Selenium Management* (BDCP Appendix 3.C, *Avoidance and Minimization Measures*) which would  
43 provide specific tidal habitat restoration design elements to reduce the potential for  
44 bioaccumulation of selenium and its bioavailability in tidal habitats. Furthermore, the effectiveness  
45 of selenium management to reduce selenium concentrations and/or bioaccumulation would be

1 evaluated separately for each restoration effort as part of design and implementation. This  
2 avoidance and minimization measure would be implemented as part of the tidal habitat restoration  
3 design schedule.

4 **NEPA Effects:** Noise and visual disturbances from the construction of water conveyance facilities  
5 could reduce cormorant, heron, and egret use of modeled habitat adjacent to work areas. Moreover,  
6 operation and maintenance of the water conveyance facilities, including the transmission facilities,  
7 could result in ongoing but periodic postconstruction disturbances that could affect cormorant,  
8 heron, and egret use of the surrounding habitat. Mitigation Measure BIO-75, *Conduct Preconstruction*  
9 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, and Mitigation Measure BIO-117, *Avoid*  
10 *Impacts on Rookeries*, would be available to address adverse effects on nesting individuals in  
11 addition to AMM1–AMM7. Tidal habitat restoration could result in increased exposure of  
12 cormorants, herons, and egrets to selenium. This effect would be addressed through the  
13 implementation of *AMM27 Selenium Management*, which would provide specific tidal habitat  
14 restoration design elements to reduce the potential for bioaccumulation of selenium and its  
15 bioavailability in tidal habitats. The implementation of tidal natural communities restoration or  
16 floodplain restoration could result in increased exposure of cormorants, herons or egrets to  
17 methylmercury through the ingestion of fish in restored tidal areas. However, it is unknown what  
18 concentrations of methylmercury are harmful to these species and the potential for increased  
19 exposure varies substantially within the study area. Site-specific restoration plans that address the  
20 creation and mobilization of mercury, as well as monitoring and adaptive management as described  
21 in CM12, would address the uncertainty of methylmercury levels in restored tidal marsh in the study  
22 area and better inform potential impacts on cormorants, herons, and egrets. The site-specific  
23 planning phase of marsh restoration would be the appropriate place to assess the potential for risk  
24 of methylmercury exposure for cormorants, herons, and egrets once site specific sampling and other  
25 information could be developed.

26 **CEQA Conclusion:** Impacts of noise, the potential for hazardous spills, increased dust and  
27 sedimentation, and operations and maintenance of the water conveyance facilities would be less  
28 than significant with the implementation of Mitigation Measure BIO-75, *Conduct Preconstruction*  
29 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, and Mitigation Measure BIO-117, *Avoid*  
30 *Impacts on Rookeries*, and AMM1–AMM7. The implementation of tidal natural communities  
31 restoration or floodplain restoration could result in increased exposure of cormorants, herons or  
32 egrets to methylmercury, through the ingestion of fish in tidally restored areas. However, it is  
33 unknown what concentrations of methylmercury are harmful to these species. Site-specific  
34 restoration plans that address the creation and mobilization of mercury, as well as monitoring and  
35 adaptive management as described in CM12 would address the potential impacts of methylmercury  
36 levels in restored tidal marsh in the study area on cormorants, herons, and egrets. Tidal habitat  
37 restoration could result in increased exposure of cormorants, herons, and egrets to selenium. This  
38 effect would be addressed through the implementation of *AMM27 Selenium Management*, which  
39 would provide specific tidal habitat restoration design elements to reduce the potential for  
40 bioaccumulation of selenium and its bioavailability in tidal habitats. Therefore, the indirect effects of  
41 Alternative 9 implementation would not have an adverse effect on cormorants, herons, and egrets.

42 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**  
43 **Disturbance of Nesting Birds**

44 See Mitigation Measure BIO-75 under Impact BIO-75.

1           **Measure BIO-117: Avoid Impacts on Rookeries**

2           Herons, egrets, and cormorants are highly traditional in their use of nest sites (rookeries);  
3           therefore, DWR will avoid all direct and indirect impacts on rookeries.

4           **Impact BIO-120: Periodic Effects of Inundation on Cormorants, Herons and Egrets as a Result**  
5           **of Implementation of Conservation Components**

6           Flooding of the Yolo Bypass from Fremont Weir operations (CM2) would increase the frequency and  
7           duration of inundation of approximately 51–92 acres of modeled breeding habitat for cormorants,  
8           herons and egrets. However, increased periodic flooding is not expected to cause any adverse effect  
9           on breeding habitat because trees in which nest sites are situated already withstand floods, the  
10          increase in inundation frequency and duration is expected to remain within the range of tolerance of  
11          riparian trees, and nest sites are located above floodwaters.

12          Based on hypothetical floodplain restoration, CM5 implementation could result in periodic  
13          inundation of up to 266 acres of breeding habitat for cormorants, herons and egrets. The overall  
14          effect of seasonal inundation in existing riparian natural communities is likely to be beneficial for  
15          these species, because, historically, flooding was the main natural disturbance regulating ecological  
16          processes in riparian areas, and flooding promotes the germination and establishment of many  
17          native riparian plants.

18          **NEPA Effects:** Increased periodic flooding would not be expected to cause any adverse effect on nest  
19          sites because trees in which nest sites are situated already withstand floods, the increase in  
20          inundation frequency and duration is expected to remain within the range of tolerance of riparian  
21          trees, and nest sites are located above floodwaters. Therefore, increased duration of periodic  
22          inundation from CM2 and CM5 would not result in an adverse effect on cormorants, herons and  
23          egrets.

24          **CEQA Conclusion:** Increased periodic flooding would not be expected to cause any adverse effect on  
25          nest sites because trees in which nest sites are situated already withstand floods, the increase in  
26          inundation frequency and duration is expected to remain within the range of tolerance of riparian  
27          trees, and nest sites are located above floodwaters. Therefore, increased duration of periodic  
28          inundation from CM2 and CM5 would have a less-than-significant impact on cormorants, herons and  
29          egrets.

30          **Short-Eared Owl and Northern Harrier**

31          Modeled habitat for short-eared owl and northern harrier consists of tidal brackish and freshwater  
32          emergent wetland, nontidal freshwater perennial emergent wetland, other natural seasonal  
33          wetland, grassland, and selected cultivated lands.

34          Construction and restoration associated with Alternative 9 conservation measures would result in  
35          both temporary and permanent losses of modeled habitat for short-eared owl and northern harrier  
36          as indicated in Table 12-9-46. Full implementation of Alternative 9 would include the following  
37          conservation actions over the term of the BDCP that would benefit short-eared owl and northern  
38          harrier (BDCP Chapter 3, Section 3.3, *Biological Goals and Objectives*).

- 39
  - 40              • Restore or create at least 6,000 acres of tidal brackish emergent wetland in CZ 11 including at  
41              least 1,500 acres of middle and high marsh (Objectives TBEWNC1.1 and TBEWNC1.2, associated  
            with CM4).

- 1 • Restore or create at least 24,000 acres of tidal freshwater emergent wetland in CZs 1, 2, 4, 5, 6,  
2 and/or 7 (Objective TFEWNC1.2, associated with CM4).
- 3 • Create at least 1,200 acres of nontidal marsh consisting of a mosaic of nontidal perennial aquatic  
4 and nontidal freshwater emergent wetland natural communities (Objective NFEW/NPANC1.1,  
5 associated with CM10).
- 6 • Protect at least 8,000 acres of grassland, with at least 2,000 acres protected in CZ 1, at least  
7 1,000 acres protected in CZ 8, at least 2,000 acres protected in CZ 11, and the remainder  
8 distributed among CZs 1, 2, 4, 5, 7, 8, and 11 (Objective GNC1.1, associated with CM3).
- 9 • Restore at least 2,000 acres of grasslands (Objective GNC1.2, associated with CM8).
- 10 • Protect at least 150 acres of alkali seasonal wetland and at least 600 acres of existing vernal pool  
11 complex in CZs 1, 8, and/or 11 (Objectives ASWNC1.1 and VPNC1.1, associated with CM3).
- 12 • Protect and enhance at least 8,100 acres of managed wetland, at least 1,500 acres of which are  
13 in the Grizzly Island Marsh Complex (Objective MWNC1.1, associated with CM3).
- 14 • Increase prey availability and accessibility for grassland-foraging species (Objectives  
15 ASWNC2.4,VPNC2.5, and GNC2.4, associated with CM11).

16 As explained below, with the restoration or protection of these amounts of habitat, in addition to  
17 management activities that would enhance habitat for these species and implementation of AMM1–  
18 AMM7, *AMM27 Selenium Management* and Mitigation Measure BIO-75, impacts on short-eared owl  
19 and northern harrier would not be adverse for NEPA purposes and would be less than significant for  
20 CEQA purposes.

21 **Table 12-9-46. Changes in Short-Eared Owl and Northern Harrier Modeled Habitat Associated with**  
22 **Alternative 9 (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	Nesting and Foraging	419	419	1,468	1,468	NA	NA
<b>Total Impacts CM1</b>		<b>419</b>	<b>419</b>	<b>1,468</b>	<b>1,468</b>	<b>NA</b>	<b>NA</b>
CM2–CM18	Nesting and Foraging	12,281	46,700	471	1,224	2,926–8,060	5,978
<b>Total Impacts CM2–CM18</b>		<b>12,281</b>	<b>46,700</b>	<b>471</b>	<b>1,224</b>	<b>2,926–8,060</b>	<b>5,978</b>
<b>TOTAL IMPACTS</b>		<b>12,700</b>	<b>47,119</b>	<b>1,939</b>	<b>2,692</b>	<b>2,926–8,060</b>	<b>5,978</b>

<sup>a</sup> See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

1 **Impact BIO-121: Loss or Conversion of Habitat for and Direct Mortality of Short-Eared Owl**  
2 **and Northern Harrier**

3 Alternative 9 conservation measures would result in the combined permanent and temporary loss  
4 of up to 34,689 acres of modeled habitat for short-eared owl and northern harrier (of which 32,369  
5 acres would be a permanent loss and 2,320 acres would be a temporary loss of habitat, Table 12-9-  
6 46). Conservation measures that would result in these losses are conveyance facilities and  
7 transmission line construction, and establishment and use of borrow and spoil areas (CM1), Yolo  
8 Bypass improvements (CM2), tidal habitat restoration (CM4), floodplain restoration (CM5),  
9 grassland restoration (CM8), vernal pool and wetland restoration (CM9), marsh restoration (CM10)  
10 and construction of conservation hatcheries (CM18). The majority of habitat loss would result from  
11 CM4. Habitat enhancement and management activities (CM11), which would include ground  
12 disturbance or removal of nonnative vegetation, could result in local adverse habitat effects. In  
13 addition, maintenance activities associated with the long-term operation of the water conveyance  
14 facilities and other BDCP physical facilities could degrade or eliminate short-eared owl and northern  
15 harrier modeled habitat. Each of these individual activities is described below. A summary  
16 statement of the combined impacts and NEPA effects, and a CEQA conclusion follow the individual  
17 conservation measure discussions.

- 18 • *CM1 Water Facilities and Operation:* Construction of Alternative 9 conveyance facilities would  
19 result in the combined permanent and temporary loss of up to 1,887 acres of modeled short-  
20 eared owl and northern harrier habitat (419 acres of permanent loss, 1,468 acres of temporary  
21 loss) from CZs 4, 5, 6, 7, and 8. The majority of habitat removed would be grassland and  
22 cultivated lands. However, fringes of tidal freshwater emergent wetland along channels and  
23 island edges would also be impacted from construction activities. There are no occurrences of  
24 nesting short-eared owl and northern harrier that overlap with the construction footprint of  
25 CM1. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid*  
26 *Disturbance of Nesting Birds*, would require preconstruction surveys and the establishment of  
27 no-disturbance buffers and would be available to address potential effects on short-eared owls  
28 and northern harriers if they were to nest in or adjacent to construction activities. Refer to the  
29 Terrestrial Biology Map Book for a detailed view of Alternative 9 construction locations. Impacts  
30 from CM1 would occur within the first 10 years of Alternative 9 implementation.
- 31 • *CM2 Yolo Bypass Fisheries Enhancement:* Construction of the Yolo bypass fisheries enhancement  
32 would permanently remove 1,021 acres of modeled short-eared owl and northern harrier  
33 habitat in the Yolo Bypass in CZ 2. In addition, 471 acres of habitat would be temporarily  
34 removed. The impact would primarily consist of loss of acreages of pastures. The conversion is  
35 expected to occur during the first 10 years of Alternative 1C implementation.
- 36 • *CM4 Tidal Natural Communities Restoration:* Tidal habitat restoration site preparation and  
37 inundation would permanently remove an estimated 39,017 acres of modeled short-eared owl  
38 and northern harrier habitat. The majority of the losses would be managed wetlands and  
39 cultivated lands in CZs 1, 2, 4, 5, 6, 7, 8, 10, and 11. Tidal restoration actions through CM4 would  
40 restore an estimated 55,000 acres of tidal natural communities. These restored wetland areas  
41 could provide suitable nesting habitat for short-eared owl and northern harrier. Consequently,  
42 although existing nesting habitat for short-eared owl and northern harrier would be removed,  
43 restoration of wetland habitats is expected to benefit marsh associated ground nesting birds by  
44 increasing the extent and value of their nesting habitat. Grizzley Island supports the only known  
45 resident population of short-eared owls in the Suisun Marsh and Sacramento-San Joaquin River

1 Delta (Roberson 2008). Grizzley Island does not overlap with the hypothetical footprint for CM4.  
2 However, this is an important breeding area for short-eared owl and if restoration footprints  
3 were changed during the implementation process of BDCP to overlap with this area, the effects  
4 on breeding short-eared owls could likely be adverse. Future NEPA and CEQA analysis would be  
5 conducted for restoration projects under BDCP and if restoration was proposed to occur outside  
6 of the hypothetical footprints used for this programmatic analysis, potential impacts on these  
7 species would be captured in the project-level analysis (Appendix 3B, Section 3.2.5).

- 8 • *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore  
9 seasonally inundated floodplain would permanently and temporarily remove approximately  
10 2,086 acres of modeled short-eared owl and northern harrier habitat (1,332 permanent, 754  
11 temporary). These losses would be expected to occur along the San Joaquin River and other  
12 major waterways in CZ 7.
- 13 • *CM7 Riparian Natural Community Restoration*: Riparian restoration would permanently remove  
14 approximately 623 acres of short-eared owl and northern harrier habitat as part of tidal  
15 restoration and 2,479 acres of habitat as part of seasonal floodplain restoration.
- 16 • *CM8 Grassland Natural Community Restoration*: Restoration of grassland is expected to be  
17 implemented on agricultural lands and would result in the conversion of 1,066 acres of  
18 cultivated lands to grassland in CZs 1, 2, 4, 5, 7, 8, and 11. The resulting 2,000 acres of grassland  
19 would provide habitat for short-eared owl and northern harrier.
- 20 • *CM11 Natural Communities Enhancement and Management*: A variety of habitat management  
21 actions included in CM11 that are designed to enhance wildlife values in restored or protected  
22 habitats could result in localized ground disturbances that could temporarily remove small  
23 amounts of modeled habitat. Ground-disturbing activities, such as removal of nonnative  
24 vegetation and road and other infrastructure maintenance activities, would be expected to have  
25 minor adverse effects on available habitat and would be expected to result in overall  
26 improvements to and maintenance of habitat values over the term of the BDCP.

27 Habitat management- and enhancement-related activities could short-eared owl and northern  
28 harrier nests. If either species were to nest in the vicinity of a worksite, equipment operation  
29 could destroy nests, and noise and visual disturbances could lead to their abandonment,  
30 resulting in mortality of eggs and nestlings. Mitigation Measure BIO-75, *Conduct Preconstruction*  
31 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to minimize  
32 these effects.

- 33 • *CM18 Conservation Hatcheries*: Implementation of CM18 would remove up to 35 acres of short-  
34 eared owl and northern harrier habitat for the development of a delta and longfin smelt  
35 conservation hatchery in CZ 1. The loss is expected to occur during the first 10 years of  
36 Alternative 9 implementation.
- 37 • *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground  
38 water conveyance facilities and restoration infrastructure could result in ongoing but periodic  
39 disturbances that could affect short-eared owl and northern harrier use of the surrounding  
40 habitat. Maintenance activities would include vegetation management, levee and structure  
41 repair, and re-grading of roads and permanent work areas. These effects, however, would be  
42 reduced by AMM1–AMM7, Mitigation Measure BIO-75, and conservation actions as described  
43 below.

- Injury and Direct Mortality: Construction-related activities would not be expected to result in direct mortality of adult or fledged short-eared owl and northern harrier if they were present in the Plan Area, because they would be expected to avoid contact with construction and other equipment. If either species were to nest in the construction area, construction-related activities, including equipment operation, noise and visual disturbances could destroy nests or lead to their abandonment, resulting in mortality of eggs and nestlings. Mitigation Measure BIO-75 would be available to minimize these effects.

The following paragraphs summarize the combined effects discussed above and describe other BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also included.

### ***Near-Term Timeframe***

Because the water conveyance facilities construction is being evaluated at the project level, the near-term BDCP conservation strategy has been evaluated to determine whether it would provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the effects of construction would not be adverse under NEPA. Alternative 9 would remove 14,639 acres of modeled habitat (12,700 permanent, 1,939 temporary) for short-eared owl and northern harrier in the study area in the near-term. These effects would result from the construction of the water conveyance facilities (CM1, 1,887 acres), and implementing other conservation measures (*CM2 Yolo Bypass Fisheries Enhancement, CM4 Tidal Natural Communities Restoration, CM5 Seasonally Inundated Floodplain Restoration, CM7, Riparian Natural Community Restoration, CM8 Grassland Natural Community Restoration, CM10 Nontidal Marsh Restoration, and CM18 Conservation Hatcheries*—12,752 acres).

Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by CM1 would be 1:1 for restoration/creation and 1:1 protection of habitat. Using these typical ratios would indicate that 1,887 acres of habitat should be restored and 1,887 acres should be protected to compensate for the CM1 losses of short-eared owl and northern harrier habitat. The near-term effects of other conservation actions would remove 12,752 acres of modeled habitat, and therefore require 12,752 acres of restoration and 12,752 acres of protection of short-eared owl and northern harrier habitat using the same typical NEPA and CEQA ratios (1:1 for restoration and 1:1 for protection).

The BDCP has committed to near-term goals of protecting 2,000 acres and restoring 1,140 acres of grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of alkali seasonal wetland complex, protecting 4,800 acres of managed wetland natural community, protecting 15,400 acres of non-rice cultivated lands, protecting 900 acres of rice or rice equivalent habitat, and restoring 19,150 acres of tidal wetlands (Table 3-4 in Chapter 3, *Description of Alternatives*). These conservation actions are associated with CM3, CM4, and CM8 and would occur in the same timeframe as the construction and early restoration losses. The acres of protection and restoration contained in the near-term Plan goals satisfy the typical mitigation ratios that would be applied to the project-level effects of CM1 and the effects from other near-term restoration actions.

Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would

1 provide nesting and foraging habitat for short-eared owl and northern harrier and reduce the effects  
2 of current levels of habitat fragmentation. Small mammal populations would also be increased on  
3 protected lands, enhancing the foraging value of these natural communities (Objectives  
4 ASWNC2.4, VPNC2.5, and GNC2.4). Foraging opportunities would also be improved by enhancing  
5 prey populations through the establishment of 20- to 30-foot-wide hedgerows along field borders  
6 and roadsides within protected cultivated lands (Objective SWHA2.2). Remnant patches of grassland  
7 or other uncultivated areas would also be protected and maintained as part of the cultivated lands  
8 reserve system which would provide additional foraging habitat and a source of rodent prey that  
9 could recolonize cultivated fields (Objective CLNC1.3). The protection of managed wetlands  
10 (including upland grassland components) would preserve habitat for short-eared owl and northern  
11 harrier (Objective MWNC1.1). Protection and enhancement of managed wetlands to meet this  
12 objective would focus on highly degraded areas in order to provide the greatest possible level of  
13 enhancement benefit to the managed wetland natural community and associated species. Managed  
14 wetland protection and enhancement would be concentrated in Suisun Marsh, which currently  
15 supports a high concentration of nesting short-eared owls on Grizzley Island.

16 The restoration of 19,150 acres of tidal natural communities, including transitional uplands would  
17 provide nesting and foraging habitat for short-eared owl and northern harrier. Short-eared owl and  
18 northern harrier nest in open habitats within cultivated lands including alfalfa, irrigated pasture,  
19 and other grain fields. At least 15,400 acres of cultivated lands that provide habitat for covered and  
20 other native wildlife species would be protected in the near-term time period (Objective CLNC1.1). A  
21 minimum of 87% of cultivated lands protected by the late long-term time period would be in alfalfa,  
22 irrigated pasture, and other hay crops (Objective SH1.2). This biological objective provides an  
23 estimate for the proportion of cultivated lands protected in the near-term time period which would  
24 provide suitable nesting and foraging habitat for short-eared owl and northern harrier. These  
25 biological goals and objectives would inform the near-term protection and restoration efforts and  
26 represent performance standards for considering the effectiveness of restoration actions.

27 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
28 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
29 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
30 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
31 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
32 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
33 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

34 The short-eared owl and the northern harrier are not covered species under the BDCP. For the BDCP  
35 to avoid adverse effects on individuals, preconstruction surveys for noncovered avian species would  
36 be required to ensure that nests are detected and avoided. Mitigation Measure BIO-75, *Conduct*  
37 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to  
38 address this adverse effect.

### 39 ***Late Long-Term Timeframe***

40 Based on modeled habitat, the study area supports approximately 406,784 acres of modeled nesting  
41 and foraging habitat for short-eared owl and northern harrier. Alternative 9 as a whole would result  
42 in the permanent loss of and temporary effects on 49,811 acres of modeled short-eared owl and  
43 northern harrier habitat during the term of the Plan (12% of the modeled habitat in the study area).

1 The locations of these losses are described above in the analyses of individual conservation  
2 measures.

3 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*  
4 *Restoration, CM4 Tidal Natural Communities Restoration, and CM8 Grassland Natural Community*  
5 *Restoration* to protect 8,000 acres and restore 2,000 acres of grassland natural community, protect  
6 600 acres of vernal pool complex, protect 150 acres of alkali seasonal wetland complex, protect  
7 8,100 acres of managed wetland, protect 48,625 acres of cultivated lands that provide suitable  
8 habitat for native wildlife species, and restore at least 65,000 acres of tidal wetlands (Table 3-4 in  
9 Chapter 3).

10 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1  
11 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali  
12 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous  
13 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would  
14 provide nesting and foraging habitat for short-eared owl and northern harrier and reduce the effects  
15 of current levels of habitat fragmentation. Small mammal populations would also be increased on  
16 protected lands, enhancing the foraging value of these natural communities (Objectives  
17 ASWNC2.4, VPNC2.5, and GNC2.4). Foraging opportunities would also be improved by enhancing  
18 prey populations through the establishment of 20- to 30-foot-wide hedgerows along field borders  
19 and roadsides within protected cultivated lands (Objective SWHA2.2). Remnant patches of grassland  
20 or other uncultivated areas would also be protected and maintained as part of the cultivated lands  
21 reserve system which would provide additional foraging habitat and a source of rodent prey that  
22 could recolonize cultivated fields (Objective CLNC1.3). The protection of managed wetlands  
23 (including upland grassland components) would preserve habitat for short-eared owl and northern  
24 harrier (Objective MWNC1.1). Protection and enhancement of managed wetlands to meet this  
25 objective would focus on highly degraded areas in order to provide the greatest possible level of  
26 enhancement benefit to the managed wetland natural community and associated species. Managed  
27 wetland protection and enhancement would be concentrated in Suisun Marsh, which supports a  
28 high concentration of nesting short-eared owls on Grizzley Island. At least 1,500 acres of the  
29 managed wetlands would be protected and enhanced on Grizzley Island by the late long-term time  
30 period. The restoration of 19,150 acres of tidal natural communities, including transitional uplands  
31 would provide nesting and foraging habitat for short-eared owl and northern harrier. Short-eared  
32 owl and northern harrier nest in open habitats within cultivated lands including alfalfa, irrigated  
33 pasture, and other grain fields. A minimum of 87% of the 48,625 acres of cultivated lands protected  
34 by the late long-term time period (Objective CLNC1.1) would be managed in alfalfa, irrigated  
35 pasture, and other hay crops (Objective SH1.2) which are compatible crop types for these species.

36 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*  
37 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*  
38 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
39 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
40 *Material, and AMM7 Barge Operations Plan. All of these AMMs include elements that would avoid or*  
41 *minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are*  
42 *described in detail in BDCP Appendix 3.C, Avoidance and Minimization Measures. Short-eared owl*  
43 *and northern harrier are not species that are covered under the BDCP. In order for the BDCP to*  
44 *avoid an adverse effect on individuals, preconstruction surveys for noncovered avian species would*  
45 *be required to ensure that active nests are detected and avoided. Mitigation Measure BIO-75,*

1 *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be  
2 available to address this effect.

3 **NEPA Effects:** The loss of short-eared owl and northern harrier habitat and potential direct  
4 mortality of these special-status species under Alternative 9 would represent an adverse effect in  
5 the absence of other conservation actions. With habitat protection and restoration associated with  
6 CM3, CM8, and CM11, guided by biological goals and objectives and by AMM1–AMM7, which would  
7 be in place throughout the construction period, the effects of short-eared owl and northern harrier  
8 habitat loss resulting from Alternative 9 would not be adverse. Short-eared owl and northern  
9 harrier are not covered species under the BDCP, and preconstruction surveys for noncovered avian  
10 species would be required to ensure that nests are detected and avoided. Mitigation Measure BIO-75  
11 would be available to address the adverse effect of direct mortality on short-eared owl and northern  
12 harrier.

13 **CEQA Conclusion:**

14 ***Near-Term Timeframe***

15 Because the water conveyance facilities construction is being evaluated at the project level, the near-  
16 term BDCP conservation strategy has been evaluated to determine whether it would provide  
17 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the effects of  
18 construction would be less than significant under CEQA. Alternative 9 would remove 14,639 acres of  
19 modeled habitat (12,700 permanent, 1,939 temporary) for short-eared owl and northern harrier in  
20 the study area in the near-term. These effects would result from the construction of the water  
21 conveyance facilities (CM1, 1,887 acres), and implementing other conservation measures (*CM2 Yolo*  
22 *Bypass Fisheries Enhancement*, *CM4 Tidal Natural Communities Restoration*, *CM5 Seasonally*  
23 *Inundated Floodplain Restoration*, *CM7, Riparian Natural Community Restoration*, *CM8 Grassland*  
24 *Natural Community Restoration*, *CM10 Nontidal Marsh Restoration*, and *CM18 Conservation*  
25 *Hatcheries*—12,752 acres).

26 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by  
27 CM1 would be 1:1 for restoration/creation and 1:1 protection of habitat. Using these typical ratios  
28 would indicate that 1,887 acres of habitat should be restored and 1,887 acres should be protected to  
29 compensate for the CM1 losses of short-eared owl and northern harrier habitat. The near-term  
30 effects of other conservation actions would remove 12,752 acres of modeled habitat, and therefore  
31 require 12,752 acres of restoration and 12,752 acres of protection of short-eared owl and northern  
32 harrier habitat using the same typical NEPA and CEQA ratios (1:1 for restoration and 1:1 for  
33 protection).

34 The BDCP has committed to near-term goals of protecting 2,000 acres and restoring 1,140 acres of  
35 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of  
36 alkali seasonal wetland complex, protecting 4,800 acres of managed wetland natural community,  
37 protecting 15,400 acres of non-rice cultivated lands, protecting 900 acres of rice or rice equivalent  
38 habitat, and restoring 19,150 acres of tidal wetlands (Table 3-4 in Chapter 3). These conservation  
39 actions are associated with CM3, CM4, and CM8 and would occur in the same timeframe as the  
40 construction and early restoration losses. The acres of protection and restoration contained in the  
41 near-term Plan goals satisfy the typical mitigation ratios that would be applied to the project-level  
42 effects of CM and the effects from other near-term restoration actions.

1 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1  
2 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali  
3 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous  
4 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would  
5 provide nesting and foraging habitat for short-eared owl and northern harrier and reduce the effects  
6 of current levels of habitat fragmentation. Small mammal populations would also be increased on  
7 protected lands, enhancing the foraging value of these natural communities (Objectives  
8 ASWNC2.4, VPNC2.5, and GNC2.4). Foraging opportunities would also be improved by enhancing  
9 prey populations through the establishment of 20- to 30-foot-wide hedgerows along field borders  
10 and roadsides within protected cultivated lands (Objective SWHA2.2). Remnant patches of grassland  
11 or other uncultivated areas would also be protected and maintained as part of the cultivated lands  
12 reserve system which would provide additional foraging habitat and a source of rodent prey that  
13 could recolonize cultivated fields (Objective CLNC1.3). The protection of managed wetlands  
14 (including upland grassland components) would preserve habitat for short-eared owl and northern  
15 harrier (Objective MWNC1.1). Protection and enhancement of managed wetlands to meet this  
16 objective would focus on highly degraded areas in order to provide the greatest possible level of  
17 enhancement benefit to the managed wetland natural community and associated species. Managed  
18 wetland protection and enhancement would be concentrated in Suisun Marsh, which supports a  
19 high concentration of nesting short-eared owls on Grizzley Island.

20 The restoration of 19,150 acres of tidal natural communities, including transitional uplands would  
21 provide nesting and foraging habitat for short-eared owl and northern harrier. Short-eared owl and  
22 northern harrier nest in open habitats within cultivated lands including alfalfa, irrigated pasture,  
23 and other grain fields. At least 15,400 acres of cultivated lands that provide habitat for covered and  
24 other native wildlife species would be protected in the near-term time period (Objective CLNC1.1). A  
25 minimum of 87% of cultivated lands protected by the late long-term time period would be in alfalfa,  
26 irrigated pasture, and other hay crops (Objective SH1.2). This biological objective provides an  
27 estimate for the proportion of cultivated lands protected in the near-term time period which would  
28 provide suitable nesting and foraging habitat for short-eared owl and northern harrier. These  
29 biological goals and objectives would inform the near-term protection and restoration efforts and  
30 represent performance standards for considering the effectiveness of restoration actions.

31 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
32 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
33 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
34 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
35 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
36 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
37 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

38 The short-eared owl and the northern harrier are not covered species under the BDCP. For the BDCP  
39 to avoid adverse effects on individuals, preconstruction surveys for noncovered avian species would  
40 be required to ensure that nests are detected and avoided. The implementation of Mitigation  
41 Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting*  
42 *Birds*, would reduce this potential impact to a less-than-significant level.

1 **Late Long-Term Timeframe**

2 Based on modeled habitat, the study area supports approximately 406,784 acres of modeled nesting  
3 and foraging habitat for short-eared owl and northern harrier. Alternative 9 as a whole would result  
4 in the permanent loss of and temporary effects on 49,811 acres of modeled short-eared owl and  
5 northern harrier habitat during the term of the Plan (12% of the modeled habitat in the study area).  
6 The locations of these losses are described above in the analyses of individual conservation  
7 measures.

8 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*  
9 *Restoration, CM4 Tidal Natural Communities Restoration, and CM8 Grassland Natural Community*  
10 *Restoration* to protect 8,000 acres and restore 2,000 acres of grassland natural community, protect  
11 600 acres of vernal pool complex, protect 150 acres of alkali seasonal wetland complex, protect  
12 8,100 acres of managed wetland, protect 48,625 acres of cultivated lands that provide suitable  
13 habitat for native wildlife species, and restore at least 65,000 acres of tidal wetlands (Table 3-4 in  
14 Chapter 3).

15 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1  
16 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali  
17 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous  
18 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would  
19 provide nesting and foraging habitat for short-eared owl and northern harrier and reduce the effects  
20 of current levels of habitat fragmentation. Small mammal populations would also be increased on  
21 protected lands, enhancing the foraging value of these natural communities (Objectives  
22 ASWNC2.4, VPNC2.5, and GNC2.4). Foraging opportunities would also be improved by enhancing  
23 prey populations through the establishment of 20- to 30-foot-wide hedgerows along field borders  
24 and roadsides within protected cultivated lands (Objective SWHA2.2). Remnant patches of grassland  
25 or other uncultivated areas would also be protected and maintained as part of the cultivated lands  
26 reserve system which would provide additional foraging habitat and a source of rodent prey that  
27 could recolonize cultivated fields (Objective CLNC1.3). The protection of managed wetlands  
28 (including upland grassland components) would preserve habitat for short-eared owl and northern  
29 harrier (Objective MWNC1.1). Protection and enhancement of managed wetlands to meet this  
30 objective would focus on highly degraded areas in order to provide the greatest possible level of  
31 enhancement benefit to the managed wetland natural community and associated species. Managed  
32 wetland protection and enhancement would be concentrated in Suisun Marsh, which supports a  
33 high concentration of nesting short-eared owls on Grizzley Island. At least 1,500 acres of the  
34 managed wetlands would be protected and enhanced on Grizzley Island by the late long-term time  
35 period. The restoration of 19,150 acres of tidal natural communities, including transitional uplands  
36 would provide nesting and foraging habitat for short-eared owl and northern harrier. Short-eared  
37 owl and northern harrier nest in open habitats within cultivated lands including alfalfa, irrigated  
38 pasture, and other grain fields. A minimum of 87% of the 48,625 acres of cultivated lands protected  
39 by the late long-term time period (Objective CLNC1.1) would be managed in alfalfa, irrigated  
40 pasture, and other hay crops (Objective SH1.2) which are compatible crop types for these species.

41 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*  
42 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*  
43 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
44 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
45 *Material, and AMM7 Barge Operations Plan. All of these AMMs include elements that would avoid or*

1 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
2 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*. Short-eared owl  
3 and northern harrier are not species that are covered under the BDCP. In order for the BDCP to have  
4 a less-than-significant impact on individuals, preconstruction surveys for noncovered avian species  
5 would be required to ensure that active nests are detected and avoided. Implementation of  
6 Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of*  
7 *Nesting Birds*, would be reduce the impact to a less-than-significant level.

8 Considering these protection and restoration provisions, which would provide acreages of new  
9 high-value or enhanced habitat in amounts suitable to compensate for habitats lost to construction  
10 and restoration activities, and with the implementation of AMM1–AMM7, and Mitigation Measure  
11 BIO-75, the loss of habitat or direct mortality through implementation of Alternative 9 would not  
12 result in a substantial adverse effect through habitat modifications and would not substantially  
13 reduce the number or restrict the range of short-eared owl and northern harrier. Therefore, the loss  
14 of habitat or potential mortality under this alternative would have a less-than-significant impact on  
15 short-eared owl and northern harrier.

16 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**  
17 **Disturbance of Nesting Birds**

18 See Mitigation Measure BIO-75 under Impact BIO-75.

19 **Impact BIO-122: Effects on Short-Eared Owl and Northern Harrier Associated with Electrical**  
20 **Transmission Facilities**

21 New transmission lines would increase the risk that short-eared owl and northern harrier could be  
22 subject to power line strikes, which could result in injury or mortality of these species. Short-eared  
23 owl and northern harrier would be at low risk of bird strike mortality based on factors assessed in  
24 the bird strike vulnerability analysis (BDCP Attachment 5J.C, *Analysis of Potential Bird Collisions at*  
25 *Proposed BDCP Transmission Lines*). Factors analyzed include the height of the new transmission  
26 lines and the flight behavior of species. The existing network of transmission lines in the Plan Area  
27 currently poses the same small risk for these species, and any incremental risk associated with the  
28 new power line corridors would also be expected to be low. *AMM20 Greater Sandhill Crane* would  
29 further reduce any potential effects.

30 **NEPA Effects:** New transmission lines would minimally increase the risk for short-eared owl and  
31 northern harrier power line strikes. With the implementation of *AMM20 Greater Sandhill Crane*, the  
32 potential effect of the construction of new transmission lines on short-eared owl and northern  
33 harrier would not be adverse.

34 **CEQA Conclusion:** New transmission lines would minimally increase the risk for short-eared owl  
35 and northern harrier power line strikes. *AMM20 Greater Sandhill Crane* would reduce the potential  
36 impact of the construction of new transmission lines on short-eared owl and northern harrier to a  
37 less-than-significant level.

38 **Impact BIO-123: Indirect Effects of Plan Implementation on Short-Eared Owl and Northern**  
39 **Harrier**

40 **Indirect construction- and operation-related effects:** Noise and visual disturbances associated  
41 with construction-related activities could result in temporary disturbances that affect short-eared

1 owl and northern harrier use of modeled habitat. Construction noise above background noise levels  
2 (greater than 50 dBA) could extend 1,900 to 5,250 feet from the edge of construction activities  
3 (BDCP Appendix 5.J, Attachment 5).D, *Indirect Effects of the Construction of the BDCP Conveyance*  
4 *Facility on Sandhill Crane*, Table 4), although there are no available data to determine the extent to  
5 which these noise levels could affect short-eared owl or northern harrier. Indirect effects associated  
6 with construction include noise, dust, and visual disturbance caused by grading, filling, contouring,  
7 and other ground-disturbing operations. Construction-related noise and visual disturbances could  
8 disrupt nesting and foraging behaviors, and reduce the functions of suitable habitat which could  
9 result in an adverse effect on these species. Mitigation Measure BIO-75, *Conduct Preconstruction*  
10 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to minimize adverse  
11 effects on active nests. The use of mechanical equipment during water conveyance construction  
12 could cause the accidental release of petroleum or other contaminants that could affect these  
13 species or their prey in the surrounding habitat. AMM1–AMM7, including *AMM2 Construction Best*  
14 *Management Practices and Monitoring*, would minimize the likelihood of such spills from occurring.  
15 The inadvertent discharge of sediment or excessive dust adjacent to short-eared owl and northern  
16 harrier could also have a negative effect on these species. AMM1–AMM7 would ensure that  
17 measures are in place to prevent runoff from the construction area and the negative effects of dust  
18 on wildlife adjacent to work areas.

19 **Methylmercury Exposure:** Covered activities have the potential to exacerbate bioaccumulation of  
20 mercury in avian species, including short-eared owl and northern harrier. Marsh (tidal and nontidal)  
21 and floodplain restoration have the potential to increase exposure to methylmercury. Mercury is  
22 transformed into the more bioavailable form of methylmercury in aquatic systems, especially areas  
23 subjected to regular wetting and drying such as tidal marshes and flood plains (Alpers et al. 2008).  
24 Thus, BDCP restoration activities that create newly inundated areas could increase bioavailability of  
25 mercury (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Species sensitivity  
26 to methylmercury differs widely and there is a large amount of uncertainty with respect to species-  
27 specific effects. Increased methylmercury associated with natural community and floodplain  
28 restoration could indirectly affect short-eared owl and northern harrier, via uptake in lower tropic  
29 levels (as described in the BDCP, Appendix 5.D, *Contaminants*).

30 In addition, the potential mobilization or creation of methylmercury within the Plan Area varies  
31 with site-specific conditions and would need to be assessed at the project level. *CM12 Methylmercury*  
32 *Management* contains provisions for project-specific Mercury Management Plans. Site-specific  
33 restoration plans that address the creation and mobilization of mercury, as well as monitoring and  
34 adaptive management as described in CM12 would be available to address the uncertainty of  
35 methylmercury levels in restored tidal marsh and potential impacts on short-eared owl and  
36 northern harrier.

37 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in  
38 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,  
39 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,  
40 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz  
41 2009). The effect of selenium toxicity differs widely between species and also between age and sex  
42 classes within a species. In addition, the effect of selenium on a species can be confounded by  
43 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith  
44 2009).

1 The primary source of selenium bioaccumulation in birds is through their diet (Ackerman and  
2 Eagles-Smith 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the  
3 trophic level at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At  
4 Kesterson Reservoir in the San Joaquin Valley, selenium concentrations in invertebrates have been  
5 found to be two to six times the levels in rooted plants. Furthermore, bivalves sampled in the San  
6 Francisco Bay contained much higher selenium levels than crustaceans such as copepods (Stewart et  
7 al. 2004). Studies conducted at the Grasslands in Merced County recorded higher selenium levels in  
8 black-necked stilts which feed on aquatic invertebrates than in mallards and pintails, which are  
9 primarily herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which  
10 forage on bivalves) have much higher levels of selenium levels than shorebirds that prey on aquatic  
11 invertebrates (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high  
12 levels of selenium have a higher risk of selenium toxicity.

13 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations  
14 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to  
15 exacerbate bioaccumulation of selenium in avian species, including short-eared owl and northern  
16 harrier. Marsh (tidal and nontidal) and floodplain restoration have the potential to mobilize  
17 selenium, and therefore increase avian exposure from ingestion of prey items with elevated  
18 selenium levels. Thus, BDCP restoration activities that create newly inundated areas could increase  
19 bioavailability of selenium (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration).  
20 Changes in selenium concentrations were analyzed in Chapter 8, *Water Quality*, and it was  
21 determined that, relative to Existing Conditions and the No Action Alternative, CM1 would not result  
22 in substantial, long-term increases in selenium concentrations in water in the Delta under any  
23 alternative. However, it is difficult to determine whether the effects of potential increases in  
24 selenium bioavailability associated with restoration-related conservation measures (CM4 and CM5)  
25 would lead to adverse effects on short-eared owl and northern harrier.

26 Because of the uncertainty that exists at this programmatic level of review, there could be a  
27 substantial effect on short-eared owl and northern harrier from increases in selenium associated  
28 with restoration activities. This effect would be addressed through the implementation of *AMM27*  
29 *Selenium Management* (BDCP Appendix 3.C, *Avoidance and Minimization Measures*) which would  
30 provide specific tidal habitat restoration design elements to reduce the potential for  
31 bioaccumulation of selenium and its bioavailability in tidal habitats. Furthermore, the effectiveness  
32 of selenium management to reduce selenium concentrations and/or bioaccumulation would be  
33 evaluated separately for each restoration effort as part of design and implementation. This  
34 avoidance and minimization measure would be implemented as part of the tidal habitat restoration  
35 design schedule.

36 **NEPA Effects:** Noise and visual disturbances from the construction of water conveyance facilities  
37 could reduce short-eared owl and northern harrier use of modeled habitat adjacent to work areas.  
38 Moreover, operation and maintenance of the water conveyance facilities, including the transmission  
39 facilities, could result in ongoing but periodic postconstruction disturbances that could affect short-  
40 eared owl and northern harrier use of the surrounding habitat. Mitigation Measure BIO-75, *Conduct*  
41 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to  
42 address adverse effects on nesting individuals in addition to AMM1-AMM7. Tidal habitat restoration  
43 could result in increased exposure of short-eared owl and northern harrier. This effect would be  
44 addressed through the implementation of *AMM27 Selenium Management*, which would provide

1 specific tidal habitat restoration design elements to reduce the potential for bioaccumulation of  
2 selenium and its bioavailability in tidal habitats.

3 Tidal habitat restoration is unlikely to have an adverse effect on short-eared owl and northern  
4 harrier through increased exposure to methylmercury, as these species currently nest and forage in  
5 tidal marshes where elevated methylmercury levels exist. However, it is unknown what  
6 concentrations of methylmercury are harmful to the species and the potential for increased  
7 exposure varies substantially within the study area. Site-specific restoration plans in addition to  
8 monitoring and adaptive management, described in CM12 *Methylmercury Management*, would  
9 address the uncertainty of methylmercury levels in restored tidal marsh. The site-specific planning  
10 phase of marsh restoration would be the appropriate place to assess the potential for risk of  
11 methylmercury exposure for California least tern, once site specific sampling and other information  
12 could be developed.

13 **CEQA Conclusion:** Noise, the potential for hazardous spills, increased dust and sedimentation, and  
14 operations and maintenance of the water conveyance facilities would have a less-than-significant  
15 impact on short-eared owl and northern harrier with the implementation of Mitigation Measure  
16 BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, and  
17 AMM1–AMM7. Tidal habitat restoration is unlikely to have a significant impact on short-eared owl  
18 and northern harrier through increased exposure to methylmercury, as these species currently nest  
19 and forage in tidal marshes where elevated methylmercury levels exist. However, it is unknown  
20 what concentrations of methylmercury are harmful to these species. Site-specific restoration plans  
21 that address the creation and mobilization of mercury, as well as monitoring and adaptive  
22 management as described in CM12 would better inform potential impacts and address the  
23 uncertainty of methylmercury levels in restored tidal marsh in the study area. Tidal habitat  
24 restoration could result in increased exposure of short-eared owl and northern harrier. This effect  
25 would be addressed through the implementation of *AMM27 Selenium Management*, which would  
26 provide specific tidal habitat restoration design elements to reduce the potential for  
27 bioaccumulation of selenium and its bioavailability in tidal habitats. Therefore, the indirect effects of  
28 Alternative 9 implementation would not have a significant impact on short-eared owl and northern  
29 harrier.

30 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**  
31 **Disturbance of Nesting Birds**

32 See Mitigation Measure BIO-75 under Impact BIO-75.

33 **Impact BIO-124: Periodic Effects of Inundation on Short-Eared Owl and Northern Harrier as a**  
34 **Result of Implementation of Conservation Components**

35 Flooding of the Yolo Bypass from Fremont Weir operations (*CM2 Yolo Bypass Fisheries*  
36 *Enhancement*) would increase the frequency and duration of inundation on approximately 2,926–  
37 8,060 acres of modeled short-eared owl and northern harrier habitat (Table 12-9-46).

38 Based on hypothetical footprints, implementation of *CM5 Seasonally Inundated Floodplain*  
39 *Restoration* could result in the periodic inundation of up to approximately 5,978 acres of modeled  
40 habitat (Table 12-9-46), the majority of which would be pasture and other cultivated lands.

1 Reduced foraging habitat availability may be expected during the fledgling period of the nesting  
2 season due to periodic inundation. However, inundation would occur during the nonbreeding  
3 season and would not be expected to have an adverse effect on either species.

4 **NEPA Effects:** Periodic inundation of floodplains would not result in an adverse effect on short-  
5 eared owl and northern harrier because inundation is expected to occur prior to the breeding  
6 season.

7 **CEQA Conclusion:** Periodic inundation of floodplains would not have a significant impact on short-  
8 eared owl and northern harrier because inundation is expected to occur prior to the breeding  
9 season.

## 10 **Redhead and Tule Greater White-Fronted Goose**

11 Impacts, relevant protection and restoration actions, and mitigation requirements under CEQA are  
12 discussed for these species in the *General Terrestrial Biology Effects* section under Impacts BIO-178  
13 through BIO-183. Further details of the methods of analysis for waterfowl and shorebirds can be  
14 found in the *BDCP Waterfowl and Shorebird Effects Analysis* (Ducks Unlimited 2013).

## 15 **Mountain Plover**

16 This section describes the effects of Alternative 9, including water conveyance facilities construction  
17 and implementation of other conservation components, on mountain plover. Modeled habitat for  
18 mountain plover consists of grassland, alkali seasonal wetland, vernal pool complex, alfalfa, grain  
19 and hay, pasture, and idle cropland throughout the study area.

20 Construction and restoration associated with Alternative 9 conservation measures would result in  
21 both temporary and permanent losses of modeled habitat for mountain plover as indicated in Table  
22 12-9-47. Full implementation of Alternative 9 would include the following biological objectives over  
23 the term of the BDCP that would benefit the mountain plover (BDCP Chapter 3, Section 3.3,  
24 *Biological Goals and Objectives*).

- 25 ● Protect at least 8,000 acres of grassland, with at least 2,000 acres protected in CZ 1, at least  
26 1,000 acres protected in CZ 8, at least 2,000 acres protected in CZ 11, and the remainder  
27 distributed among CZs 1, 2, 4, 5, 7, 8, and 11 (Objective GNC1.1, associated with CM3).
- 28 ● Restore at least 2,000 acres of grasslands (Objective GNC1.2, associated with CM8).
- 29 ● Protect at least 150 acres of alkali seasonal wetland and at least 600 acres of existing vernal pool  
30 complex in CZs 1, 8, and/or 11 (Objectives ASWNC1.1 and VPNC1.1, associated with CM3).
- 31 ● Increase prey availability and accessibility for grassland-foraging species (Objectives  
32 ASWNC2.4, VPNC2.5, GNC2.4, associated with CM11).
- 33 ● Protect at least 48,625 acres of cultivated lands that provide suitable habitat for covered and  
34 other native wildlife species (Objective CLNC1.1, associated with CM3).
- 35 ● Within the 48,625 acres of protected cultivated lands, protect at least 42,275 acres of cultivated  
36 lands as Swainson's hawk foraging habitat with at least 50% in very high-value habitat in CZs 2,  
37 3, 4, 5, 7, 8, 9, and 11 (Objective SH1.2, associated with CM3).

38 As explained below, with the restoration or protection of these amounts of habitat, in addition to  
39 management activities that would enhance these natural communities for the species, impacts on

1 mountain plover would not be adverse for NEPA purposes and would be less than significant for  
2 CEQA purposes.

3 **Table 12-9-47. Changes in Mountain Plover Modeled Habitat Associated with Alternative 9 (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	Wintering	318	318	1,281	1,281	NA	NA
<b>Total Impacts CM1</b>		<b>318</b>	<b>318</b>	<b>1,281</b>	<b>1,281</b>	<b>NA</b>	<b>NA</b>
CM2–CM18	Wintering	5,450	26,198	376	893	1,158-3,650	3,823
<b>Total Impacts CM2–CM18</b>		<b>5,450</b>	<b>26,198</b>	<b>376</b>	<b>893</b>	<b>1,158-3,650</b>	<b>3,823</b>
<b>TOTAL IMPACTS</b>		<b>5,768</b>	<b>26,516</b>	<b>1,657</b>	<b>2,174</b>	<b>1,158-3,650</b>	<b>3,823</b>

<sup>a</sup> See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

4

5 **Impact BIO-125: Loss or Conversion of Habitat for and Direct Mortality of Mountain Plover**

6 Alternative 9 conservation measures would result in the combined permanent and temporary loss  
7 of up to 28,690 acres of modeled habitat for mountain plover (25,516 acres of permanent loss and  
8 2,174 of temporary loss, Table 12-9-47). Conservation measures that would result in these losses  
9 are conveyance facilities and transmission line construction, and establishment and use of borrow  
10 and spoil areas (CM1), Yolo Bypass fisheries improvements (CM2), tidal habitat restoration (CM4),  
11 floodplain restoration (CM5), riparian restoration (CM7), grassland restoration (CM8), vernal pool  
12 and wetland restoration (CM9), nontidal marsh restoration (CM10), and construction of  
13 conservation hatcheries (CM18). The majority of habitat loss (20,880 acres) would result from CM4.  
14 Habitat enhancement and management activities (CM11), which include ground disturbance or  
15 removal of nonnative vegetation, and the construction of recreational trails, signs, and facilities,  
16 could result in local adverse habitat effects. In addition, maintenance activities associated with the  
17 long-term operation of the water conveyance facilities and other BDCP physical facilities could  
18 degrade or eliminate mountain plover modeled wintering habitat. Each of these individual activities  
19 is described below. A summary statement of the combined impacts and NEPA effects, and a CEQA  
20 conclusion follows the individual conservation measure discussions.

- 21 • *CM1 Water Facilities and Operation:* Construction of Alternative 9 conveyance facilities would  
22 result in the combined permanent and temporary loss of up to 1,559 acres of modeled mountain  
23 plover habitat (318 acres of permanent loss, 1,281 acres of temporary loss) from CZ 4, 5, 6, and  
24 8. These losses would occur at numerous locations where dredging, construction of operable

1 barriers and canals, and channel enlargement would be undertaken. Other impacts would occur  
2 from potential borrow and spoil sites, access roads, barge unloading facilities, and intake and  
3 fish screen construction areas. There are no CNDDDB occurrences of mountain plover that  
4 intersect with the CM1 footprint. However, the study area does overlap with the species' winter  
5 range, and there are occurrences west and north of the study area. Refer to the Terrestrial  
6 Biology Map Book for a detailed view of Alternative 9 construction locations. Impacts from CM1  
7 would occur within the first 10 years of Alternative 9 implementation.

- 8 • *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo bypass fisheries enhancement  
9 would result in the combined permanent and temporary loss of up to 1,274 acres of modeled  
10 mountain plover wintering habitat (898 acres of permanent loss, 376 acres of temporary loss) in  
11 the Yolo Bypass in CZ 2. Impacted habitat would consist primarily of grassland and pasture.  
12 Most of the grassland losses would occur at the north end of the bypass below Fremont Weir,  
13 along the Toe Drain/Tule Canal, and along the west side channels. Realignment of Putah Creek  
14 could also involve excavation and grading in alkali seasonal wetland complex habitat as a new  
15 channel is constructed. The loss is expected to occur during the first 10 years of Alternative 9  
16 implementation.
- 17 • *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and  
18 inundation would permanently remove an estimated 20,880 acres of modeled mountain plover  
19 habitat. The majority of the acres lost would consist of cultivated lands in CZs 1, 2, 4, 5, 6, and/or  
20 7. Grassland losses would likely occur in the vicinity of Cache Slough, on Decker Island in the  
21 West Delta ROA, on the upslope fringes of Suisun Marsh, and along narrow bands adjacent to  
22 waterways in the South Delta ROA. Tidal restoration would directly impact and fragment  
23 grassland just north of Rio Vista in and around French and Prospect Islands, and in an area  
24 south of Rio Vista around Threemile Slough. Losses of alkali seasonal wetland complex habitat  
25 would likely occur in the south end of the Yolo Bypass and on the northern fringes of Suisun  
26 Marsh.
- 27 • *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore  
28 seasonally inundated floodplain would permanently and temporarily remove approximately  
29 1,450 acres of modeled mountain plover habitat (933 permanent, 517 temporary). These losses  
30 would be expected after the first 10 years of Alternative 9 implementation along the San Joaquin  
31 River and other major waterways in CZ 7.
- 32 • *CM7 Riparian Natural Community Restoration*: Riparian restoration would permanently remove  
33 approximately 370 acres of mountain plover wintering habitat as part of tidal restoration and  
34 1,489 acres of habitat as part of seasonal floodplain restoration.
- 35 • *CM8 Grassland Natural Community Restoration and CM9 Vernal Pool and Alkali Seasonal Wetland*  
36 *Complex Restoration*: Temporary construction-related disturbance of grassland habitat would  
37 result from implementation of CM8 and CM9 in CZs 1, 2, 4, 5, 7, 8, and 11. However, all areas  
38 would be restored after the construction periods. Grassland restoration would be implemented  
39 on agricultural lands that also provide wintering habitat for mountain plover and would result  
40 in the conversion of 837 acres of cultivated lands to grassland.
- 41 • *CM10 Nontidal Marsh Restoration*: Implementation of CM10 would result in the permanent  
42 removal of 705 acres of mountain plover habitat.
- 43 • *CM11 Natural Communities Enhancement and Management*: A variety of habitat management  
44 actions included in CM11 that are designed to enhance wildlife values in restored or protected

1 habitats could result in localized ground disturbances that could temporarily remove small  
2 amounts of mountain plover habitat. Ground-disturbing activities, such as removal of nonnative  
3 vegetation and road and other infrastructure maintenance activities, would be expected to have  
4 minor adverse effects on available mountain plover habitat. CM11 would also include the  
5 construction of recreational-related facilities including trails, interpretive signs, and picnic  
6 tables (BDCP Chapter 4, *Covered Activities and Associated Federal Actions*). The construction of  
7 trailhead facilities, signs, staging areas, picnic areas, bathrooms, etc. would be placed on existing,  
8 disturbed areas when and where possible. However, approximately 50 acres of grassland  
9 habitat would be lost from the construction of trails and facilities.

- 10 • *CM18 Conservation Hatcheries*: Implementation of CM18 would remove up to 35 acres of  
11 modeled mountain plover habitat for the development of a delta and longfin smelt conservation  
12 hatchery in CZ 1.
- 13 • *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground  
14 water conveyance facilities and restoration infrastructure could result in ongoing but periodic  
15 disturbances that could affect mountain plover use of the surrounding habitat. Maintenance  
16 activities would include vegetation management, levee and structure repair, and re-grading of  
17 roads and permanent work areas. These effects, however, would be reduced by AMM1–  
18 AMM7 and conservation actions as described below.
- 19 • *Injury and Direct Mortality*: Construction would not be expected to result in direct mortality of  
20 mountain plover because foraging individuals would be expected to temporarily avoid the  
21 increased noise and activity associated with construction areas.

22 The following paragraphs summarize the combined effects discussed above and describe other  
23 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also  
24 included.

### 25 ***Near-term Timeframe***

26 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
27 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
28 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
29 effects of construction would not be adverse under NEPA. Alternative 9 would remove 7,425 acres  
30 (5,768 permanent, 1,657 temporary) of modeled mountain plover wintering habitat in the study  
31 area in the near-term. These effects would result from the construction of the water conveyance  
32 facilities (CM1, 1,599 acres), and implementing other conservation measures (*CM2 Yolo Bypass*  
33 *Fisheries Enhancement*, *CM4 Tidal Natural Communities Restoration*, *CM7 Riparian Natural*  
34 *Community Restoration*, *CM8 Grassland Natural Community Restoration*, *CM9 Vernal Pool and Alkali*  
35 *Seasonal Wetland Complex Restoration*, *CM11 Natural Communities Enhancement and Management*  
36 *and CM18 Conservation Hatcheries*—5,826 acres).

37 The typical NEPA and CEQA project-level mitigation ratio for those natural communities affected  
38 would be 2:1 for protection of habitat. Using this ratio would indicate that 3,198 acres should be  
39 protected to compensate for the CM1 losses of 1,599 acres of mountain plover wintering habitat.  
40 The near-term effects of other conservation actions would remove 5,826 acres of modeled habitat,  
41 and therefore require 11,652 acres of protection of mountain plover habitat using the same typical  
42 NEPA and CEQA ratio (2:1 for protection).

1 The BDCP has committed to near-term goals of protecting 2,000 acres and restoring 1,140 acres of  
2 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of  
3 alkali seasonal wetland complex, and protecting 15,400 acres of non-rice cultivated lands (Table 3-4  
4 in Chapter 3, *Description of Alternatives*). These conservation actions are associated with CM3, CM8,  
5 and CM9 and would occur in the same timeframe as the construction and early restoration losses  
6 thereby avoiding adverse effects of habitat loss on mountain plover wintering in the study area.  
7 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1  
8 and GNC1.2). Grassland protection in CZs 1, 8, and 11 would be associated with vernal pool and  
9 alkali seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a  
10 contiguous matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which  
11 would expand mountain plover wintering habitat and reduce the effects of current levels of habitat  
12 fragmentation. Under *CM11 Natural Communities Enhancement and Management*, insect prey  
13 populations would be increased on protected lands, enhancing the foraging value of these natural  
14 communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4). Cultivated lands that provide habitat  
15 for covered and other native wildlife species would provide approximately 15,400 acres of potential  
16 wintering habitat for mountain plover (Objective CLNC1.1). Approximately 87% of cultivated lands  
17 protected by the late long-term time period would be in alfalfa and pasture crop types (very high-  
18 and high-value crop types for Swainson's hawk (Objective SH1.2) which are also modeled habitat for  
19 wintering mountain plover. This biological objective provides an estimate for the high proportion of  
20 cultivated lands protected in the near-term time period which would be suitable for mountain  
21 plover.

22 The acres of restoration and protection contained in the near-term Plan goals and the additional  
23 detail in the biological objectives satisfy the typical mitigation that would be applied to the project-  
24 level effects of CM1 on mountain plover, as well as mitigate the near-term effects of the other  
25 conservation measures with the consideration that some portion of the 15,400 acres of cultivated  
26 lands protected in the near-term timeframe would be managed in suitable crop types to compensate  
27 for the loss of habitat at a ratio of 2:1. Mitigation Measure BIO-125, *Compensate for the Near-Term*  
28 *Loss of Mountain Plover Wintering Habitat*, would be available to address the adverse effect of  
29 habitat loss in the near-term.

30 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
31 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
32 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
33 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
34 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
35 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
36 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

### 37 **Late Long-Term Timeframe**

38 Based on the habitat model, the study area supports approximately 269,411 acres of potential  
39 habitat for mountain plover. Alternative 9 as a whole would result in the permanent loss of and  
40 temporary effects on 28,690 acres of modeled mountain plover wintering habitat during the term of  
41 the Plan. The locations of these losses are described above in the analyses of individual conservation  
42 measures. The Plan includes conservation commitments through *CM3 Natural Communities*  
43 *Protection and Restoration*, *CM8 Grassland Natural Community Restoration*, and *CM9 Vernal Pool and*  
44 *Alkali Seasonal Wetland Complex Restoration* to protect 8,000 acres and restore 2,000 acres of  
45 grassland natural community, protect 600 acres of vernal pool complex, protect 150 acres of alkali

1 seasonal wetland complex and protect 48,625 acres of cultivated lands that provide suitable habitat  
2 for native wildlife species (Table 3-4 in Chapter 3). Grassland restoration and protection would  
3 occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1 and GNC1.2). Grassland protection in CZs 1, 8,  
4 and 11 would be associated with vernal pool and alkali seasonal wetland complexes (Objectives  
5 ASWNC1.1 and VPNC1.1) and would result in a contiguous matrix of grassland, alkali seasonal  
6 wetland, and vernal pool natural communities which would expand habitat for mountain plover and  
7 reduce the effects of current levels of habitat fragmentation. Under *CM11 Natural Communities*  
8 *Enhancement and Management*, insect prey populations would be increased on protected lands,  
9 enhancing the foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and  
10 GNC2.4). Cultivated lands that provide habitat for covered and other native wildlife species would  
11 provide approximately 15,400 acres of potential wintering habitat for mountain plover (Objective  
12 CLNC1.1). Approximately 42,275 acres of cultivated lands protected would be in alfalfa and pasture  
13 crop types (very high- and high-value crop types for Swainson's hawk (Objective SH1.2) which  
14 would also provide potential wintering habitat for mountain plover. The Plan also includes  
15 commitments to implement *AMM1 Worker Awareness Training*, *AMM2 Construction Best*  
16 *Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention Plan*, *AMM4 Erosion*  
17 *and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and Countermeasure Plan*, *AMM6*  
18 *Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged Material*, and *AMM7 Barge*  
19 *Operations Plan*. All of these AMMs include elements that would avoid or minimize the risk of  
20 affecting individuals and species habitats adjacent to work areas. The AMMs are described in detail  
21 in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

22 **NEPA Effects:** The loss of mountain plover habitat and potential mortality of this special-status  
23 species under Alternative 9 would represent an adverse effect in the absence of other conservation  
24 actions. However, with habitat protection and restoration associated with CM3, CM8, CM9, and  
25 CM11, guided by biological goals and objectives and by AMM1–AMM7, which would be in place  
26 throughout the construction period, and with implementation of Mitigation Measure BIO-125,  
27 *Compensate for the Near-Term Loss of Mountain Plover Wintering Habitat*, the effects of habitat loss  
28 and potential for direct mortality on mountain plover under Alternative 9 would not be adverse.

29 **CEQA Conclusion:**

30 **Near-Term Timeframe**

31 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
32 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
33 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
34 effects of construction would be less than significant under CEQA. Alternative 9 would remove 7,425  
35 acres (5,768 permanent, 1,657 temporary) of modeled mountain plover wintering habitat in the  
36 study area in the near-term. These effects would result from the construction of the water  
37 conveyance facilities (CM1, 1,599 acres), and implementing other conservation measures (*CM2 Yolo*  
38 *Bypass Fisheries Enhancement*, *CM4 Tidal Natural Communities Restoration*, *CM7 Riparian Natural*  
39 *Community Restoration*, *CM8 Grassland Natural Community Restoration*, *CM9 Vernal Pool and Alkali*  
40 *Seasonal Wetland Complex Restoration*, *CM11 Natural Communities Enhancement and Management*  
41 and *CM18 Conservation Hatcheries*—5,826 acres).

42 The typical NEPA and CEQA project-level mitigation ratio for those natural communities affected  
43 would be 2:1 for protection of habitat. Using this ratio would indicate that 3,198 acres should be  
44 protected to compensate for the CM1 losses of 1,599 acres of mountain plover wintering habitat.

1 The near-term effects of other conservation actions would remove 5,826 acres of modeled habitat,  
2 and therefore require 11,652 acres of protection of mountain plover habitat using the same typical  
3 NEPA and CEQA ratio (2:1 for protection).

4 The BDCP has committed to near-term goals of protecting 2,000 acres and restoring 1,140 acres of  
5 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of  
6 alkali seasonal wetland complex, and protecting 15,400 acres of non-rice cultivated lands (Table 3-4  
7 in Chapter 3). These conservation actions are associated with CM3, CM8, and CM9 and would occur  
8 in the same timeframe as the construction and early restoration losses thereby avoiding significant  
9 impacts of habitat loss on mountain plover. Grassland restoration and protection would occur in CZs  
10 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1 and GNC1.2). Grassland protection in CZs 1, 8, and 11  
11 would be associated with vernal pool and alkali seasonal wetland complexes (Objectives ASWNC1.1  
12 and VPNC1.1) and would result in a contiguous matrix of grassland, alkali seasonal wetland, and  
13 vernal pool natural communities which would expand wintering habitat for mountain plover and  
14 reduce the effects of current levels of habitat fragmentation. Under *CM11 Natural Communities*  
15 *Enhancement and Management*, insect prey populations would be increased on protected lands,  
16 enhancing the foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and  
17 GNC2.4). Cultivated lands that provide habitat for covered and other native wildlife species would  
18 provide approximately 15,400 acres of potential wintering habitat for mountain plover (Objective  
19 CLNC1.1). Approximately 87% of cultivated lands protected by the late long-term time period would  
20 be in alfalfa and pasture crop types (very high- and high-value crop types for Swainson's hawk  
21 (Objective SH1.2) which would also provide potential habitat for mountain plover wintering in the  
22 study area. This biological objective provides an estimate for the high proportion of cultivated lands  
23 protected in the near-term time period which would provide habitat for mountain plover.

24 These Plan objectives represent performance standards for considering the effectiveness of  
25 conservation actions. The acres of restoration and protection contained in the near-term Plan goals  
26 and the additional detail in the biological objectives satisfy the typical mitigation that would be  
27 applied to the project-level effects of CM1 on mountain plover, as well as mitigate the near-term  
28 effects of the other conservation measures with the consideration that some portion of the 15,400  
29 acres of cultivated lands protected in the near-term timeframe would be managed in suitable crop  
30 types to compensate for the loss of habitat at a ratio of 2:1. The implementation of Mitigation  
31 Measure BIO-125, *Compensate for the Near-Term Loss of Mountain Plover Wintering Habitat*, would  
32 reduce the impact of habitat loss in the near-term to a less-than-significant level.

33 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
34 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
35 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
36 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
37 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
38 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
39 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

#### 40 **Late Long-Term Timeframe**

41 Alternative 9 as a whole would result in the permanent loss of and temporary effects on 28,690  
42 acres of mountain plover habitat during the term of the Plan (11% of the total habitat in the study  
43 area). The locations of these losses are described above in the analyses of individual conservation  
44 measures. The Plan includes conservation commitments through *CM3 Natural Communities*

1 *Protection and Restoration, CM8 Grassland Natural Community Restoration, and CM9 Vernal Pool and*  
2 *Alkali Seasonal Wetland Complex Restoration* to protect 8,000 acres and restore 2,000 acres of  
3 grassland natural community, protect 600 acres of vernal pool complex, protect 150 acres of alkali  
4 seasonal wetland complex and protect 48,625 acres of cultivated lands that provide suitable habitat  
5 for native wildlife species (Table 3-4 in Chapter 3). Grassland restoration and protection would  
6 occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1 and GNC1.2). Grassland protection in CZs 1, 8,  
7 and 11 would be associated with vernal pool and alkali seasonal wetland complexes (Objectives  
8 ASWNC1.1 and VPNC1.1) and would result in a contiguous matrix of grassland, alkali seasonal  
9 wetland, and vernal pool natural communities which would expand wintering habitat for mountain  
10 plover and reduce the effects of current levels of habitat fragmentation. Under *CM11 Natural*  
11 *Communities Enhancement and Management*, insect prey populations would be increased on  
12 protected lands, enhancing the foraging value of these natural communities (Objectives  
13 ASWNC2.4, VPNC2.5, and GNC2.4). Cultivated lands that provide habitat for covered and other native  
14 wildlife species would provide approximately 15,400 acres of potential habitat for mountain plover  
15 (Objective CLNC1.1). Approximately 42,275 acres of cultivated lands protected would be in alfalfa  
16 and pasture crop types (very high- and high-value crop types for Swainson's hawk (Objective SH1.2)  
17 which would also provide habitat for mountain plover.

18 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*  
19 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*  
20 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
21 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
22 *Material, and AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
23 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
24 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

25 Considering Alternative 9's protection and restoration provisions, which would provide acreages of  
26 new or enhanced habitat in amounts suitable to compensate for habitats lost to construction and  
27 restoration activities, and with the implementation of AMM1-AMM7 and Mitigation Measure BIO-  
28 125, *Compensate for the Near-Term Loss of Mountain Plover Wintering Habitat*, the loss of habitat or  
29 direct mortality through implementation of Alternative 9 would not result in a substantial adverse  
30 effect through habitat modifications and would not substantially reduce the number or restrict the  
31 range of mountain plover. Therefore, the loss of habitat or potential mortality under this alternative  
32 would have a less-than-significant impact on mountain plover.

33 **Mitigation Measure BIO-125: Compensate for the Near-Term Loss of Mountain Plover**  
34 **Wintering Habitat**

35 DWR will manage and protect sufficient acres of cultivated lands such as pasture, grain and hay  
36 crops, or alfalfa to provide habitat for mountain plover such that the total acres of high-value  
37 habitat impacted in the near-term timeframe are mitigated at a ratio of 2:1. Additional grassland  
38 protection, enhancement, and management may be substituted for the protection of high-value  
39 cultivated lands.

40 **Impact BIO-126: Effects on Mountain Plover Associated with Electrical Transmission**  
41 **Facilities**

42 New transmission lines would increase the risk for bird-power line strikes, which could result in  
43 injury or mortality of mountain plover. Mountain plovers congregate in flocks during the winter and

1 travel between grasslands and cultivated lands that provide foraging habitat for the species. This  
2 flocking behavior puts them at risk of collisions with powerlines. Existing transmission lines in the  
3 study area currently pose this risk. Plovers are primarily visual foragers and therefore, the risk for  
4 collision would be reduced by *AMM20 Greater Sandhill Crane*, which would require the installation  
5 of bird flight diverters on new and selected existing transmission lines in the study area.

6 **NEPA Effects:** New transmission lines are not expected to have an adverse effect on mountain plover  
7 because mortality from powerline strikes would be minimized with the implementation of *AMM20*  
8 *Greater Sandhill Crane* which would require the installation of bird flight diverters on new and  
9 selected existing transmission lines in the study area. The risk for bird-power line strikes is,  
10 therefore, not expected to have an adverse effect on mountain plover.

11 **CEQA Conclusion:** New transmission lines would have a less-than-significant impact on mountain  
12 plover because mortality from powerline strikes would be minimized with the implementation of  
13 *AMM20 Greater Sandhill Crane* which would require the installation of bird flight diverters on new  
14 and selected existing transmission lines in the study area.

### 15 **Impact BIO-127: Indirect Effects of Operations and Maintenance of Water Conveyance** 16 **Facilities on Mountain Plover**

17 Construction- and subsequent maintenance-related noise and visual disturbances could disrupt  
18 foraging, and reduce the functions of suitable foraging habitat for mountain plover. Construction  
19 noise above background noise levels (greater than 50 dBA) could extend 1,900 to 5,250 feet from  
20 the edge of construction activities (BDCP Appendix 5.J, Attachment 5J.D, *Indirect Effects of the*  
21 *Construction of the BDCP Conveyance Facility on Sandhill Crane*, Table 4), although there are no  
22 available data to determine the extent to which these noise levels could affect mountain plover.  
23 Indirect effects associated with construction include noise, dust, and visual disturbance caused by  
24 grading, filling, contouring, and other ground-disturbing operations. The use of mechanical  
25 equipment during water conveyance facilities construction could cause the accidental release of  
26 petroleum or other contaminants that could affect these species or their prey in the surrounding  
27 habitat. AMM1–AMM7 would minimize the likelihood of such spills from occurring. The inadvertent  
28 discharge of sediment or excessive dust adjacent to mountain plover grassland habitat could also  
29 have a negative effect on the species. However, AMM1–AMM7 would also ensure that measures  
30 would be in place to prevent runoff from the construction area and the negative effects of dust on  
31 wildlife adjacent to work areas.

32 **NEPA Effects:** Indirect effects on mountain plover as a result of Alternative 9 implementation could  
33 have adverse effects on the species through the modification of habitat. With the  
34 implementation of AMM1–AMM7, indirect effects as a result of Alternative 9 implementation would  
35 not have an adverse effect mountain plover.

36 **CEQA Conclusion:** Indirect effects on mountain plover as a result of Alternative 9 implementation  
37 could have a significant impact on the species from modification of habitat. With the implementation  
38 of AMM1–AMM7, indirect effects as a result of Alternative 9 implementation would have a less-than-  
39 significant impact on mountain plover.

1 **Impact BIO-128: Periodic Effects of Inundation on Mountain Plover as a Result of**  
2 **Implementation of Conservation Components**

3 Flooding of the Yolo Bypass from Fremont Weir operations (*CM2 Yolo Bypass Fisheries*  
4 *Enhancement*) would increase the frequency and duration of inundation on approximately 1,158–  
5 3,650 acres of modeled mountain plover wintering habitat (Table 12-9-47). Based on hypothetical  
6 footprints, implementation of *CM5 Seasonally Inundated Floodplain Restoration*, could result in the  
7 periodic inundation of up to approximately 3,823 acres of modeled mountain plover habitat (Table  
8 12-9-47).

9 **NEPA Effects:** Implementation of CM2 and CM5 would periodically inundate suitable mountain  
10 plover foraging habitat. However, effects of periodic inundation would not have an adverse effect on  
11 mountain plover because birds would be expected to move to adjacent foraging habitat.

12 **CEQA Conclusion:** Implementation of CM2 and CM5 would periodically inundate suitable mountain  
13 plover foraging habitat. However, effects of periodic inundation would have a less-than-significant  
14 impact on mountain plover because birds would be expected to move to adjacent foraging habitat.

15 **Black Tern**

16 This section describes the effects of Alternative 9, including water conveyance facilities construction  
17 and implementation of other conservation components, on black tern. Modeled nesting habitat for  
18 black tern in the study area is currently limited to rice in CZ 2.

19 Construction and restoration associated with Alternative 9 conservation measures would result in  
20 both temporary and permanent losses of modeled habitat for black tern as indicated in Table 12-9-  
21 48. Full implementation of Alternative 9 would include the following biological objectives over the  
22 term of the BDCP that would benefit the black tern (BDCP Chapter 3, Section 3.3, *Biological Goals*  
23 *and Objectives*).

- 24 ● Protect 700 acres of cultivated lands, with at least 500 acres consisting of rice land, to expand  
25 upon and buffer newly restored/created nontidal perennial habitat in CZ 2, (Objective GGS2.3,  
26 associated with CM3).
- 27 ● Protect up to 1,700 acres of rice land or equivalent habitat (e.g. perennial wetland) in the Yolo  
28 Bypass if this portion meets the criteria specified in CM3, *Reserve Design Requirements by*  
29 *Species*, for giant garter snake. Any remaining acreage (from a total 2,740-acre commitment) will  
30 consist of rice land or equivalent-value habitat outside the Yolo Bypass in CZs 1, 2, 4, or 5  
31 (Objective GGS3.1, associated with CM3).

32 As explained below, with the restoration and protection of these amounts of habitat, in addition to  
33 management activities that would enhance this habitat for the species and implementation of  
34 AMM1–AMM7 and Mitigation Measure BIO-75, impacts on black tern would not be adverse for NEPA  
35 purposes and would be less than significant for CEQA purposes.

1 **Table 12-9-48. Changes in Black Tern Modeled Habitat Associated with Alternative 9 (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	Nesting	0	0	0	0	NA	NA
<b>Total Impacts CM1</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	NA	NA
CM2–CM18	Nesting	76	260	0	0	791–1,582	0
<b>Total Impacts CM2–CM18</b>		<b>76</b>	<b>260</b>	<b>0</b>	<b>0</b>	<b>791–1,582</b>	<b>0</b>
<b>TOTAL IMPACTS</b>		<b>76</b>	<b>260</b>	<b>0</b>	<b>0</b>	<b>791–1,582</b>	<b>0</b>

<sup>a</sup> See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

2

3 **Impact BIO-129a: Loss or Conversion of Habitat for and Direct Mortality of Black Tern**

4 Alternative 9 conservation measures would result in the permanent loss of up to 260 acres of  
5 modeled nesting habitat for black tern, consisting of rice in CZ 2 (Table 12-9-48). Conservation  
6 measures that would result in these losses are grassland restoration (CM8) and nontidal marsh  
7 restoration (CM10). Each of these individual activities is described below. A summary statement of  
8 the combined impacts and NEPA effects, and a CEQA conclusion follows the individual conservation  
9 measure discussions.

- 10 • *CM8 Grassland Natural Community Restoration:* Restoration of grassland is expected to be  
11 implemented on agricultural lands and would result in the conversion of 52 acres of rice lands  
12 to grassland in CZ 2 by the late-long time period. An estimated 30 acres of impact would occur in  
13 the first 10 years.
- 14 • *CM10 Nontidal Marsh Restoration:* Implementation of *CM10* would result in the permanent  
15 removal of 208 acres of black tern nesting habitat in in CZ 2. An estimated 46 acres would be  
16 removed in the first 10 years.

17 *CM11 Natural Communities Enhancement and Management:* A variety of habitat management  
18 actions that are designed to enhance wildlife values in restored or protected habitats could  
19 result in localized ground disturbances that could temporarily remove small amounts of  
20 modeled habitat. Ground-disturbing activities, such as removal of nonnative vegetation and road  
21 and other infrastructure maintenance activities, would be expected to have minor adverse  
22 effects on available habitat and would be expected to result in overall improvements to and  
23 maintenance of habitat values over the term of the BDCP. Habitat management- and  
24 enhancement-related activities could disturb nesting black terns if they were to nest in the

1 vicinity of a worksite. Equipment operation could destroy nests, and noise and visual  
2 disturbances could lead to their abandonment, resulting in mortality of eggs and nestlings. The  
3 potential for these activities to result in direct mortality of black tern would be minimized with  
4 the implementation of and Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird*  
5 *Surveys and Avoid Disturbance of Nesting Birds*.

- 6 • Operations and Maintenance: Postconstruction operation and maintenance of the restoration  
7 infrastructure could result in ongoing but periodic disturbances that could affect black tern  
8 nesting adjacent to maintenance areas. Maintenance activities would include vegetation  
9 management, levee and structure repair, and re-grading of roads and permanent work areas.  
10 These effects, however, would be reduced by AMM1–AMM7, Mitigation Measure BIO-75, and  
11 conservation actions as described below.
- 12 • Injury and Direct Mortality: Construction-related activities would not be expected to result in  
13 direct mortality of adult or fledged black tern individuals if they were present in the study area,  
14 because they would be expected to avoid contact with construction and other equipment. If  
15 black tern were to nest in the construction area, construction-related activities, including  
16 equipment operation, noise and visual disturbances could destroy nests or lead to their  
17 abandonment, resulting in mortality of eggs and nestlings. These effects would be avoided and  
18 minimized with the implementation of Mitigation Measure BIO-75.
- 19 • Late season flooding in the Yolo Bypass could result in the loss of rice (nesting habitat for black  
20 tern) by precluding the preparation and planting of rice fields. The methods for estimating loss  
21 of rice in the bypass and results are provided in BDCP Appendix 5.J, Attachment 5J.E, *Estimation*  
22 *of BDCP Impact on Giant Garter Snake Summer Foraging Habitat in the Yolo Bypass*. This analysis  
23 concludes that the estimated loss of rice could be up to 1,662 acres by the late long-term  
24 timeframe. This potential impact is further described under Impact BIO-129c below.

25 The following paragraphs summarize the combined effects discussed above and describe other  
26 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also  
27 included.

### 28 ***Near-Term Timeframe***

29 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
30 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
31 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
32 effects of construction would not be adverse under NEPA. There would be no impacts on black tern  
33 nesting habitat resulting from the construction of the water conveyance facilities (CM1). However,  
34 there would be a loss of 76 acres of modeled nesting habitat for black tern in the study area in the  
35 near-term. These effects would result from implementing *CM8 Grassland Natural Community*  
36 *Restoration* and *CM10 Nontidal Marsh Restoration*.

37 The typical NEPA and CEQA project-level mitigation ratio would be 1:1 protection for the loss of  
38 cultivated lands including rice. Using this ratio would indicate that 76 acres of rice lands should be  
39 protected in CZ 2 to compensate for the losses of black tern nesting habitat.

40 The BDCP has committed to near-term goals of protecting 200 acres of rice and 700 acres of rice or  
41 equivalent habitat (Table 3-4 in Chapter 3, *Description of Alternatives*). These conservation actions  
42 are associated with CM3 and would occur in the same timeframe as the early restoration losses. The  
43 BDCP also contains objectives for the giant garter snake to protect at least 500 acres of rice in CZ 2

1 and to protect up to 1,700 acres of rice land or equivalent habitat in the Yolo Bypass (if this portion  
2 meets the criteria specified in CM3, *Reserve Design Requirements by Species* for giant garter snake,  
3 Objectives GGS2.3 and GGS 3.1) by the late long-term time period. These objectives would inform the  
4 near-term protection actions, and therefore some portion of the 200 acres of rice and 700 acres of  
5 rice or equivalent habitat would be expected to be restored in CZ 2. However, there is no near-term  
6 acreage commitment in the plan that is specific to CZ 2. In order to avoid an adverse effect on black  
7 tern from habitat loss, protection of 76 acres of rice would need to occur in CZ 2 in the near-term  
8 timeframe. Mitigation Measure BIO-129a, *Compensate for Loss of Black Tern Nesting Habitat*, would  
9 be available to address this adverse effect.

10 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
11 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
12 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
13 *Countermeasure Plan*, and *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
14 *Material*. All of these AMMs include elements that would avoid or minimize the risk of affecting  
15 individuals and species habitats adjacent to work areas. The AMMs are described in detail in BDCP  
16 Appendix 3.C, *Avoidance and Minimization Measures*. Black tern is not a covered species under the  
17 BDCP. For the BDCP to avoid an adverse effect on individuals, preconstruction surveys for  
18 noncovered avian species would be required to ensure that nests are detected and avoided.  
19 Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of*  
20 *Nesting Birds*, would be available to address this adverse effect.

### 21 **Late Long-Term Timeframe**

22 Alternative 9 as a whole would result in the permanent loss of 260 acres of modeled black tern  
23 nesting habitat during the term of the Plan. This impact would result from the removal of rice in CZ  
24 2. The Plan includes conservation commitments through *CM3 Natural Communities Protection and*  
25 *Restoration* to protect 500 acres of rice lands (Table 3-4 in Chapter 3) and up to 1,700 acres of rice  
26 lands or equivalent habitat for the giant garter snake (Objective GGS3.1) in CZ 2. The nesting habitat  
27 for black tern in the northern part of the study area has largely been reduced to rice lands, and these  
28 acres would provide protected nesting habitat for the species.

29 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
30 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
31 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
32 *Countermeasure Plan*, and *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
33 *Material*. All of these AMMs include elements that would avoid or minimize the risk of affecting  
34 individuals and species habitats adjacent to work areas. The AMMs are described in detail in BDCP  
35 Appendix 3.C, *Avoidance and Minimization Measures*. Black tern is not a covered species under the  
36 BDCP. For the BDCP to avoid an adverse effect on individuals, preconstruction surveys for  
37 noncovered avian species would be required to ensure that nests are detected and avoided.  
38 Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of*  
39 *Nesting Birds*, would be available to address this effect.

40 **NEPA Effects:** The loss of black tern nesting habitat and potential for mortality of this special-status  
41 species under Alternative 9 would represent an adverse effect in the absence of other conservation  
42 actions. With habitat protection associated with CM3, guided by biological goals and objectives and  
43 AMM1–AMM6, which would be in place throughout the construction period, the effects of habitat  
44 loss under Alternative 9 would not be adverse under NEPA. Black tern is not a covered species

1 under the BDCP and potential mortality would be an adverse effect without preconstruction surveys  
2 to ensure that nests are detected and avoided. Mitigation Measure BIO-75, *Conduct Preconstruction*  
3 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to address this effect.

4 **CEQA Conclusion:**

5 **Near-Term Timeframe**

6 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
7 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
8 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
9 effects of construction would be less than significant under CEQA. There would be no impacts on  
10 black tern nesting habitat resulting from the construction of the water conveyance facilities (CM1).  
11 However, there would be a loss of 76 acres of modeled nesting habitat for black tern in the study  
12 area in the near-term. These effects would result from implementing *CM8 Grassland Natural*  
13 *Community Restoration* and *CM10 Nontidal Marsh Restoration*.

14 The typical NEPA and CEQA project-level mitigation ratio would be 1:1 protection for the loss of  
15 cultivated lands including rice. Using this ratio would indicate that 76 acres of rice lands should be  
16 protected in CZ 2 to mitigate the losses of black tern nesting habitat.

17 The BDCP has committed to near-term goals of protecting 200 acres of rice and 700 acres of rice or  
18 equivalent habitat (Table 3-4 in Chapter 3). These conservation actions are associated with CM3 and  
19 would occur in the same timeframe as the early restoration losses. The BDCP also contains  
20 objectives for the giant garter snake to protect at least 500 acres of rice in CZ 2 and to protect up to  
21 1,700 acres of rice land or equivalent habitat in the Yolo Bypass (if this portion meets the criteria  
22 specified in CM3, *Reserve Design Requirements by Species* for giant garter snake, Objectives GGS2.3  
23 and GGS 3.1) by the late long-term time period. These objectives would inform the near-term  
24 protection actions, and therefore some portion of the 200 acres of rice and 700 acres of rice or  
25 equivalent habitat would be expected to be restored in CZ 2. However, there is no near-term acreage  
26 commitment in the plan that is specific to CZ 2. Implementation of Mitigation Measure BIO-129a,  
27 *Compensate for Loss of Black Tern Nesting Habitat*, which would require 1:1 protection of habitat in  
28 CZ 2 in the near-term timeframe, would reduce this potential impact to a less-than-significant level.

29 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
30 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
31 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
32 *Countermeasure Plan*, and *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
33 *Material*. All of these AMMs include elements that would avoid or minimize the risk of affecting  
34 individuals and species habitats adjacent to work areas. The AMMs are described in detail in BDCP  
35 Appendix 3.C, *Avoidance and Minimization Measures*. Black tern is not a covered species under the  
36 BDCP. For the BDCP to have a less-than-significant impact on individuals, preconstruction would be  
37 required to ensure that nests are detected and avoided. Implementation of Mitigation Measure BIO-  
38 75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would  
39 reduce the potential impact on nesting black tern to a less-than-significant level.

40 **Late Long-Term Timeframe**

41 Alternative 9 as a whole would result in the permanent loss of 260 acres of modeled black tern  
42 nesting habitat during the term of the Plan. This impact would result from the removal of rice in CZ

1 2. The Plan includes conservation commitments through *CM3 Natural Communities Protection and*  
2 *Restoration* to protect 500 acres of rice lands (Table 3-4 in Chapter 3) and up to 1,700 acres of rice  
3 lands or equivalent habitat for the giant garter snake (Objective GGS3.1) in CZ 2.

4 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*  
5 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*  
6 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
7 *Countermeasure Plan, and AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
8 *Material*. All of these AMMs include elements that would avoid or minimize the risk of affecting  
9 individuals and species habitats adjacent to work areas. The AMMs are described in detail in BDCP  
10 Appendix 3.C, *Avoidance and Minimization Measures*. Black tern is not a covered species under the  
11 BDCP. For the BDCP to avoid an adverse effect on individuals, preconstruction surveys for  
12 noncovered avian species would be required to ensure that nests are detected and avoided.  
13 Implementation of Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and*  
14 *Avoid Disturbance of Nesting Birds*, would reduce the potential impact on nesting black tern to a less-  
15 than-significant level.

16 Considering these protection provisions, which would provide acreages of new or enhanced habitat  
17 in amounts greater than necessary to compensate for habitats lost to construction and restoration  
18 activities, loss of habitat or direct mortality through implementation of Alternative 9 would not  
19 result in a substantial adverse effect through habitat modifications and would not substantially  
20 reduce the number or restrict the range of the species. Therefore, the alternative would have a less-  
21 than-significant impact on black tern.

22 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**  
23 **Disturbance of Nesting Birds**

24 See Mitigation Measure BIO-75 under Impact BIO-75.

25 **Mitigation Measure BIO-129a: Compensate for loss of black tern nesting habitat**

26 Because there is no near-term acreage commitment associated with the protection of rice in CZ  
27 2, BDCP proponents must protect rice at a 1:1 ratio for each acre of rice impacted in CZ 2.

28 **Impact BIO-129b: Indirect Effects of Plan Implementation on Black Tern**

29 Construction noise above background noise levels (greater than 50 dBA) could extend 1,900 to  
30 5,250 feet from the edge of construction activities (BDCP Appendix 5.J, Attachment 5J.D, *Indirect*  
31 *Effects of the Construction of the BDCP Conveyance Facility on Sandhill Crane*, Table 4), although there  
32 are no available data to determine the extent to which these noise levels could affect black tern. If  
33 black terns were to nest in or adjacent to work areas, construction and subsequent maintenance-  
34 related noise and visual disturbances could mask calls, disrupt foraging and nesting behaviors, and  
35 reduce the functions of suitable nesting habitat for these species. Mitigation Measure BIO-75,  
36 *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would avoid  
37 the potential for adverse effects of construction-related activities on survival and productivity of  
38 nesting black terns. The use of mechanical equipment during restoration activities could cause the  
39 accidental release of petroleum or other contaminants that could affect black terns in the  
40 surrounding habitat. The inadvertent discharge of sediment or excessive dust adjacent to suitable  
41 habitat could also have an adverse effect on these species. AMM1–AMM7, including *AMM2*  
42 *Construction Best Management Practices and Monitoring*, would minimize the likelihood of such

1 spills and ensure that measures are in place to prevent runoff from the construction area and  
2 negative effects of dust on active nests.

3 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in  
4 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,  
5 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,  
6 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz  
7 2009). The effect of selenium toxicity differs widely between species and also between age and sex  
8 classes within a species. In addition, the effect of selenium on a species can be confounded by  
9 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith  
10 2009).

11 The primary source of selenium bioaccumulation in birds is through their diet (Ackerman and  
12 Eagles-Smith 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the  
13 trophic level at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At  
14 Kesterson Reservoir in the San Joaquin Valley, selenium concentrations in invertebrates have been  
15 found to be two to six times the levels in rooted plants. Furthermore, bivalves sampled in the San  
16 Francisco Bay contained much higher selenium levels than crustaceans such as copepods (Stewart et  
17 al. 2004). Studies conducted at the Grasslands in Merced County recorded higher selenium levels in  
18 black-necked stilts which feed on aquatic invertebrates than in mallards and pintails, which are  
19 primarily herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which  
20 forage on bivalves) have much higher levels of selenium levels than shorebirds that prey on aquatic  
21 invertebrates (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high  
22 levels of selenium have a higher risk of selenium toxicity.

23 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations  
24 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to  
25 exacerbate bioaccumulation of selenium in avian species, including black tern. Marsh (tidal and  
26 nontidal) and floodplain restoration have the potential to mobilize selenium, and therefore increase  
27 avian exposure from ingestion of prey items with elevated selenium levels. Thus, BDCP restoration  
28 activities that create newly inundated areas could increase bioavailability of selenium (see BDCP  
29 Chapter 3, *Conservation Strategy*, for details of restoration). Changes in selenium concentrations  
30 were analyzed in Chapter 8, *Water Quality*, and it was determined that, relative to Existing  
31 Conditions and the No Action Alternative, CM1 would not result in substantial, long-term increases  
32 in selenium concentrations in water in the Delta under any alternative. However, it is difficult to  
33 determine whether the effects of potential increases in selenium bioavailability associated with  
34 restoration-related conservation measures (CM4 and CM5) would lead to adverse effects on black  
35 tern.

36 Because of the uncertainty that exists at this programmatic level of review, there could be an effect  
37 on black tern from increases in selenium associated with restoration activities. This effect would be  
38 addressed through the implementation of *AMM27 Selenium Management* (BDCP Appendix 3.C,  
39 *Avoidance and Minimization Measures*) which would provide specific tidal habitat restoration design  
40 elements to reduce the potential for bioaccumulation of selenium and its bioavailability in tidal  
41 habitats. Furthermore, the effectiveness of selenium management to reduce selenium  
42 concentrations and/or bioaccumulation would be evaluated separately for each restoration effort as  
43 part of design and implementation. This avoidance and minimization measure would be  
44 implemented as part of the tidal habitat restoration design schedule.

1 **NEPA Effects:** Noise and visual disturbances from the construction of conservation components  
2 could black tern use of modeled habitat adjacent to work areas. Moreover, the use of mechanical  
3 equipment for the construction of conservation components could cause the accidental release of  
4 petroleum or other contaminants, or the inadvertent discharge of sediment or excess dust adjacent  
5 to suitable habitat. AMM1–AMM7, and Mitigation Measure BIO-75, *Conduct Preconstruction Nesting*  
6 *Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to address adverse effects on  
7 nesting individuals. Tidal habitat restoration could result in increased exposure of black tern to  
8 selenium. This effect would be addressed through the implementation of *AMM27 Selenium*  
9 *Management*, which would provide specific tidal habitat restoration design elements to reduce the  
10 potential for bioaccumulation of selenium and its bioavailability in tidal habitats.

11 **CEQA Conclusion:** Noise and visual disturbances from the construction of conservation components  
12 could black tern use of modeled habitat adjacent to work areas. Moreover, the use of mechanical  
13 equipment for the construction of conservation components could cause the accidental release of  
14 petroleum or other contaminants, or the inadvertent discharge of sediment or excess dust adjacent  
15 to suitable habitat. AMM1–AMM7, and Mitigation Measure BIO-75, *Conduct Preconstruction Nesting*  
16 *Bird Surveys and Avoid Disturbance of Nesting Birds*, would reduce these impacts to a less-than-  
17 significant level. Tidal habitat restoration could result in increased exposure of black tern to  
18 selenium. This effect would be addressed through the implementation of *AMM27 Selenium*  
19 *Management*, which would provide specific tidal habitat restoration design elements to reduce the  
20 potential for bioaccumulation of selenium and its bioavailability in tidal habitats.

21 **Impact BIO-129c: Periodic Effects of Inundation on Black Tern Nesting Habitat as a Result of**  
22 **Implementation of Conservation Components**

23 Flooding of the Yolo Bypass would inundate 791–1,582 acres of suitable black tern nesting habitat  
24 (land currently managed as rice in CZ 2). Inundation would occur during the nonbreeding season  
25 but could reduce the availability of nesting habitat during years that flooding extends into the  
26 nesting season (past March). Extended inundation of the Yolo Bypass would not be expected to  
27 affect black tern nesting habitat. However, if periodic inundation took land out of rice production,  
28 this could have an adverse effect on black tern nesting habitat. Late season flooding in the Yolo  
29 Bypass could result in the loss of rice (nesting habitat for black tern) by precluding the preparation  
30 and planting of rice fields. The methods for estimating loss of rice in the bypass and results are  
31 provided in BDCP Appendix 5.J, Attachment 5J.E, *Estimation of BDCP Impact on Giant Garter Snake*  
32 *Summer Foraging Habitat in the Yolo Bypass*. This analysis concludes that the estimated loss of rice  
33 could be up to 1,662 acres by the late long-term timeframe. The BDCP has committed to protect,  
34 restore and/or create up to 1,700 acres of rice in the Yolo Bypass (Objective GGS3.1). These acres of  
35 rice would be protected in areas that are less susceptible to inundation, which would benefit the  
36 black tern during years in which the magnitude and duration of inundation were increased.

37 **NEPA Effects:** Flooding of the Yolo Bypass is not expected to adversely affect nesting habitat for  
38 black tern. However, if flooding were to extend into the nesting season or were to significantly  
39 reduce rice production it could also reduce suitable black tern nesting habitat. This potential effect  
40 would not be adverse with the creation and/or protection of 1,700 acres of rice in CZ 2 under  
41 Objective GGS3.1 in the BDCP.

42 **CEQA Conclusion:** Flooding of the Yolo Bypass is not expected to have a significant impact on  
43 nesting habitat for black tern. However, if flooding were to extend into the nesting season or were to  
44 significantly reduce rice production it could also reduce suitable black tern nesting habitat. This

1 potential impact would be reduced to less than significant by the creation and/or protection of  
2 1,700 acres of rice in CZ 2 under Objective GGS3.1 in the BDCP.

### 3 **California Horned Lark and Grasshopper Sparrow**

4 The primary impact of concern for grasshopper sparrow and California horned lark would be the  
5 loss of breeding habitat in the study area, which consists of grassland, vernal pool complex, and  
6 alkali seasonal wetland natural communities and selected cultivated lands including grain and hay  
7 crops and pasture. Construction and restoration associated with Alternative 9 conservation  
8 measures would result in both temporary and permanent losses of modeled breeding habitat for  
9 California horned lark and grasshopper sparrow as indicated in Table 12-9-49. Full implementation  
10 of Alternative 9 would include the following biological objectives over the term of the BDCP that  
11 would benefit the California horned lark and the grasshopper sparrow (BDCP Chapter 3, Section 3.3,  
12 *Biological Goals and Objectives*).

- 13 ● Protect at least 8,000 acres of grassland, with at least 2,000 acres protected in CZ 1, at least  
14 1,000 acres protected in CZ 8, at least 2,000 acres protected in CZ 11, and the remainder  
15 distributed among CZs 1, 2, 4, 5, 7, 8, and 11 (Objective GNC1.1, associated with CM3).
- 16 ● Restore at least 2,000 acres of grasslands (Objective GNC1.2, associated with CM8).
- 17 ● Protect at least 150 acres of alkali seasonal wetland and at least 600 acres of existing vernal pool  
18 complex in CZs 1, 8, and/or 11 (Objectives ASWNC1.1 and VPNC1.1, associated with CM3).
- 19 ● Protect at least 48,625 acres of cultivated lands that provide suitable habitat for covered and  
20 other native wildlife species (Objective CLNC1.1, associated with CM3).
- 21 ● Within the 48,625 acres of protected cultivated lands, protect at least 42,275 acres of cultivated  
22 lands as Swainson's hawk foraging habitat with at least 50% in very high-value habitat in CZs 2,  
23 3, 4, 5, 7, 8, 9, and 11 (Objective SH1.2, associated with CM3).
- 24 ● Increase prey availability and accessibility for grassland-foraging species (Objectives  
25 ASWNC2.4, VPNC2.5, and GNC2.4, associated with CM11).

26 As explained below, with the restoration or protection of these amounts of habitat, in addition to  
27 management activities that would enhance habitat for these species, and implementation of  
28 AMMs1-AMM7 and Mitigation Measure BIO-75, impacts on California horned lark and grasshopper  
29 sparrow would not be adverse for NEPA purposes and would be less than significant for CEQA  
30 purposes.

1 **Table 12-9-49. Changes in California Horned Lark and Grasshopper Sparrow Modeled Habitat**  
2 **Associated with Alternative 9 (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	Breeding	318	318	1,281	1,281	NA	NA
<b>Total Impacts CM1</b>		<b>318</b>	<b>318</b>	<b>1,281</b>	<b>1,281</b>	NA	NA
CM2–CM18	Breeding	5,450	26,198	376	893	777–2,423	3,823
<b>Total Impacts CM2–CM18</b>		<b>5,450</b>	<b>26,198</b>	<b>376</b>	<b>893</b>	<b>777–2,423</b>	<b>3,823</b>
<b>TOTAL IMPACTS</b>		<b>5,768</b>	<b>26,516</b>	<b>1,657</b>	<b>2,174</b>	<b>777–2,423</b>	<b>3,823</b>

<sup>a</sup> See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-130: Loss or Conversion of Habitat for and Direct Mortality of California Horned**  
5 **Lark and Grasshopper Sparrow**

6 Alternative 9 conservation measures would result in the combined permanent and temporary loss  
7 of up to 28,690 acres of modeled breeding habitat for California horned lark and grasshopper  
8 sparrow (26,516 acres of permanent loss, 2,174 acres of temporary loss, Table 12-9-49).  
9 Conservation measures that would result in these losses are conveyance facilities and transmission  
10 line construction, and establishment and use of borrow and spoil areas (CM1), Yolo Bypass fisheries  
11 improvements (CM2), tidal habitat restoration (CM4), floodplain restoration (CM5), riparian  
12 restoration (CM7), grassland restoration (CM8), vernal pool and wetland restoration (CM9),  
13 nontidal marsh restoration (CM10), and construction of conservation hatcheries (CM18). The  
14 majority of habitat loss (20,880 acres) would result from CM4. Habitat enhancement and  
15 management activities (CM11), which include ground disturbance or removal of nonnative  
16 vegetation, and the construction of recreational trails, signs, and facilities, could result in local  
17 adverse habitat effects. In addition, maintenance activities associated with the long-term operation  
18 of the water conveyance facilities and other BDCP physical facilities could degrade or eliminate  
19 California horned lark and grasshopper sparrow modeled habitat. Each of these individual activities  
20 is described below. A summary statement of the combined impacts and NEPA effects, and a CEQA  
21 conclusion follow the individual conservation measure discussions.

- 22 • *CM1 Water Facilities and Operation:* Construction of Alternative 9 conveyance facilities would  
23 result in the combined permanent and temporary loss of up to 1,599 acres of potential California  
24 horned lark and grasshopper sparrow habitat (318 acres of permanent loss, 1,281 acres of  
25 temporary loss) from CZ 4, 5, 6, 7, and 8. These losses would occur at numerous locations where

1 dredging, construction of operable barriers and canals, and channel enlargement would be  
2 undertaken. Other impacts would occur from potential borrow and spoil sites, access roads,  
3 barge unloading facilities, and intake and fish screen construction areas. Grasshopper sparrows  
4 were detected in DHCCP surveys south of Byron Highway in CZ 8 (1 occurrence) and in the  
5 Stone Lakes NWR (6 occurrences). However, the CM1 footprint does not overlap with any  
6 grasshopper sparrow or California horned lark occurrences. However, Mitigation Measure BIO-  
7 75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would  
8 require preconstruction surveys and the establishment of no-disturbance buffers and would be  
9 available to address potential effects on California horned larks and grasshopper sparrows if  
10 they were to nest in or adjacent to construction areas. Refer to the Terrestrial Biology Map Book  
11 for a detailed view of Alternative 9 construction locations. Impacts from CM1 would occur  
12 within the first 10 years of Alternative 9 implementation.

- 13 ● *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo bypass fisheries enhancement  
14 would result in the combined permanent and temporary loss of up to 1,274 acres of modeled  
15 California horned lark and grasshopper sparrow habitat (898 acres of permanent loss, 376 acres  
16 of temporary loss) in the Yolo Bypass in CZ 2. Impacted habitat would consist primarily of  
17 grassland and pasture. Most of the grassland losses would occur at the north end of the bypass  
18 below Fremont Weir, along the Toe Drain/Tule Canal, and along the west side channels.  
19 Realignment of Putah Creek could also involve excavation and grading in alkali seasonal wetland  
20 complex habitat as a new channel is constructed. The loss is expected to occur during the first 10  
21 years of Alternative 9 implementation.
- 22 ● *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and  
23 inundation would permanently remove an estimated 20,880 acres of modeled California horned  
24 lark and grasshopper sparrow habitat. The majority of the acres lost would consist of cultivated  
25 lands in CZs 1, 2, 4, 5, 6, and/or 7. Grassland losses would likely occur in the vicinity of Cache  
26 Slough, on Decker Island in the West Delta ROA, on the upslope fringes of Suisun Marsh, and  
27 along narrow bands adjacent to waterways in the South Delta ROA. Tidal restoration would  
28 directly impact and fragment grassland just north of Rio Vista in and around French and  
29 Prospect Islands, and in an area south of Rio Vista around Threemile Slough. Losses of alkali  
30 seasonal wetland complex habitat would likely occur in the south end of the Yolo Bypass and on  
31 the northern fringes of Suisun Marsh.
- 32 ● *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore  
33 seasonally inundated floodplain would permanently and temporarily remove approximately  
34 1,450 acres of modeled California horned lark and grasshopper sparrow nesting habitat (933  
35 permanent, 517 temporary). These losses would be expected after the first 10 years of  
36 Alternative 9 implementation along the San Joaquin River and other major waterways in CZ 7.
- 37 ● *CM7 Riparian Natural Community Restoration*: Riparian restoration would permanently remove  
38 approximately 370 acres of California horned lark and grasshopper sparrow nesting habitat as  
39 part of tidal restoration and 1,489 acres as part of seasonal floodplain restoration.
- 40 ● *CM8 Grassland Natural Community Restoration and CM9 Vernal Pool and Alkali Seasonal Wetland*  
41 *Complex Restoration*: Temporary construction-related disturbance of grassland habitat would  
42 result from implementation of CM8 and CM9 in CZs 1, 2, 4, 5, 7, 8, and 11. However, all areas  
43 would be restored after the construction periods. Grassland restoration would be implemented  
44 on agricultural lands that also provide nesting habitat for California horned lark and

1 grasshopper sparrow and would result in the conversion of 837 acres of cultivated lands to  
2 grassland.

- 3 ● *CM10 Nontidal Marsh Restoration*: Implementation of CM10 would result in the permanent  
4 removal of 705 acres of California horned lark and grasshopper sparrow nesting habitat.
- 5 ● *CM11 Natural Communities Enhancement and Management*: A variety of habitat management  
6 actions included in CM11 that are designed to enhance wildlife values in restored or protected  
7 habitats could result in localized ground disturbances that could temporarily remove small  
8 amounts of modeled habitat. Ground-disturbing activities, such as removal of nonnative  
9 vegetation and road and other infrastructure maintenance activities, would be expected to have  
10 minor adverse effects on available habitat and would be expected to result in overall  
11 improvements to and maintenance of habitat values over the term of the BDCP. CM11 would  
12 also include the construction of recreational-related facilities including trails, interpretive signs,  
13 and picnic tables (BDCP Chapter 4, *Covered Activities and Associated Federal Actions*). The  
14 construction of trailhead facilities, signs, staging areas, picnic areas, bathrooms, etc. would be  
15 placed on existing, disturbed areas when and where possible. However, approximately 50 acres  
16 of grassland habitat would be lost from the construction of trails and facilities.

17 Habitat management- and enhancement-related activities could disturb California horned lark  
18 and grasshopper sparrow nests. If either species were to nest in the vicinity of a worksite,  
19 equipment operation could destroy nests, and noise and visual disturbances could lead to their  
20 abandonment, resulting in mortality of eggs and nestlings. Mitigation Measure BIO-75, *Conduct*  
21 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available  
22 to address these effects.

- 23 ● *CM18 Conservation Hatcheries*: Implementation of CM18 would remove up to 35 acres of  
24 modeled California horned lark and grasshopper sparrow habitat for the development of a delta  
25 and longfin smelt conservation hatchery in CZ 1.
- 26 ● *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground  
27 water conveyance facilities and restoration infrastructure could result in ongoing but periodic  
28 disturbances that could affect California horned lark and grasshopper sparrow use of the  
29 surrounding habitat. Maintenance activities would include vegetation management, levee and  
30 structure repair, and re-grading of roads and permanent work areas. These effects, however,  
31 would be reduced by AMM1-AMM7, Mitigation Measure BIO-75, and conservation actions as  
32 described below.
- 33 ● *Injury and Direct Mortality*: Construction-related activities would not be expected to result in  
34 direct mortality of adult or fledged California horned lark and grasshopper sparrow if they were  
35 present in the Plan Area, because they would be expected to avoid contact with construction and  
36 other equipment. If either species were to nest in the construction area, construction-related  
37 activities, including equipment operation, noise and visual disturbances could destroy nests or  
38 lead to their abandonment, resulting in mortality of eggs and nestlings. Mitigation Measure BIO-  
39 75 would be available to address these effects.

40 The following paragraphs summarize the combined effects discussed above and describe other  
41 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also  
42 included.

1       **Near-Term Timeframe**

2       Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
3       the near-term BDCP conservation strategy has been evaluated to determine whether it would  
4       provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
5       effects of construction would not be adverse under NEPA. Alternative 9 would remove 7,425 acres  
6       (5,768 permanent, 1,657 temporary) of modeled breeding habitat for California horned lark and  
7       grasshopper sparrow in the study area in the near-term. These effects would result from the  
8       construction of the water conveyance facilities (CM1, 1,599 acres), and implementing other  
9       conservation measures (*CM2 Yolo Bypass Fisheries Enhancement*, *CM4 Tidal Natural Communities*  
10       *Restoration*, *CM7 Riparian Natural Community Restoration*, *CM8 Grassland Natural Community*  
11       *Restoration*, *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*, *CM11 Natural*  
12       *Communities Enhancement and Management* and *CM18 Conservation Hatcheries*—5,826 acres).

13       The typical NEPA and CEQA project-level mitigation ratio for those natural communities affected  
14       would be 2:1 for protection of habitat. Using this ratio would indicate that 3,198 acres should be  
15       protected to compensate for the CM1 losses of 1,599 acres of California horned lark and  
16       grasshopper sparrow habitat. The near-term effects of other conservation actions would remove  
17       5,826 acres of modeled habitat, and therefore require 11,652 acres of protection of California  
18       horned lark and grasshopper sparrow nesting habitat using the same typical NEPA and CEQA ratio  
19       (2:1 for protection).

20       The BDCP has committed to near-term goals of protecting 2,000 acres and restoring 1,140 acres of  
21       grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of  
22       alkali seasonal wetland complex, and protecting 15,400 acres of non-rice cultivated lands (Table 3-4  
23       in Chapter 3, *Description of Alternatives*). These conservation actions are associated with CM3, CM8,  
24       and CM9 and would occur in the same timeframe as the construction and early restoration losses  
25       thereby avoiding adverse effects of habitat loss on California horned lark and grasshopper sparrow.  
26       Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1  
27       and GNC1.2). Grassland protection in CZs 1, 8, and 11 would be associated with vernal pool and  
28       alkali seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a  
29       contiguous matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which  
30       would expand breeding habitat for California horned lark and grasshopper sparrow and reduce the  
31       effects of current levels of habitat fragmentation. Under *CM11 Natural Communities Enhancement*  
32       *and Management*, insect prey populations would be increased on protected lands, enhancing the  
33       foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4).  
34       Cultivated lands that provide habitat for covered and other native wildlife species would provide  
35       approximately 15,400 acres of potential nesting habitat for California horned lark and grasshopper  
36       sparrow (Objective CLNC1.1). Approximately 87% of cultivated lands protected by the late long-  
37       term time period would be in alfalfa and pasture crop types (very high- and high-value crop types  
38       for Swainson's hawk (Objective SH1.2) which would also provide potential nesting habitat for  
39       California horned lark and grasshopper sparrow. This biological objective provides an estimate for  
40       the high proportion of cultivated lands protected in the near-term time period which would provide  
41       nesting habitat for California horned lark and grasshopper sparrow.

42       The acres of restoration and protection contained in the near-term Plan goals and the additional  
43       detail in the biological objectives satisfy the typical mitigation that would be applied to the project-  
44       level effects of CM1 on California horned lark and grasshopper sparrow, as well as mitigate the near-  
45       term effects of the other conservation measures with the consideration that some portion of the

1 15,400 acres of cultivated lands protected in the near-term timeframe would be managed in suitable  
2 crop types to compensate for the loss of habitat at a ratio of 2:1. Mitigation Measure BIO-130,  
3 *Compensate for the Near-Term Loss of California Horned Lark and Grasshopper Sparrow Habitat*,  
4 would be available to address the adverse effect of habitat loss in the near-term.

5 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
6 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
7 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
8 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
9 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
10 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
11 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

12 California horned lark and grasshopper sparrow are not covered species under the BDCP. For the  
13 BDCP to avoid an adverse effect on individuals, preconstruction surveys for noncovered avian  
14 species would be required to ensure that nests are detected and avoided. Mitigation Measure BIO-  
15 75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be  
16 available to address this adverse effect.

### 17 **Late Long-Term Timeframe**

18 Alternative 9 as a whole would result in the permanent loss of and temporary effects on 28,690  
19 acres of modeled California horned lark and grasshopper sparrow habitat during the term of the  
20 Plan. The locations of these losses are described above in the analyses of individual conservation  
21 measures. The Plan includes conservation commitments through *CM3 Natural Communities*  
22 *Protection and Restoration*, *CM8 Grassland Natural Community Restoration*, and *CM9 Vernal Pool and*  
23 *Alkali Seasonal Wetland Complex Restoration* to protect 8,000 acres and restore 2,000 acres of  
24 grassland natural community, protect 600 acres of vernal pool complex, protect 150 acres of alkali  
25 seasonal wetland complex and protect 48,625 acres of cultivated lands that provide suitable habitat  
26 for native wildlife species (Table 3-4 in Chapter 3). Grassland restoration and protection would  
27 occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1 and GNC1.2). Grassland protection in CZs 1, 8,  
28 and 11 would be associated with vernal pool and alkali seasonal wetland complexes (Objectives  
29 ASWNC1.1 and VPNC1.1) and would result in a contiguous matrix of grassland, alkali seasonal  
30 wetland, and vernal pool natural communities which would expand breeding habitat for California  
31 horned lark and grasshopper sparrow and reduce the effects of current levels of habitat  
32 fragmentation. Under *CM11 Natural Communities Enhancement and Management*, insect prey  
33 populations would be increased on protected lands, enhancing the foraging value of these natural  
34 communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4). Cultivated lands that provide habitat for  
35 covered and other native wildlife species would provide approximately 15,400 acres of potential  
36 nesting habitat for California horned lark and grasshopper sparrow (Objective CLNC1.1).  
37 Approximately 42,275 acres of cultivated lands protected would be in alfalfa and pasture crop types.  
38 These are very high- and high-value crop types for Swainson's hawk (Objective SH1.2) and would  
39 provide potential nesting habitat for California horned lark and grasshopper sparrow.

40 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
41 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
42 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
43 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
44 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or

1 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
2 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*. California horned  
3 lark and grasshopper sparrow are not covered species under the BDCP. For the BDCP to avoid an  
4 adverse effect on individuals, preconstruction surveys for noncovered avian species would be  
5 required to ensure that nests are detected and avoided. Mitigation Measure BIO-75, *Conduct*  
6 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to  
7 address this adverse effect.

8 **NEPA Effects:** The loss of California horned lark and grasshopper sparrow habitat and potential  
9 mortality of these special-status species under Alternative 9 would represent an adverse effect in  
10 the absence of other conservation actions. With habitat protection and restoration associated with  
11 CM3, CM8, CM9, and CM11, guided by biological goals and objectives and AMM1–AMM7, which  
12 would be in place throughout the construction period, and with Mitigation Measure BIO-130,  
13 *Compensate for the Near-Term Loss of California Horned Lark and Grasshopper Sparrow Habitat*, the  
14 effects of habitat loss under Alternative 9 on California horned lark and grasshopper sparrow would  
15 not be adverse under NEPA. California horned lark and grasshopper sparrow are not covered  
16 species under the BDCP, and potential mortality would be an adverse effect without preconstruction  
17 surveys to ensure that nests are detected and avoided. Mitigation Measure BIO-75 would be  
18 available to address this effect.

19 **CEQA Conclusion:**

20 **Near-Term Timeframe**

21 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
22 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
23 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
24 effects of construction would be less than significant under CEQA. Alternative 9 would remove 7,425  
25 acres (5,768 permanent, 1,657 temporary) of modeled breeding habitat for California horned lark  
26 and grasshopper sparrow in the study area in the near-term. These effects would result from the  
27 construction of the water conveyance facilities (CM1, 1,599 acres), and implementing other  
28 conservation measures (*CM2 Yolo Bypass Fisheries Enhancement*, *CM4 Tidal Natural Communities*  
29 *Restoration*, *CM7 Riparian Natural Community Restoration*, *CM8 Grassland Natural Community*  
30 *Restoration*, *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*, *CM11 Natural*  
31 *Communities Enhancement and Management* and *CM18 Conservation Hatcheries*—5,826 acres).

32 The typical NEPA and CEQA project-level mitigation ratio for those natural communities affected  
33 would be 2:1 for protection of habitat. Using this ratio would indicate that 3,198 acres should be  
34 protected to compensate for the CM1 losses of 1,599 acres of California horned lark and  
35 grasshopper sparrow habitat. The near-term effects of other conservation actions would remove  
36 5,826 acres of modeled habitat, and therefore require 11,652 acres of protection of California  
37 horned lark and grasshopper sparrow nesting habitat using the same typical NEPA and CEQA ratio  
38 (2:1 for protection).

39 The BDCP has committed to near-term goals of protecting 2,000 acres and restoring 1,140 acres of  
40 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of  
41 alkali seasonal wetland complex, and protecting 15,400 acres of non-rice cultivated lands (Table 3-4  
42 in Chapter 3). These conservation actions are associated with CM3, CM8, and CM9 and would occur  
43 in the same timeframe as the construction and early restoration losses thereby avoiding significant

1 impacts on California horned lark and grasshopper sparrow. Grassland restoration and protection  
2 would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1 and GNC1.2). Grassland protection in  
3 CZs 1, 8, and 11 would be associated with vernal pool and alkali seasonal wetland complexes  
4 (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous matrix of grassland, alkali  
5 seasonal wetland, and vernal pool natural communities which would expand breeding habitat for  
6 California horned lark and grasshopper sparrow and reduce the effects of current levels of habitat  
7 fragmentation. Under *CM11 Natural Communities Enhancement and Management*, insect prey  
8 populations would be increased on protected lands, enhancing the foraging value of these natural  
9 communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4). Cultivated lands that provide habitat for  
10 covered and other native wildlife species would provide approximately 15,400 acres of potential  
11 nesting habitat for California horned lark and grasshopper sparrow (Objective CLNC1.1).  
12 Approximately 87% of cultivated lands protected by the late long-term time period would be in  
13 alfalfa and pasture crop types (very high- and high-value crop types for Swainson's hawk (Objective  
14 SH1.2) which would also provide potential nesting habitat for California horned lark and  
15 grasshopper sparrow. This biological objective provides an estimate for the high proportion of  
16 cultivated lands protected in the near-term time period which would provide nesting habitat for  
17 California horned lark and grasshopper sparrow.

18 The acres of restoration and protection contained in the near-term Plan goals and the additional  
19 detail in the biological objectives satisfy the typical mitigation that would be applied to the project-  
20 level effects of CM1 on California horned lark and grasshopper sparrow, as well as mitigate the near-  
21 term effects of the other conservation measures with the consideration that some portion of the  
22 15,400 acres of cultivated lands protected in the near-term timeframe would be managed in suitable  
23 crop types to compensate for the loss of habitat at a ratio of 2:1. Implementation of Mitigation  
24 Measure BIO-130, *Compensate for the Near-Term Loss of California Horned Lark and Grasshopper*  
25 *Sparrow Habitat*, would reduce the impact of habitat loss in the near-term to a less-than-significant  
26 level.

27 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
28 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
29 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
30 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
31 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
32 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
33 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

34 California horned lark and grasshopper sparrow are not covered species under the BDCP. For the  
35 BDCP to avoid an adverse effect on individuals, preconstruction surveys for noncovered avian  
36 species would be required to ensure that nests are detected and avoided. Mitigation Measure BIO-  
37 75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would  
38 reduce this potential impact to a less-than-significant level.

### 39 **Late Long-Term Timeframe**

40 Alternative 9 as a whole would result in the permanent loss of and temporary effects on 28,690  
41 acres of modeled California horned lark and grasshopper sparrow habitat during the term of the  
42 Plan. The locations of these losses are described above in the analyses of individual conservation  
43 measures. The Plan includes conservation commitments through *CM3 Natural Communities*  
44 *Protection and Restoration*, *CM8 Grassland Natural Community Restoration*, and *CM9 Vernal Pool and*

1 *Alkali Seasonal Wetland Complex Restoration* to protect 8,000 acres and restore 2,000 acres of  
2 grassland natural community, protect 600 acres of vernal pool complex, protect 150 acres of alkali  
3 seasonal wetland complex and protect 48,625 acres of cultivated lands that provide suitable habitat  
4 for native wildlife species (Table 3-4 in Chapter 3). Grassland restoration and protection would  
5 occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1 and GNC1.2). Grassland protection in CZs 1, 8,  
6 and 11 would be associated with vernal pool and alkali seasonal wetland complexes (Objectives  
7 ASWNC1.1 and VPNC1.1) and would result in a contiguous matrix of grassland, alkali seasonal  
8 wetland, and vernal pool natural communities which would expand breeding habitat for California  
9 horned lark and grasshopper sparrow and reduce the effects of current levels of habitat  
10 fragmentation. Under *CM11 Natural Communities Enhancement and Management*, insect prey  
11 populations would be increased on protected lands, enhancing the foraging value of these natural  
12 communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4). Cultivated lands that provide habitat for  
13 covered and other native wildlife species would provide approximately 15,400 acres of potential  
14 nesting habitat for California horned lark and grasshopper sparrow (Objective CLNC1.1).  
15 Approximately 42,275 acres of cultivated lands protected would be in alfalfa and pasture crop types  
16 (very high- and high-value crop types for Swainson's hawk (Objective SH1.2) which would also  
17 provide potential nesting habitat for California horned lark and grasshopper sparrow. The Plan also  
18 includes commitments to implement *AMM1 Worker Awareness Training, AMM2 Construction Best  
19 Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention Plan, AMM4 Erosion  
20 and Sediment Control Plan, AMM5 Spill Prevention, Containment, and Countermeasure Plan, AMM6  
21 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged Material, and AMM7 Barge  
22 Operations Plan*. All of these AMMs include elements that would avoid or minimize the risk of  
23 affecting individuals and species habitats adjacent to work areas. The AMMs are described in detail  
24 in BDCP Appendix 3.C, *Avoidance and Minimization Measures*. California horned lark and  
25 grasshopper sparrow are not covered species under the BDCP. For the BDCP to avoid significant  
26 impacts on individuals, preconstruction surveys for noncovered avian species would be required to  
27 ensure that nests are detected and avoided. Implementation of Mitigation Measure BIO-75, *Conduct  
28 Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would reduce this  
29 impact to a less-than-significant level.

30 Considering Alternative 9's protection and restoration provisions, which would provide acreages of  
31 new high-value or enhanced habitat in amounts suitable to compensate for habitats lost to  
32 construction and restoration activities, and with the implementation of AMM1-AMM7, Mitigation  
33 Measure BIO-75, and Mitigation Measure BIO-130, *Compensate for the Near-Term Loss of California  
34 Horned Lark and Grasshopper Sparrow Habitat*, the loss of habitat or direct mortality through  
35 implementation of Alternative 9 would not result in a substantial adverse effect through habitat  
36 modifications and would not substantially reduce the number or restrict the range of California  
37 horned lark and grasshopper sparrow. Therefore, the loss of habitat or potential mortality under  
38 this alternative would have a less-than-significant impact on California horned lark and grasshopper  
39 sparrow.

40 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**  
41 **Disturbance of Nesting Birds**

42 See Mitigation Measure BIO-75 under Impact BIO-75.

1           **Mitigation Measure BIO-130: Compensate for the Near-Term Loss of California Horned**  
2           **Lark and Grasshopper Sparrow Habitat**

3           DWR will manage and protect sufficient acres of cultivated lands such as pasture, grain and hay  
4           crops, or alfalfa to provide California horned lark and grasshopper sparrow habitat such that the  
5           total acres of habitat impacted in the near-term timeframe are mitigated at a ratio of 2:1  
6           protection. Additional grassland protection, enhancement, and management may be substituted  
7           for the protection of cultivated lands.

8           **Impact BIO-131: Effects on California Horned Lark and Grasshopper Sparrow Associated with**  
9           **Electrical Transmission Facilities**

10          New transmission lines would increase the risk for bird-power line strikes and/or electrocution,  
11          which could result in injury or mortality of grasshopper sparrow and California horned lark. The  
12          potential for this risk, is considered minimal based on the flight behaviors of each species.  
13          Transmission line poles and towers also provide perching substrate for raptors, which could result  
14          in increased predation pressure. However, this would be expected to have few adverse effects on the  
15          grasshopper sparrow and California horned lark local populations.

16          **NEPA Effects:** New transmission lines would increase the risk for bird-power line strikes, which  
17          could result in injury or mortality of grasshopper sparrow and California horned lark. With the  
18          implementation of *AMM20 Greater Sandhill Crane* the effect of new transmission lines on California  
19          horned lark and grasshopper sparrow would not be adverse.

20          **CEQA Conclusion:** New transmission lines would increase the risk for bird-power line strikes, which  
21          could result in injury or mortality of grasshopper sparrow and California horned lark. With the  
22          incorporation of *AMM20 Greater Sandhill Crane*, new transmission lines would have a less-than-  
23          significant impact on grasshopper sparrow and California horned lark.

24          **Impact BIO-132: Indirect Effects of Plan Implementation on Grasshopper Sparrow and**  
25          **California Horned Lark**

26          Noise and visual disturbances associated with construction-related activities could result in  
27          temporary disturbances that affect California horned lark and grasshopper sparrow use of modeled  
28          habitat. Construction noise above background noise levels (greater than 50 dBA) could extend 1,900  
29          to 5,250 feet from the edge of construction activities (BDCP Appendix 5.J, Attachment 5J.D, *Indirect*  
30          *Effects of the Construction of the BDCP Conveyance Facility on Sandhill Crane*, Table 4), although there  
31          are no available data to determine the extent to which these noise levels could affect California  
32          horned lark or grasshopper sparrow. Indirect effects associated with construction include noise,  
33          dust, and visual disturbance caused by grading, filling, contouring, and other ground-disturbing  
34          operations. Construction-related noise and visual disturbances could disrupt nesting and foraging  
35          behaviors, and reduce the functions of suitable habitat which could result in an adverse effect on  
36          these species. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid*  
37          *Disturbance of Nesting Birds*, would be available to minimize adverse effects on active nests. The use  
38          of mechanical equipment during water conveyance construction could cause the accidental release  
39          of petroleum or other contaminants that could affect these species or their prey in the surrounding  
40          habitat. AMM1–AMM7, including *AMM2 Construction Best Management Practices and Monitoring*,  
41          would minimize the likelihood of such spills from occurring. The inadvertent discharge of sediment  
42          or excessive dust adjacent to grasshopper sparrow and California horned lark habitat could also

1 have a negative effect on these species. AMM1–AMM7 would ensure that measures are in place to  
2 prevent runoff from the construction area and the negative effects of dust on wildlife adjacent to  
3 work areas.

4 **NEPA Effects:** Indirect effects on California horned lark and grasshopper sparrow as a result of  
5 Alternative 9 implementation could have adverse effects on these species through the modification  
6 of habitat and potential direct mortality. California horned lark and grasshopper sparrow are not  
7 covered species under the BDCP, and potential mortality would be an adverse effect without  
8 preconstruction surveys to ensure that nests are detected and avoided. In conjunction with AMM1–  
9 AMM7, Mitigation Measure BIO-75 *Conduct Preconstruction Nesting Bird Surveys and Avoid*  
10 *Disturbance of Nesting Birds*, would be available to address this adverse effect.

11 **CEQA Conclusion:** Indirect effects on grasshopper sparrow and California horned lark as a result of  
12 constructing the water conveyance facilities could have a significant impact on these species. The  
13 incorporation of AMM1–AMM7 into the BDCP and the implementation of Mitigation Measure BIO-  
14 75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would  
15 reduce this impact to a less-than-significant level.

16 **Mitigation Measure BIO-75a: Conduct Preconstruction Nesting Bird Surveys and Avoid**  
17 **Disturbance of Nesting Birds**

18 See Mitigation Measure BIO-75a under Impact BIO-75.

19 **Impact BIO-133: Periodic Effects of Inundation on Grasshopper Sparrow and California**  
20 **Horned Lark as a Result of Implementation of Conservation Components**

21 Flooding of the Yolo Bypass from Fremont Weir operations (*CM2 Yolo Bypass Fisheries*  
22 *Enhancement*) would increase the frequency and duration of inundation on approximately 1,158–  
23 3,650 acres of modeled California horned lark and grasshopper sparrow habitat (Table 12-9-49).

24 Based on hypothetical footprints, implementation of *CM5 Seasonally Inundated Floodplain*  
25 *Restoration* could result in the periodic inundation of up to approximately 3,823 acres of modeled  
26 habitat (Table 12-9-49).

27 Reduced foraging habitat availability may be expected during the fledgling period of the nesting  
28 season due to periodic inundation. However, inundation would occur during the nonbreeding  
29 season and would not be expected to have an adverse effect on either species.

30 **NEPA Effects:** Periodic inundation of floodplains would not have adverse effects on grasshopper  
31 sparrow or California horned lark because inundation is expected to occur prior to the breeding  
32 season.

33 **CEQA Conclusion:** Periodic inundation of floodplains would not have a significant impact on  
34 grasshopper sparrow or California horned lark because inundation is expected to occur prior to the  
35 breeding season.

36 **Least Bittern and White-Faced Ibis**

37 This section describes the effects of Alternative 9, including water conveyance facilities construction  
38 and implementation of other conservation components, on least bittern and white-faced ibis.  
39 Modeled breeding habitat for least bittern and white-faced ibis consists of tidal freshwater and

nontidal freshwater emergent wetlands, managed wetlands, and other natural seasonal wetlands in CZs 2, 4, and 11. Construction and restoration associated with Alternative 9 conservation measures would result in both temporary and permanent losses of modeled habitat for least bittern and white-faced ibis as indicated in Table 12-9-50. Full implementation of Alternative 9 would include the following biological objectives over the term of the BDCP that would benefit least bittern and white-faced ibis (BDCP Chapter 3, Section 3.3, *Biological Goals and Objectives*).

- Restore or create at least 24,000 acres of tidal freshwater emergent wetland in CZs 1, 2, 4, 5, 6, and/or 7 (Objective TFEWNC1.1, associated with CM4).
- Create at least 1,200 acres of nontidal marsh consisting of a mosaic of nontidal perennial aquatic and nontidal freshwater emergent wetland natural communities (Objective NFEW/NPANC1.1, associated with CM10).
- Protect and enhance at least 8,100 acres of managed wetland, at least 1,500 acres of which are in the Grizzly Island Marsh Complex (Objective MWNC1.1, associated with CM3).

As explained below, with the restoration or protection of these amounts of habitat, in addition to management activities that would enhance habitat for these species, and implementation of AMM1-AMM7, AMM27 *Selenium Management*, and Mitigation Measure BIO-75, impacts on least bittern and white-faced ibis would not be adverse for NEPA purposes and would be less than significant for CEQA purposes.

**Table 12-9-50. Changes in Least Bittern and White-Faced Ibis Modeled Habitat Associated with Alternative 9 (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	Nesting	1	1	0	0	NA	NA
<b>Total Impacts CM1</b>		<b>1</b>	<b>1</b>	<b>0</b>	<b>0</b>	NA	NA
CM2-CM18	Nesting	5,134	13,063	45	45	961-2,672	NA
<b>Total Impacts CM2-CM18</b>		<b>5,134</b>	<b>13,063</b>	<b>45</b>	<b>45</b>	<b>961-2,672</b>	<b>NA</b>
<b>TOTAL IMPACTS</b>		<b>5,135</b>	<b>13,064</b>	<b>45</b>	<b>45</b>	<b>961-2,672</b>	<b>NA</b>

<sup>a</sup> See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

1 **Impact BIO-134: Loss or Conversion of Habitat for and Direct Mortality of Least Bittern and**  
2 **White-Faced Ibis**

3 Alternative 9 conservation measures would result in the combined permanent and temporary loss  
4 and conversion of up to 13,109 acres of modeled habitat for least bittern and white-faced ibis  
5 (13,064 acres of permanent loss and conversion and 45 of temporary loss, Table 12-9-50).  
6 Conservation measures that would result in these losses are conveyance facilities and transmission  
7 line construction, and establishment and use of borrow and spoil areas (CM1), *CM2 Yolo Bypass*  
8 *Fisheries Enhancement*, and *CM4 Tidal Natural Communities Restoration*. Habitat enhancement and  
9 management activities (CM11), which would include ground disturbance or removal of nonnative  
10 vegetation, could result in local adverse habitat effects. In addition, maintenance activities  
11 associated with the long-term operation of the water conveyance facilities and other BDCP physical  
12 facilities could degrade or eliminate least bittern and white-faced ibis habitat. Each of these  
13 individual activities is described below. A summary statement of the combined impacts, NEPA  
14 effects, and a CEQA conclusion follow the individual conservation measure discussions.

- 15 • *CM1 Water Facilities and Operation*: Construction of Alternative 9 conveyance facilities would  
16 result in the permanent loss of 1 acre of modeled least bittern and white-faced ibis habitat from  
17 CZ 4. This loss would occur from the fringes of tidal freshwater emergent wetland along  
18 channels and island edges that would be impacted from channel dredging activities. The  
19 construction footprint for CM1 does not overlap with any occurrences of least bittern or white-  
20 faced ibis. The Refer to the Terrestrial Biology Map Book for a detailed view of Alternative 9  
21 construction locations. Impacts from CM1 would occur within the first 10 years of Alternative 9  
22 implementation.
- 23 • *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo bypass fisheries enhancement  
24 would permanently remove 55 acres of modeled least bittern and white-faced ibis habitat in the  
25 Yolo Bypass in CZ 2. In addition, 45 acres of habitat would be temporarily removed. The loss is  
26 expected to occur during the first 10 years of Alternative 9 implementation.
- 27 • *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and  
28 inundation would permanently remove an estimated 13,008 acres of modeled least bittern and  
29 white-faced ibis habitat in CZ 2, 4, and 11 by the late long-term time period.
- 30 • *CM11 Natural Communities Enhancement and Management*: A variety of habitat management  
31 actions included in *CM11 Natural Communities Enhancement and Management* that are designed  
32 to enhance wildlife values in restored or protected habitats could result in localized ground  
33 disturbances that could temporarily remove small amounts of least bittern and white-faced ibis  
34 habitat. Ground-disturbing activities, such as removal of nonnative vegetation and road and  
35 other infrastructure maintenance activities, would be expected to have minor adverse effects on  
36 available least bittern and white-faced ibis habitat.
- 37 • *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground  
38 water conveyance facilities and restoration infrastructure could result in ongoing but periodic  
39 disturbances that could affect least bittern and white-faced ibis use of the surrounding habitat.  
40 Maintenance activities would include vegetation management, levee and structure repair, and  
41 re-grading of roads and permanent work areas. These effects, however, would be reduced by  
42 AMM1–AMM7 described below and Mitigation Measure BIO-75, *Conduct Preconstruction Nesting*  
43 *Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to further reduce  
44 potential effects.

- 1 • Injury and Direct Mortality: Construction-related activities would not be expected to result in  
2 direct mortality of least bittern and white-faced ibis because adults and fledged young would be  
3 expected to avoid contact with construction and other equipment. However, if either species  
4 were to nest in the construction area, equipment operation, noise and visual disturbances could  
5 destroy nests or lead to their abandonment, resulting in mortality of eggs and nestlings.  
6 Mitigation Measure BIO-75 would be available to address these effects.

7 The following paragraphs summarize the combined effects discussed above and describe other  
8 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also  
9 included.

### 10 ***Near-Term Timeframe***

11 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
12 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
13 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
14 effects of construction would not be adverse under NEPA. Alternative 9 would remove 5,180 acres  
15 of modeled habitat for least bittern and white-faced ibis in the study area in the near-term (5,135  
16 acres of permanent loss, and 45 acres of temporary loss). These effects would result from the  
17 construction of the water conveyance facilities (CM1, 1 acre), and the implementation of other  
18 conservation measures (Yolo Bypass fisheries enhancement [CM2], and tidal restoration [CM4]  
19 5,179 acres).

20 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected would  
21 be 1:1 for restoration/creation and 1:1 protection of least bittern and white-faced ibis habitat. Using  
22 these ratios would indicate that 1 acre of habitat should be restored and 1 acre of habitat should be  
23 protected to compensate for the CM1 losses of 1 acre of least bittern and white-faced ibis habitat.  
24 The near-term effects of other conservation actions would remove 5,179 acres of modeled habitat,  
25 and therefore require 5,179 acres of restoration and 5,179 acres of protection of least bittern and  
26 white-faced ibis habitat using the same typical NEPA and CEQA ratios (1:1 for restoration and 1:1  
27 for protection).

28 The BDCP has committed to near-term goals of restoring 8,850 acres of tidal freshwater emergent  
29 wetland and protecting and enhancing 4,800 acres of managed wetland in the Plan Area (Table 3-4  
30 in Chapter 3, *Biological Goals and Objectives*). These conservation actions are associated with CM4  
31 and CM3 and would occur in the same timeframe as the construction and early restoration losses,  
32 thereby avoiding adverse effects of habitat loss on least bittern and white-faced ibis. The tidal  
33 freshwater emergent wetland would be restored in CZs 1, 2, 4, 5, 6, and/or 7 (Objective TFEWNC1.1  
34 in BDCP Chapter 3, *Conservation Strategy*) and would be restored in a way that creates topographic  
35 heterogeneity and in areas that increase connectivity among protected lands (Objective  
36 TFEWNC2.2). The 4,800 acres of managed wetland would be protected and enhanced in CZ 11 and  
37 would benefit these species through the enhancement of degraded areas (such as areas of bare  
38 ground or marsh where the predominant vegetation consists of invasive species such as perennial  
39 pepperweed) to vegetation such as pickleweed-alkali heath-American bulrush plant associations  
40 (Objective MWNC1.1). In addition, at least 400 acres of nontidal marsh would be created, some of  
41 which would provide nesting habitat for least bittern and white-faced ibis. These Plan objectives  
42 represent performance standards for considering the effectiveness of restoration and protection  
43 actions. The acres of restoration and protection contained in the near-term Plan goals satisfy the

1 typical mitigation that would be applied to the project-level effects of CM1, as well as mitigate the  
2 near-term effects of the other conservation measures.

3 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
4 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
5 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
6 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
7 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that avoid or  
8 minimize the risk of affecting individuals and species habitats adjacent to work areas and storage  
9 sites. The AMMs are described in detail in BDCP Appendix 3.C, *Avoidance and Minimization*  
10 *Measures*. Least bittern and white-faced ibis are not covered species under the BDCP. For the BDCP  
11 to avoid an adverse effect on individuals, preconstruction surveys for noncovered avian species  
12 would be required to ensure that nests are detected and avoided.

### 13 **Late Long-Term Timeframe**

14 Alternative 9 as a whole would result in the permanent loss of and temporary effects on 13,109  
15 acres (13,064 acres of permanent loss, 45 acres of temporary loss) of least bittern and white-faced  
16 ibis habitat during the term of the Plan. The locations of these losses are described above in the  
17 analyses of individual conservation measures. The Plan includes conservation commitments  
18 through *CM4 Tidal Natural Communities Restoration* to restore or create at least 24,000 acres of tidal  
19 freshwater emergent wetland in CZs 1, 2, 4, 5, 6, and/or 7 (Objective TFEWNC1.1). In addition, 1,200  
20 acres of nontidal marsh would be created through *CM10 Nontidal Marsh Restoration* and 8,100 acres  
21 of managed wetland would be protected and enhanced in CZ 11.

22 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
23 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
24 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
25 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
26 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that avoid or  
27 minimize the risk of affecting individuals and species habitats adjacent to work areas and storage  
28 sites. The AMMs are described in detail in BDCP Appendix 3.C, *Avoidance and Minimization*  
29 *Measures*. Least bittern and white-faced ibis are not covered species under the BDCP. For the BDCP  
30 to avoid an adverse effect on individuals, preconstruction surveys for noncovered avian species  
31 would be required to ensure that nests are detected and avoided.

32 **NEPA Effects:** The loss of least bittern and white-faced ibis habitat and potential mortality of these  
33 special-status species under Alternative 9 would represent an adverse effect in the absence of other  
34 conservation actions. However, with the habitat protection and restoration associated with CM3,  
35 CM4, CM6, CM7, and CM11, guided by biological goals and objectives and by AMM1–AMM7, which  
36 would be in place throughout the construction period, the effects of habitat loss on least bittern and  
37 white-faced ibis would not be adverse under Alternative 9. Least bittern and white-faced ibis are not  
38 covered species under the BDCP, and the potential for mortality would be an adverse effect without  
39 preconstruction surveys to ensure that nests are detected and avoided. Mitigation Measure BIO-75  
40 would be available to address this effect.

### 41 **CEQA Conclusion:**

1 **Near-Term Timeframe**

2 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
3 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
4 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
5 impacts of construction would be less than significant under CEQA. Alternative 9 would remove  
6 1,580 acres of modeled habitat for least bittern and white-faced ibis in the study area in the near-  
7 term (5,135 acres of permanent loss, and 45 acres of temporary loss). These effects would result  
8 from the construction of the water conveyance facilities (CM1, 1 acre), and the implementation of  
9 other conservation measures (Yolo Bypass fisheries enhancement [CM2], and tidal restoration  
10 [CM4] 5,179 acres).

11 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected would  
12 be 1:1 for restoration/creation and 1:1 protection of least bittern and white-faced ibis habitat. Using  
13 these ratios would indicate that 1 acre of habitat should be restored and 1 acre of habitat should be  
14 protected to compensate for the CM1 losses of 1 acre of least bittern and white-faced ibis habitat.  
15 The near-term effects of other conservation actions would remove 5,179 acres of modeled habitat,  
16 and therefore require 5,179 acres of restoration and 5,179 acres of protection of least bittern and  
17 white-faced ibis habitat using the same typical NEPA and CEQA ratios (1:1 for restoration and 1:1  
18 for protection).

19 The BDCP has committed to near-term goals of restoring 2,000 acres of tidal freshwater emergent  
20 wetland and 4,800 acres of managed wetland in the Plan Area (Table 3-4 in Chapter 3, *Description of*  
21 *Alternatives*). These conservation actions are associated with CM4 and CM3 and would occur in the  
22 same timeframe as the construction and early restoration losses, thereby avoiding adverse effects of  
23 habitat loss on least bittern and white-faced ibis. The tidal freshwater emergent wetland would be  
24 restored in CZs 1, 2, 4, 5, 6, and/or 7 (Objective TFEWNC1.1 in BDCP Chapter 3, *Conservation*  
25 *Strategy*) and would be restored in a way that creates topographic heterogeneity and in areas that  
26 increase connectivity among protected lands (Objective TFEWNC2.2). The 4,800 acres of managed  
27 wetland would be protected and enhanced in CZ 11 and would benefit these species through the  
28 enhancement of degraded areas (such as areas of bare ground or marsh where the predominant  
29 vegetation consists of invasive species such as perennial pepperweed) to vegetation such as  
30 pickleweed-alkali heath-American bulrush plant associations (Objective MWNC1.1). In addition, at  
31 least 400 acres of nontidal marsh would be created, some of which would provide nesting habitat  
32 for least bittern and white-faced ibis. These Plan objectives represent performance standards for  
33 considering the effectiveness of restoration and protection actions. The acres of restoration and  
34 protection contained in the near-term Plan goals satisfy the typical mitigation that would be applied  
35 to the project-level effects of CM1, as well as mitigate the near-term effects of the other conservation  
36 measures.

37 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
38 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
39 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
40 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
41 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that avoid or  
42 minimize the risk of affecting individuals and species habitats adjacent to work areas and storage  
43 sites. The AMMs are described in detail in BDCP Appendix 3.C, *Avoidance and Minimization*  
44 *Measures*. Least bittern and white-faced ibis are not covered species under the BDCP. For the BDCP  
45 to have a less-than-significant impact on individuals, preconstruction surveys would be required to

1 ensure that nests were detected and avoided. Implementation of Mitigation Measure BIO-75,  
2 *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would reduce  
3 the potential impact on nesting least bittern and white-faced ibis to a less-than-significant level.

#### 4 **Late Long-Term Timeframe**

5 Alternative 9 as a whole would result in the permanent loss of and temporary effects on 13,109  
6 acres (13,064 acres of permanent loss, 45 acres of temporary loss) of least bittern and white-faced  
7 ibis habitat during the term of the Plan. The locations of these losses are described above in the  
8 analyses of individual conservation measures. The Plan includes conservation commitments  
9 through *CM4 Tidal Natural Communities Restoration* to restore or create at least 24,000 acres of tidal  
10 freshwater emergent wetland in CZs 1, 2, 4, 5, 6, and/or 7 (Objective TFEWNC1.1). In addition, 1,200  
11 acres of nontidal marsh would be created through *CM10 Nontidal Marsh Restoration* and 8,100 acres  
12 of managed wetland would be protected and enhanced in CZ 11.

13 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
14 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
15 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
16 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
17 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that avoid or  
18 minimize the risk of affecting individuals and species habitats adjacent to work areas and storage  
19 sites. The AMMs are described in detail in BDCP Appendix 3.C, *Avoidance and Minimization*  
20 *Measures*. Least bittern and white-faced ibis are not covered species under the BDCP. For the BDCP  
21 to avoid an adverse effect on individuals, preconstruction surveys for noncovered avian species  
22 would be required to ensure that nests were detected and avoided. Implementation of Mitigation  
23 Measure BIO-75 would reduce the potential impact on nesting least bittern and white-faced ibis and  
24 to a less-than-significant level.

25 Considering these protection and restoration provisions, which would provide acreages of new  
26 high-value or enhanced habitat in amounts suitable to compensate for habitats lost to construction  
27 and restoration activities, and with the implementation of AMM1–AMM7, and Mitigation Measure  
28 BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, the loss  
29 of habitat or direct mortality through implementation of Alternative 9 would not result in a  
30 substantial adverse effect through habitat modifications and would not substantially reduce the  
31 number or restrict the range of least bittern and white-faced ibis. Therefore, the loss of habitat or  
32 potential mortality under this alternative would have a less-than-significant impact on least bittern  
33 and white-faced ibis.

#### 34 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid** 35 **Disturbance of Nesting Birds**

36 See Mitigation Measure BIO-75 under Impact BIO-75.

#### 37 **Impact BIO-135: Effects on Least Bittern and White-Faced Ibis Associated with Electrical** 38 **Transmission Facilities**

39 New transmission lines would increase the risk for bird-power line strikes, which could result in  
40 injury or mortality of least bittern and white-faced ibis. The risk for bird-power line strikes, would  
41 be minimized with the incorporation of *AMM20 Greater Sandhill Crane* into the BDCP. This measure

1 would ensure that conductor and ground lines are fitted with flight diverters in compliance with the  
2 best available practices, such as those specified in the USFWS Avian Protection Guidelines.

3 **NEPA Effects:** New transmission lines would increase the risk for bird-power line strikes, which  
4 could result in injury or mortality of least bittern and white-faced ibis. With the incorporation of  
5 *AMM20 Greater Sandhill Crane* into the BDCP, new transmission lines would not have an adverse  
6 effect on least bittern and white-faced ibis.

7 **CEQA Conclusion:** New transmission lines would increase the risk for bird-power line strikes, which  
8 could result in injury or mortality of least bittern and white-faced ibis. With the incorporation of  
9 *AMM20 Greater Sandhill Crane* into the BDCP, new transmission lines would have a less-than-  
10 significant impact on least bittern and white-faced ibis.

### 11 **Impact BIO-136: Indirect Effects of Plan Implementation on Least Bittern and White-Faced** 12 **Ibis**

13 **Indirect construction- and operation-related effects:** Noise and visual disturbances associated  
14 with construction-related activities could result in temporary disturbances that affect least bittern  
15 and white-faced ibis use of modeled habitat. Construction noise above background noise levels  
16 (greater than 50 dBA) could extend 1,900 to 5,250 feet from the edge of construction activities  
17 (BDCP Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of the BDCP Conveyance*  
18 *Facility on Sandhill Crane*, Table 4), although there are no available data to determine the extent to  
19 which these noise levels could affect least bittern or white-faced ibis. Indirect effects associated with  
20 construction include noise, dust, and visual disturbance caused by grading, filling, contouring, and  
21 other ground-disturbing operations. Construction-related noise and visual disturbances could  
22 disrupt nesting and foraging behaviors, and reduce the functions of suitable habitat which could  
23 result in an adverse effect on these species. Mitigation Measure BIO-75, *Conduct Preconstruction*  
24 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to minimize effects  
25 on active nests. The use of mechanical equipment during water conveyance construction could  
26 cause the accidental release of petroleum or other contaminants that could affect these species or  
27 their prey in the surrounding habitat. AMM1-AMM7, including *AMM2 Construction Best*  
28 *Management Practices and Monitoring*, would minimize the likelihood of such spills from occurring.  
29 The inadvertent discharge of sediment or excessive dust adjacent to least bittern and white-faced  
30 ibis could also have a negative effect on these species. AMM1-AMM7 would ensure that measures  
31 are in place to prevent runoff from the construction area and the negative effects of dust on wildlife  
32 adjacent to work areas.

33 **Methylmercury Exposure:** Marsh (tidal and nontidal) and floodplain restoration have the potential  
34 to increase exposure to methylmercury. Mercury is transformed into the more bioavailable form of  
35 methylmercury in aquatic systems, especially areas subjected to regular wetting and drying such as  
36 tidal marshes and flood plains (Alpers et al. 2008). Thus, BDCP restoration activities that create  
37 newly inundated areas could increase bioavailability of mercury (see BDCP Chapter 3, *Conservation*  
38 *Strategy*, for details of restoration). Species sensitivity to methylmercury differs widely and there is  
39 a large amount of uncertainty with respect to species-specific effects. Increased methylmercury  
40 associated with natural community and floodplain restoration could indirectly affect least bittern  
41 and white-faced ibis, via uptake in lower trophic levels (as described in the BDCP, Appendix 5.D,  
42 *Contaminants*).

1 In addition, the potential mobilization or creation of methylmercury within the Plan Area varies  
2 with site-specific conditions and would need to be assessed at the project level. *CM12 Methylmercury*  
3 *Management* contains provisions for project-specific Mercury Management Plans. Site-specific  
4 restoration plans that address the creation and mobilization of mercury, as well as monitoring and  
5 adaptive management as described in CM12 would be available to address the uncertainty of  
6 methylmercury levels in restored tidal marsh and potential impacts on least bittern and white-faced  
7 ibis.

8 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in  
9 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,  
10 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,  
11 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz  
12 2009). The effect of selenium toxicity differs widely between species and also between age and sex  
13 classes within a species. In addition, the effect of selenium on a species can be confounded by  
14 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith  
15 2009).

16 The primary source of selenium bioaccumulation in birds is through their diet (Ackerman and  
17 Eagles-Smith 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the  
18 trophic level at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At  
19 Kesterson Reservoir in the San Joaquin Valley, selenium concentrations in invertebrates have been  
20 found to be two to six times the levels in rooted plants. Furthermore, bivalves sampled in the San  
21 Francisco Bay contained much higher selenium levels than crustaceans such as copepods (Stewart et  
22 al. 2004). Studies conducted at the Grasslands in Merced County recorded higher selenium levels in  
23 black-necked stilts which feed on aquatic invertebrates than in mallards and pintails, which are  
24 primarily herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which  
25 forage on bivalves) have much higher levels of selenium levels than shorebirds that prey on aquatic  
26 invertebrates (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high  
27 levels of selenium have a higher risk of selenium toxicity.

28 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations  
29 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to  
30 exacerbate bioaccumulation of selenium in avian species, including least bittern and white-faced  
31 ibis. Marsh (tidal and nontidal) and floodplain restoration have the potential to mobilize selenium,  
32 and therefore increase avian exposure from ingestion of prey items with elevated selenium levels.  
33 Thus, BDCP restoration activities that create newly inundated areas could increase bioavailability of  
34 selenium (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Changes in  
35 selenium concentrations were analyzed in Chapter 8, *Water Quality*, and it was determined that,  
36 relative to Existing Conditions and the No Action Alternative, CM1 would not result in substantial,  
37 long-term increases in selenium concentrations in water in the Delta under any alternative.  
38 However, it is difficult to determine whether the effects of potential increases in selenium  
39 bioavailability associated with restoration-related conservation measures (CM4 and CM5) would  
40 lead to adverse effects on least bittern and white-faced ibis.

41 Because of the uncertainty that exists at this programmatic level of review, there could be a  
42 substantial effect on least bittern and white-faced ibis from increases in selenium associated with  
43 restoration activities. This effect would be addressed through the implementation of *AMM27*  
44 *Selenium Management* (BDCP Appendix 3.C, *Avoidance and Minimization Measures*) which would  
45 provide specific tidal habitat restoration design elements to reduce the potential for

1 bioaccumulation of selenium and its bioavailability in tidal habitats. Furthermore, the effectiveness  
2 of selenium management to reduce selenium concentrations and/or bioaccumulation would be  
3 evaluated separately for each restoration effort as part of design and implementation. This  
4 avoidance and minimization measure would be implemented as part of the tidal habitat restoration  
5 design schedule.

6 **NEPA Effects:** Indirect effects on least bittern and white-faced ibis as a result of constructing the  
7 water conveyance facilities could have adverse effects on these species in the absence of other  
8 conservation actions. However, the implementation of AMM1–AMM7 would help to reduce this  
9 effect. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid*  
10 *Disturbance of Nesting Birds*, would also be available to address the adverse indirect effects of  
11 construction on active nests. Tidal habitat restoration could result in increased exposure of least  
12 bittern and white-faced ibis to selenium. This effect would be addressed through the  
13 implementation of *AMM27 Selenium Management*, which would provide specific tidal habitat  
14 restoration design elements to reduce the potential for bioaccumulation of selenium and its  
15 bioavailability in tidal habitats.

16 Increased methylmercury associated with natural community and floodplain restoration could  
17 indirectly affect least bittern and white-faced ibis, via uptake in lower trophic levels (as described in  
18 the BDCP, Appendix 5.D, *Contaminants*). However, it is unknown what concentrations of  
19 methylmercury are harmful to the species, and the potential for increased exposure varies  
20 substantially within the study area. *CM12 Methylmercury Management* contains provisions for  
21 project-specific Mercury Management Plans. Site-specific restoration plans that address the creation  
22 and mobilization of mercury, as well as monitoring and adaptive management as described in *CM12*  
23 would better inform potential adverse effects and address the uncertainty of methylmercury levels  
24 in restored tidal marsh in the study area. The site-specific planning phase of marsh restoration  
25 would be the appropriate place to assess the potential for risk of methylmercury exposure for least  
26 bittern and white-faced ibis, once site specific sampling and other information could be developed.

27 **CEQA Conclusion:** Indirect effects on least bittern and white-faced ibis as a result of constructing the  
28 water conveyance facilities could have a significant impact on these species. The incorporation of  
29 AMM1–AMM7 into the BDCP and the implementation of Mitigation Measure BIO-75, *Conduct*  
30 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would reduce this  
31 impact to a less-than-significant level. Increased methylmercury associated with natural community  
32 and floodplain restoration could indirectly affect least bittern and white-faced ibis, via uptake in  
33 lower trophic levels (as described in the BDCP, Appendix 5.D, *Contaminants*). In addition, the  
34 potential mobilization or creation of methylmercury within the Plan Area varies with site-specific  
35 conditions and would need to be assessed at the project level. *CM12 Methylmercury Management*  
36 contains provisions for project-specific Mercury Management Plans. Tidal habitat restoration could  
37 result in increased exposure of least bittern and white-faced ibis to selenium. This effect would be  
38 addressed through the implementation of *AMM27 Selenium Management*, which would provide  
39 specific tidal habitat restoration design elements to reduce the potential for bioaccumulation of  
40 selenium and its bioavailability in tidal habitats. Therefore, the indirect effects of Alternative 9  
41 implementation would not have a significant impact on least bittern and white-faced ibis.

42 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**  
43 **Disturbance of Nesting Birds**

44 See Mitigation Measure BIO-75 under Impact BIO-75.

1 **Impact BIO-137: Periodic Effects of Inundation on Least Bittern and White-Faced Ibis as a**  
2 **Result of Implementation of Conservation Components**

3 Flooding of the Yolo Bypass from Fremont Weir operations (*CM2 Yolo Bypass Fisheries*  
4 *Enhancement*) would increase the frequency and duration of inundation on approximately 961-  
5 2,672 acres of modeled least bittern and white-faced ibis habitat (Table 12-9-50). However, no  
6 adverse effects of increased inundation frequency on nesting habitat would be expected because  
7 wetland vegetation has persisted under the existing Yolo Bypass flooding regime, and changes to  
8 frequency and inundation are within the tolerance of these vegetation types. Inundation would  
9 occur in the nonbreeding season and wetlands supporting habitat would not be expected to be  
10 affected by flood flows.

11 **NEPA Effects:** Periodic inundation of Yolo Bypass would not be expected to have adverse effects on  
12 least bittern or white-faced ibis because wetland vegetation has persisted under the existing Yolo  
13 Bypass flooding regime, and changes to frequency and inundation are within the tolerance of these  
14 vegetation types.

15 **CEQA Conclusion:** Periodic inundation of Yolo Bypass would not be expected to have a significant  
16 impact on least bittern or white-faced ibis because wetland vegetation has persisted under the  
17 existing Yolo Bypass flooding regime, and changes to frequency and inundation are within the  
18 tolerance of these vegetation types.

19 **Loggerhead Shrike**

20 Modeled habitat for loggerhead shrike includes both high-value and low-value modeled habitat.  
21 High-value habitat includes grassland, vernal pool complex and alkali seasonal wetland natural  
22 communities in addition to cultivated lands, including pasture and grain and hay crops. Low-value  
23 habitat includes row crops such as truck and berry crops and field crops that are not considered to  
24 be valuable habitat for the species but which were included in the model because they may provide  
25 foraging opportunities.

26 Construction and restoration associated with Alternative 9 conservation measures would result in  
27 both temporary and permanent losses of modeled habitat for loggerhead shrike as indicated in  
28 Table 12-9-51. Full implementation of Alternative 9 would include the following biological  
29 objectives over the term of the BDCP that would benefit loggerhead shrike (BDCP Chapter 3, Section  
30 3.3, *Biological Goals and Objectives*).

- 31 ● Protect at least 8,000 acres of grassland, with at least 2,000 acres protected in CZ 1, at least  
32 1,000 acres protected in CZ 8, at least 2,000 acres protected in CZ 11, and the remainder  
33 distributed among CZs 1, 2, 4, 5, 7, 8, and 11 (Objective GNC1.1, associated with CM3).
- 34 ● Restore at least 2,000 acres of grasslands (Objective GNC1.2, associated with CM8).
- 35 ● Protect at least 150 acres of alkali seasonal wetland and at least 600 acres of existing vernal pool  
36 complex in CZs 1, 8, and/or 11 (Objectives ASWNC1.1 and VPNC1.1, associated with CM3).
- 37 ● Increase prey availability and accessibility for grassland-foraging species (Objectives  
38 ASWNC2.4, VPNC2.5, and GNC2.4, associated with CM11).
- 39 ● Protect at least 48,625 acres of cultivated lands that provide suitable habitat for covered and  
40 other native wildlife species (Objective CLNC1.1, associated with CM3).

- Maintain and protect the small patches of important wildlife habitats that occur in cultivated lands within the reserve system, including isolated valley oak trees, trees and shrubs along field borders and roadsides, remnant groves, riparian corridors, water conveyance channels, grasslands, ponds, and wetlands (Objective CLNC1.3, associated with CM3 and CM11).
- Establish 20- to 30-foot-wide hedgerows along field borders and roadsides within protected cultivated lands at a minimum rate of 400 linear feet per 100 acres (Objective SH2.2, associated with CM11).

As explained below, with the restoration or protection of these amounts of habitat, in addition to management activities that would enhance habitat for the species, and implementation of AMM1-AMM7 and Mitigation Measure BIO-75, impacts on loggerhead shrike would not be adverse for NEPA purposes and would be less than significant for CEQA purposes.

**Table 12-9-51. Changes in Loggerhead Shrike Modeled Habitat Associated with Alternative 9 (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	High-value	318	318	1,281	1,281	NA	NA
	Low-value	55	55	1,231	1,231	NA	NA
<b>Total Impacts CM1</b>		<b>373</b>	<b>373</b>	<b>2,512</b>	<b>2,512</b>	<b>NA</b>	<b>NA</b>
CM2-CM18	High-value	5,450	26,198	376	893	777-2,423	3,823
	Low-value	1,801	17,575	97	624	672-1,996	4,315
<b>Total Impacts CM2-CM18</b>		<b>7,251</b>	<b>43,723</b>	<b>474</b>	<b>1,517</b>	<b>1,830-5,646</b>	<b>8,138</b>
<b>Total High-value</b>		<b>5,768</b>	<b>26,516</b>	<b>1,657</b>	<b>2,174</b>		
<b>Total Low-value</b>		<b>1,856</b>	<b>17,630</b>	<b>1,328</b>	<b>1,855</b>		
<b>TOTAL IMPACTS</b>		<b>7,624</b>	<b>44,096</b>	<b>2,986</b>	<b>4,029</b>		

<sup>a</sup> See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

### Impact BIO-138: Loss or Conversion of Modeled Habitat for and Direct Mortality of Loggerhead Shrike

Alternative 9 conservation measures would result in the combined permanent loss or conversion and temporary loss of up to 48,125 acres of modeled habitat for loggerhead shrike (28,690 acres of which would be high-value habitat, Table 12-9-51). Conservation measures that would result in

1 these losses are conveyance facilities and transmission line construction, and establishment and use  
2 of borrow and spoil areas (CM1), Yolo Bypass fisheries improvements (CM2), tidal habitat  
3 restoration (CM4), floodplain restoration (CM5), channel margin enhancement (CM6), riparian  
4 restoration, (CM7), grassland restoration (CM8), vernal pool and wetland restoration (CM9),  
5 nontidal marsh restoration (CM10), natural communities enhancement and management (CM11)  
6 and construction of conservation hatcheries (CM18). The majority of habitat loss (33,244 acres)  
7 would result from CM4. Habitat enhancement and management activities (CM11), which include  
8 ground disturbance or removal of nonnative vegetation, and the construction of recreational trails,  
9 signs, and facilities, could result in local adverse habitat effects. In addition, maintenance activities  
10 associated with the long-term operation of the water conveyance facilities and other BDCP physical  
11 facilities could degrade or eliminate loggerhead shrike modeled habitat. Each of these individual  
12 activities is described below. A summary statement of the combined impacts and NEPA effects, and a  
13 CEQA conclusion follow the individual conservation measure discussions.

- 14 • *CM1 Water Facilities and Operation:* Construction of Alternative 9 conveyance facilities would  
15 result in the combined permanent and temporary loss of up to 1,599 acres of high-value  
16 loggerhead shrike habitat (318 acres of permanent loss, 1,281 acres of temporary loss). In  
17 addition, 1,286 acres of low-value habitat would be removed (55 acres of permanent loss or  
18 conversion, 1,231 acres of temporary loss or conversion, Table 12-9-51). These losses would  
19 occur at numerous locations where dredging, construction of operable barriers and canals, and  
20 channel enlargement would be undertaken. Other impacts would occur from potential borrow  
21 and spoil sites, access roads, barge unloading facilities, and intake and fish screen construction  
22 areas. The CM1 construction footprint for the canal that would be constructed south of the  
23 Clifton Court Forebay overlaps with two loggerhead shrike occurrences. Mitigation Measure  
24 BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*,  
25 would require preconstruction surveys and the establishment of no-disturbance buffers and  
26 would be available to address potential effects on nesting loggerhead shrikes. Refer to the  
27 Terrestrial Biology Map Book for a detailed view of Alternative 9 construction locations.  
28 Construction of the water conveyance facilities would occur in the near-term timeframe.
- 29 • *CM2 Yolo Bypass Fisheries Enhancement:* Construction of the Yolo bypass fisheries enhancement  
30 would result in the combined permanent and temporary loss of up to 1,274 acres of high-value  
31 loggerhead shrike habitat (898 acres of permanent loss, 376 acres of temporary loss) in the Yolo  
32 Bypass in CZ 2. In addition, 182 acres of low-value habitat would be removed (85 acres of  
33 permanent loss, 97 acres of temporary loss). The loss is expected to occur during the first 10  
34 years of Alternative 9 implementation.
- 35 • *CM4 Tidal Natural Communities Restoration:* Tidal habitat restoration site preparation and  
36 inundation would permanently remove an estimated 20,880 acres of high-value loggerhead  
37 shrike habitat and 12,364 acres of low-value habitat. The majority of the acres lost would  
38 consist of cultivated lands in CZs 1, 2, 4, 5, 6, and/or 7. Grassland losses would likely occur in the  
39 vicinity of Cache Slough, on Decker Island in the West Delta ROA, on the upslope fringes of  
40 Suisun Marsh, and along narrow bands adjacent to waterways in the South Delta ROA. Tidal  
41 restoration would directly impact and fragment grassland just north of Rio Vista in and around  
42 French and Prospect Islands, and in an area south of Rio Vista around Threemile Slough. Losses  
43 of alkali seasonal wetland complex habitat would likely occur in the south end of the Yolo  
44 Bypass and on the northern fringes of Suisun Marsh.

- 1       ● *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore  
2       seasonally inundated floodplain would permanently and temporarily remove approximately  
3       1,450 acres of high-value loggerhead shrike habitat (933 permanent, 517 temporary). These  
4       losses would be expected after the first 10 years of Alternative 9 implementation along the San  
5       Joaquin River and other major waterways in CZ 7.
  
- 6       ● *CM7 Riparian Natural Community Restoration*: Riparian restoration would permanently remove  
7       approximately 370 acres of high-value loggerhead shrike habitat as part of tidal restoration and  
8       1,489 acres as part of seasonal floodplain restoration. In addition, 503 acres of low-value habitat  
9       would be removed as a part of tidal restoration and 1,971 acres would be removed as part of  
10      seasonal floodplain restoration through CM7.
  
- 11      ● *CM8 Grassland Natural Community Restoration and CM9 Vernal Pool and Alkali Seasonal Wetland*  
12      *Complex Restoration*: Temporary construction-related disturbance of grassland habitat would  
13      result from implementation of CM8 and CM9 in in CZs 1, 2, 4, 5, 7, 8, and 11. However, all areas  
14      would be restored after the construction periods. Grassland restoration would be implemented  
15      on agricultural lands that also provide habitat for loggerhead shrike and would result in the  
16      conversion of 1,849 acres of cultivated lands to high-value grassland.
  
- 17      ● *CM10 Nontidal Marsh Restoration*: Implementation of CM10 would result in the permanent  
18      removal of 705 acres of high-value loggerhead shrike habitat and 735 acres of low-value  
19      loggerhead shrike habitat.
  
- 20      ● *CM11 Natural Communities Enhancement and Management*: A variety of habitat management  
21      actions included in CM11 that are designed to enhance wildlife values in restored or protected  
22      habitats could result in localized ground disturbances that could temporarily remove small  
23      amounts of modeled habitat. Ground-disturbing activities, such as removal of nonnative  
24      vegetation and road and other infrastructure maintenance activities, would be expected to have  
25      minor adverse effects on available habitat and would be expected to result in overall  
26      improvements to and maintenance of habitat values over the term of the BDCP. CM11 would  
27      also include the construction of recreational-related facilities including trails, interpretive signs,  
28      and picnic tables (BDCP Chapter 4, *Covered Activities and Associated Federal Actions*). The  
29      construction of trailhead facilities, signs, staging areas, picnic areas, bathrooms, etc. would be  
30      placed on existing, disturbed areas when and where possible. However, approximately 50 acres  
31      of grassland habitat would be lost from the construction of trails and facilities.
  
- 32      Habitat management- and enhancement-related activities could disturb loggerhead shrike nests.  
33      If either species were to nest in the vicinity of a worksite, equipment operation could destroy  
34      nests, and noise and visual disturbances could lead to their abandonment, resulting in mortality  
35      of eggs and nestlings. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys*  
36      *and Avoid Disturbance of Nesting Birds*, would be available to address these effects.
  
- 37      ● *CM18 Conservation Hatcheries*: Implementation of CM18 would remove up to 35 acres of high-  
38      value loggerhead shrike habitat for the development of a delta and longfin smelt conservation  
39      hatchery in CZ 1. Hatchery construction is expected to occur within the first 10 years of Plan  
40      implementation.
  
- 41      ● *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground  
42      water conveyance facilities and restoration infrastructure could result in ongoing but periodic  
43      disturbances that could affect loggerhead shrike use of the surrounding habitat. Maintenance  
44      activities would include vegetation management, levee and structure repair, and re-grading of

1 roads and permanent work areas. These effects, however, would be reduced by AMM1–AMM7,  
2 Mitigation Measure BIO-75, and conservation actions as described below.

- 3 • Injury and Direct Mortality: Construction-related activities would not be expected to result in  
4 direct mortality of adult or fledged loggerhead shrike if they were present in the Plan Area,  
5 because they would be expected to avoid contact with construction and other equipment. If  
6 either species were to nest in the construction area, construction-related activities, including  
7 equipment operation, noise and visual disturbances could destroy nests or lead to their  
8 abandonment, resulting in mortality of eggs and nestlings. Mitigation Measure BIO-75 would be  
9 available to address these potential effects.

10 The following paragraphs summarize the combined effects discussed above and describe other  
11 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also  
12 included.

### 13 **Near-Term Timeframe**

14 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
15 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
16 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
17 effects of construction would not be adverse under NEPA. Alternative 9 would remove 7,425 acres  
18 (5,768 permanent, 1,657 temporary) of high-value habitat for loggerhead shrike in the study area in  
19 the near-term. These effects would result from the construction of the water conveyance facilities  
20 (CM1, 1,599 acres), and implementing other conservation measures (*CM2 Yolo Bypass Fisheries*  
21 *Enhancement*, *CM4 Tidal Natural Communities Restoration*, *CM5 Seasonally Inundated Floodplain*  
22 *Restoration*, *CM7 Riparian Natural Community Restoration*, *CM8 Grassland Natural Community*  
23 *Restoration*, *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*, *CM11 Natural*  
24 *Communities Enhancement and Management* and *CM18 Conservation Hatcheries*—5,826 acres). In  
25 addition, 3,184 acres of low-value habitat would be removed or converted in the near-term (CM1,  
26 1,286 acres; *CM2 Yolo Bypass Fisheries Enhancement*, *CM4 Tidal Natural Communities Restoration*,  
27 *CM7 Riparian Natural Community Restoration*, *CM8 Grassland Natural Community Restoration*, *CM9*  
28 *Vernal Pool and Alkali Seasonal Wetland Complex Restoration*, *CM11 Natural Communities*  
29 *Enhancement and Management* and *CM18 Conservation Hatcheries*—1,898 acres).

30 The typical NEPA and CEQA project-level mitigation ratio for those natural communities affected  
31 would be 2:1 protection of high-value habitat. Using this ratio would indicate that 3,198 acres  
32 should be protected to compensate for the loss of high-value habitat from CM1. The near-term  
33 effects of other conservation actions would require 11,652 acres of protection to compensate for the  
34 loss of high-value shrike habitat using the same typical NEPA and CEQA ratio (2:1 protection for the  
35 loss of high-value habitat). The loss of low-value habitat would not require mitigation because a  
36 large proportion of the low-value habitat would result from the conversion and enhancement to  
37 high-value habitats. In addition, temporary impacts on cultivated lands would be restored relatively  
38 quickly after completion of construction.

39 The BDCP has committed to near-term goals of protecting 2,000 acres and restoring 1,140 acres of  
40 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of  
41 alkali seasonal wetland complex, and protecting 15,400 acres of non-rice cultivated lands (Table 3-4  
42 in Chapter 3, *Description of Alternatives*). These conservation actions are associated with CM3, CM8,  
43 and CM9 and would occur in the same timeframe as the construction and early restoration losses.

1 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1  
2 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali  
3 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous  
4 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would  
5 create larger, more expansive patches of high-value habitat for loggerhead shrike and reduce the  
6 effects of current levels of habitat fragmentation. Under *CM11 Natural Communities Enhancement*  
7 *and Management*, insect prey populations would be increased on protected lands, enhancing the  
8 foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4).  
9 Cultivated lands that provide habitat for covered and other native wildlife species would provide  
10 approximately 15,400 acres of potential high-value habitat for loggerhead shrike (Objective  
11 CLNC1.1). In addition, there is a commitment in the plan (Objective CLNC1.3) to maintain and  
12 protect small patches of trees and shrubs within cultivated lands that would maintain foraging  
13 perches and nesting habitat for the species. The establishment of 20- to 30-foot-wide hedgerows  
14 along field borders and roadsides within protected cultivated lands would also provide high-value  
15 nesting habitat for loggerhead shrike (Objective SH2.2). These Plan objectives represent  
16 performance standards for considering the effectiveness of conservation actions.

17 The combined acres of restoration and protection of 3,660 acres of grassland, vernal pool complex,  
18 and alkali seasonal wetland contained in the near-term Plan goals and the additional detail in the  
19 biological objectives satisfy the typical mitigation that would be applied to the project-level effects of  
20 CM1 and other near-term effects on loggerhead shrike high-value habitat with the consideration  
21 that some portion of the 15,400 acres of cultivated lands protected in the near-term timeframe  
22 would include suitable high-value crop types for loggerhead shrike. Sufficient acreage of the  
23 protected cultivated lands would need to be managed in pasture, alfalfa, or grain and hay crops such  
24 that the near-term impacts on high-value habitat were compensated for at a ratio of 2:1. Mitigation  
25 Measure BIO-138, *Compensate for the Near-Term Loss of High-Value Loggerhead Shrike Habitat*,  
26 would be available to address the adverse effect of near-term high-value habitat loss. With the  
27 management and enhancement of cultivated lands including insect prey enhancement through CM3  
28 and CM11, the protection of shrubs and establishment of hedgerows within protected cultivated  
29 lands would compensate for any potential effect from the loss of low-value loggerhead shrike  
30 foraging habitat.

31 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
32 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
33 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
34 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
35 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
36 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
37 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

38 The loggerhead shrike is not a covered species under the BDCP. For the BDCP to avoid an adverse  
39 effect on individuals, preconstruction surveys for noncovered avian species would be required to  
40 ensure that nests are detected and avoided. Mitigation Measure BIO-75, *Conduct Preconstruction*  
41 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to address this  
42 adverse effect.

1 **Late Long-Term Timeframe**

2 Alternative 9 as a whole would result in the combined permanent of and temporary effects on  
3 28,690 acres of high-value habitat and 19,485 acres of low-value loggerhead shrike habitat over the  
4 term of the Plan. The locations of these losses are described above in the analyses of individual  
5 conservation measures. The Plan includes conservation commitments through *CM3 Natural*  
6 *Communities Protection and Restoration*, *CM8 Grassland Natural Community Restoration*, and *CM9*  
7 *Vernal Pool and Alkali Seasonal Wetland Complex Restoration* to protect 8,000 acres and restore  
8 2,000 acres of grassland natural community, protect 600 acres of vernal pool complex, protect 150  
9 acres of alkali seasonal wetland complex and protect 48,625 acres of cultivated lands that provide  
10 suitable habitat for native wildlife species (Table 3-4 in Chapter 3). Grassland restoration and  
11 protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1 and GNC1.2). Grassland  
12 protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali seasonal wetland  
13 complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous matrix of  
14 grassland, alkali seasonal wetland, and vernal pool natural communities which would create larger,  
15 more expansive patches of high-value habitat for loggerhead shrike and reduce the effects of current  
16 levels of habitat fragmentation. Under *CM11 Natural Communities Enhancement and Management*,  
17 insect prey populations would be increased on protected lands, enhancing the foraging value of  
18 these natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4). Cultivated lands that  
19 provide habitat for covered and other native wildlife species would provide approximately 48,625  
20 acres of potential high-value habitat for loggerhead shrike (Objective CLNC1.1). In addition, there is  
21 a commitment in the plan (Objective CLNC1.3) to maintain and protect small patches of trees and  
22 shrubs within cultivated lands that would maintain foraging perches and nesting habitat for the  
23 species. The establishment of 20- to 30-foot-wide hedgerows along field borders and roadsides  
24 within protected cultivated lands would also provide high-value nesting habitat for loggerhead  
25 shrike (Objective SH2.2).

26 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
27 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
28 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
29 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
30 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
31 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
32 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*. The loggerhead  
33 shrike is not a covered species under the BDCP. For the BDCP to avoid an adverse effect on  
34 individuals, preconstruction surveys for noncovered avian species would be required to ensure that  
35 nests are detected and avoided. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird*  
36 *Surveys and Avoid Disturbance of Nesting Birds*, would be available to address this effect.

37 **NEPA Effects:** The loss of loggerhead shrike habitat and potential mortality of this special-status  
38 species under Alternative 9 would represent an adverse effect in the absence of other conservation  
39 actions. With habitat protection and restoration associated with CM3, CM8, CM9, and CM11, guided  
40 by biological goals and objectives and by AMM1–AMM7, and with implementation of Mitigation  
41 Measure BIO-138, *Compensate for the Near-Term Loss of High-Value Loggerhead Shrike Habitat*,  
42 which would be available to guide the near-term protection and management of cultivated lands, the  
43 effects of habitat loss on loggerhead shrike under Alternative 9 would not be adverse. Loggerhead  
44 shrike is not a covered species under the BDCP, and potential mortality would be an adverse effect  
45 without preconstruction surveys to ensure that nests are detected and avoided. Mitigation Measure

1 BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would  
2 be available to address this effect.

3 **CEQA Conclusion:**

4 **Near-Term Timeframe**

5 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
6 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
7 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
8 effects of construction would be less than significant under CEQA. Alternative 9 would remove 7,425  
9 acres (5,768 permanent, 1,657 temporary) of high-value habitat for loggerhead shrike in the study  
10 area in the near-term. These effects would result from the construction of the water conveyance  
11 facilities (CM1, 1,599 acres), and implementing other conservation measures (*CM2 Yolo Bypass*  
12 *Fisheries Enhancement*, *CM4 Tidal Natural Communities Restoration*, *CM5 Seasonally Inundated*  
13 *Floodplain Restoration*, *CM7 Riparian Natural Community Restoration*, *CM8 Grassland Natural*  
14 *Community Restoration*, *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*, *CM11*  
15 *Natural Communities Enhancement and Management* and *CM18 Conservation Hatcheries*—5,826  
16 acres). In addition, 3,184 acres of low-value habitat would be removed or converted in the near-  
17 term (CM1, 1,286 acres; *CM2 Yolo Bypass Fisheries Enhancement*, *CM4 Tidal Natural Communities*  
18 *Restoration*, *CM7 Riparian Natural Community Restoration*, *CM8 Grassland Natural Community*  
19 *Restoration*, *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*, *CM11 Natural*  
20 *Communities Enhancement and Management* and *CM18 Conservation Hatcheries*—1,898 acres).

21 The typical NEPA and CEQA project-level mitigation ratio for those natural communities affected  
22 would be 2:1 protection of high-value habitat. Using this ratio would indicate that 3,198 acres  
23 should be protected to compensate for the loss of high-value habitat from CM1. The near-term  
24 effects of other conservation actions would require 11,652 acres of protection to compensate for the  
25 loss of high-value shrike habitat using the same typical NEPA and CEQA ratio (2:1 protection for the  
26 loss of high-value habitat). The loss of low-value habitat would not require mitigation because a  
27 large proportion of the low-value habitat would result from the conversion and enhancement to  
28 high-value habitats. In addition, temporary impacts on cultivated lands would be restored relatively  
29 quickly after completion of construction.

30 The BDCP has committed to near-term goals of protecting 2,000 acres and restoring 1,140 acres of  
31 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of  
32 alkali seasonal wetland complex, and protecting 15,400 acres of non-rice cultivated lands (Table 3-4  
33 in Chapter 3). These conservation actions are associated with CM3, CM8, and CM9 and would occur  
34 in the same timeframe as the construction and early restoration losses.

35 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1  
36 and GNC1.2). Grassland protection in CZs 1, 8, and 11 would be associated with vernal pool and  
37 alkali seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a  
38 contiguous matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which  
39 would create larger, more expansive patches of high-value habitat for loggerhead shrike and reduce  
40 the effects of current levels of habitat fragmentation. Under *CM11 Natural Communities*  
41 *Enhancement and Management*, insect prey populations would be increased on protected lands,  
42 enhancing the foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and  
43 GNC2.4). Cultivated lands that provide habitat for covered and other native wildlife species would

1 provide approximately 15,400 acres of potential high-value habitat for loggerhead shrike (Objective  
2 CLNC1.1). In addition, there is a commitment in the plan (Objective CLNC1.3) to maintain and  
3 protect small patches of trees and shrubs within cultivated lands that would maintain foraging  
4 perches and nesting habitat for the species. The establishment of 20- to 30-foot-wide hedgerows  
5 along field borders and roadsides within protected cultivated lands would also provide high-value  
6 nesting habitat for loggerhead shrike (Objective SH2.2). These Plan objectives represent  
7 performance standards for considering the effectiveness of conservation actions.

8 The combined acres of restoration and protection of 3,660 acres of grassland, vernal pool complex,  
9 and alkali seasonal wetland contained in the near-term Plan goals and the additional detail in the  
10 biological objectives satisfy the typical mitigation that would be applied to the project-level effects of  
11 CM1 and other near-term effects on loggerhead shrike high-value habitat with the consideration  
12 that some portion of the 15,400 acres of cultivated lands protected in the near-term timeframe  
13 would include suitable high-value crop types for loggerhead shrike. Sufficient acreage of the  
14 protected cultivated lands would need to be managed in pasture, alfalfa, or grain and hay crops such  
15 that the near-term impacts on high-value habitat were compensated for at a ratio of 2:1. The  
16 implementation of Mitigation Measure BIO-138, *Compensate for the Near-Term Loss of High-Value*  
17 *Loggerhead Shrike Habitat*, would reduce the impact of near-term high-value habitat loss to a less-  
18 than-significant level. With the management and enhancement of cultivated lands including insect  
19 prey enhancement through CM3 and CM11, the protection of shrubs and establishment of  
20 hedgerows within protected cultivated lands would compensate for any potential impact from the  
21 loss of low-value loggerhead shrike foraging habitat.

22 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
23 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
24 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
25 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
26 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
27 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
28 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

29 The loggerhead shrike is not a covered species under the BDCP and in order to avoid an adverse  
30 effect on individuals, preconstruction surveys for noncovered avian species would be required to  
31 ensure that nests are detected and avoided. Mitigation Measure BIO-75, *Conduct Preconstruction*  
32 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would reduce this potential impact to a  
33 less-than-significant level.

#### 34 **Late Long-Term Timeframe**

35 Alternative 9 as a whole would result in the combined permanent of and temporary effects on  
36 28,690 acres of high-value habitat and 19,485 acres of low-value loggerhead shrike habitat over the  
37 term of the Plan. The locations of these losses are described above in the analyses of individual  
38 conservation measures. The Plan includes conservation commitments through *CM3 Natural*  
39 *Communities Protection and Restoration*, *CM8 Grassland Natural Community Restoration*, and *CM9*  
40 *Vernal Pool and Alkali Seasonal Wetland Complex Restoration* to protect 8,000 acres and restore  
41 2,000 acres of grassland natural community, protect 600 acres of vernal pool complex, protect 150  
42 acres of alkali seasonal wetland complex and protect 48,625 acres of cultivated lands that provide  
43 suitable habitat for native wildlife species (Table 3-4 in Chapter 3). Grassland restoration and  
44 protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1 and GNC1.2). Grassland

1 protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali seasonal wetland  
2 complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous matrix of  
3 grassland, alkali seasonal wetland, and vernal pool natural communities which would create larger,  
4 more expansive patches of high-value habitat for loggerhead shrike and reduce the effects of current  
5 levels of habitat fragmentation. Under *CM11 Natural Communities Enhancement and Management*,  
6 insect prey populations would be increased on protected lands, enhancing the foraging value of  
7 these natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4). Cultivated lands that  
8 provide habitat for covered and other native wildlife species would provide approximately 48,625  
9 acres of potential high-value habitat for loggerhead shrike (Objective CLNC1.1). In addition, there is  
10 a commitment in the plan (Objective CLNC1.3) to maintain and protect small patches of trees and  
11 shrubs within cultivated lands that would maintain foraging perches and nesting habitat for the  
12 species. The establishment of 20- to 30-foot-wide hedgerows along field borders and roadsides  
13 within protected cultivated lands would also provide high-value nesting habitat for loggerhead  
14 shrike (Objective SH2.2).

15 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
16 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
17 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
18 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
19 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
20 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
21 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*. The loggerhead  
22 shrike is not a covered species under the BDCP. For the BDCP to avoid an adverse effect on  
23 individuals, preconstruction surveys for noncovered avian species would be required to ensure that  
24 nests are detected and avoided. Implementation of Mitigation Measure BIO-75, *Conduct*  
25 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would reduce this  
26 potential impact to a less-than-significant level.

27 Considering Alternative 9's protection and restoration provisions, which would provide acreages of  
28 new high-value or enhanced habitat in amounts suitable to compensate for habitats lost to  
29 construction and restoration activities, and with the implementation of AMM1-AMM7, Mitigation  
30 Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting*  
31 *Birds*, and Mitigation Measure BIO-138, *Compensate for the Near-Term Loss of High-Value*  
32 *Loggerhead Shrike Habitat*, the loss of habitat or direct mortality through implementation of  
33 Alternative 9 would not result in a substantial adverse effect through habitat modifications and  
34 would not substantially reduce the number or restrict the range of loggerhead shrike. Therefore, the  
35 loss of habitat or potential mortality under this alternative would have a less-than-significant impact  
36 on loggerhead shrike.

37 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**  
38 **Disturbance of Nesting Birds**

39 See Mitigation Measure BIO-75 under Impact BIO-75.

40 **Mitigation Measure BIO-138: Compensate for the Near-Term Loss of High-Value**  
41 **Loggerhead Shrike Habitat**

42 Because the BDCP does not include acreage commitments for the protection of crop types in the  
43 near-term time period, DWR will manage and protect sufficient acres of cultivated lands such as

1 pasture, grain and hay crops, or alfalfa as high-value loggerhead shrike habitat such that the  
2 total acres of high-value habitat impacted in the near-term timeframe are mitigated at a ratio of  
3 2:1. Additional grassland protection, enhancement, and management may be substituted for the  
4 protection of high-value cultivated lands.

### 5 **Impact BIO-139: Effects on Loggerhead Shrike Associated with Electrical Transmission** 6 **Facilities**

7 New transmission lines would increase the risk for bird-power line strikes, which could result in  
8 injury or mortality of loggerhead shrike. The risk for bird-power line strikes would be minimized  
9 with the incorporation of *AMM20 Greater Sandhill Crane* into the BDCP. This measure would ensure  
10 that conductor and ground lines are fitted with flight diverters in compliance with the best available  
11 practices, such as those specified in the USFWS Avian Protection Guidelines and would further  
12 ensure no adverse effect from electrical transmission facilities.

13 **NEPA Effects:** New transmission lines would increase the risk for bird-power line strikes, which  
14 could result in injury or mortality of loggerhead shrike. With the implementation of *AMM20 Greater*  
15 *Sandhill Crane* the effect of new transmission lines on loggerhead shrike would not be adverse.

16 **CEQA Conclusion:** New transmission lines would increase the risk for bird-power line strikes, which  
17 could result in injury or mortality of loggerhead shrike. With the incorporation of *AMM20 Greater*  
18 *Sandhill Crane* into the BDCP, new transmission lines would have a less-than-significant impact on  
19 loggerhead shrike.

### 20 **Impact BIO-140: Indirect Effects of Plan Implementation on Loggerhead Shrike**

21 Noise and visual disturbances associated with construction-related activities could result in  
22 temporary disturbances that affect loggerhead shrike use of modeled habitat. Construction noise  
23 above background noise levels (greater than 50 dBA) could extend 1,900 to 5,250 feet from the edge  
24 of construction activities (BDCP Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of*  
25 *the BDCP Conveyance Facility on Sandhill Crane*, Table 4), although there are no available data to  
26 determine the extent to which these noise levels could affect loggerhead shrike. Indirect effects  
27 associated with construction include noise, dust, and visual disturbance caused by grading, filling,  
28 contouring, and other ground-disturbing operations. Construction-related noise and visual  
29 disturbances could disrupt nesting and foraging behaviors, and reduce the functions of suitable  
30 habitat which could result in an adverse effect on these species. Indirect effects from construction of  
31 the new forebay in CZ 8 could result in substantial effects on active loggerhead shrike nests. DHCCP  
32 surveys in 2009 detected 10 nest sites south-west of the Clifton Court Forebay (Appendix 12C, *2009*  
33 *to 2011 Bay Delta Conservation Plan EIR/EIS Environmental Data Report*) and the large expanses of  
34 grassland in CZ 8 provide high-value nesting habitat for the species. Mitigation Measure BIO-75,  
35 *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be  
36 available to minimize adverse effects on active nests. The use of mechanical equipment during water  
37 conveyance facilities construction could cause the accidental release of petroleum or other  
38 contaminants that could affect these species or their prey in the surrounding habitat. AMM1-AMM7,  
39 including *AMM2 Construction Best Management Practices and Monitoring*, would minimize the  
40 likelihood of such spills. The inadvertent discharge of sediment or excessive dust adjacent to  
41 loggerhead shrike nesting habitat could also have a negative effect on these species. AMM1-  
42 AMM7 would ensure that measures are in place to prevent runoff from the construction area and the  
43 negative effects of dust on wildlife adjacent to work areas.

1 **NEPA Effects:** Indirect effects on loggerhead shrike as a result of Alternative 9 implementation could  
2 have adverse effects on the species through the modification of habitat and potential for direct  
3 mortality. The loggerhead shrike is not a covered species under the BDCP, and the potential for  
4 mortality would be an adverse effect without preconstruction surveys to ensure that nests are  
5 detected and avoided. Construction of the new forebay in CZ 8 would have the potential to disrupt  
6 nesting loggerhead shrikes in the highly suitable habitat surrounding Clifton Court Forebay and  
7 adjacent to work areas. In conjunction with AMM1–AMM7, Mitigation Measure BIO-75, *Conduct*  
8 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to  
9 address this adverse effect.

10 **CEQA Conclusion:** Indirect effects on loggerhead shrike as a result of Alternative 1A implementation  
11 could have a significant impact on the species. Construction of the new forebay in CZ 8 would have  
12 the potential to disrupt nesting loggerhead shrikes in the highly suitable habitat surrounding Clifton  
13 Court Forebay and adjacent to work areas. The incorporation of AMM1–AMM7 into the BDCP and  
14 the implementation of Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and*  
15 *Avoid Disturbance of Nesting Birds*, would reduce this impact to a less-than-significant level.

16 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**  
17 **Disturbance of Nesting Birds**

18 See Mitigation Measure BIO-75 under Impact BIO-75.

19 **Impact BIO-141: Periodic Effects of Inundation on Loggerhead Shrike as a Result of**  
20 **Implementation of Conservation Components**

21 Flooding of the Yolo Bypass from Fremont Weir operations (*CM2 Yolo Bypass Fisheries*  
22 *Enhancement*) would increase the frequency and duration of inundation on 1,830–5,646 acres of  
23 modeled loggerhead shrike habitat (consisting of approximately 777–2,423 acres of high-value  
24 habitat; Table 12-9-51).

25 Based on hypothetical footprints, implementation of *CM5 Seasonally Inundated Floodplain*  
26 *Restoration* could result in the periodic inundation of up to approximately 8,138 acres of modeled  
27 habitat (Table 12-9-51), consisting of 3,823 acres of high-value and 4,315 acres of low-value habitat.

28 Reduced foraging habitat availability may be expected during the fledgling period of the nesting  
29 season due to periodic inundation. However, increased frequency and duration of inundation would  
30 occur during the nonbreeding season.

31 **NEPA Effects:** Periodic inundation of floodplains would not result in an adverse effect on loggerhead  
32 shrike from the modification of habitat. Reduced foraging habitat availability may be expected  
33 during the fledgling period of the nesting season due to periodic inundation. However, increased  
34 frequency and duration of inundation would occur during the nonbreeding season.

35 **CEQA Conclusion:** Periodic inundation of floodplains would result in a less-than-significant impact  
36 on loggerhead shrike from the modification of habitat. Reduced foraging habitat availability may be  
37 expected during the fledgling period of the nesting season due to periodic inundation. However,  
38 increased frequency and duration of inundation would occur during the nonbreeding season.

1 **Song Sparrow “Modesto” Population**

2 The Modesto song sparrow is common and ubiquitous throughout the study area, excluding CZ 11,  
3 and modeled habitat for the species includes managed wetlands, tidal freshwater emergent, nontidal  
4 freshwater emergent, and valley/foothill riparian vegetation communities.

5 Construction and restoration associated with Alternative 9 conservation measures would result in  
6 both temporary and permanent removal of Modesto song sparrow habitat in the quantities  
7 indicated in Table 12-9-52. However, BDCP activities are expected to have little impact on the  
8 population. Full implementation of Alternative 9 would include the following biological objectives  
9 over the term of the BDCP that would benefit Modesto song sparrow (BDCP Chapter 3, Section 3.3,  
10 *Biological Goals and Objectives*).

- 11 • Restore or create at least 5,000 acres of valley/foothill riparian natural community, with at least  
12 3,000 acres occurring on restored seasonally inundated floodplain (Objective VFRNC1.1,  
13 associated with CM7).
- 14 • Protect at least 750 acres of existing valley/foothill riparian natural community in CZ 7 by year  
15 10 (Objective VFRNC1.2, associated with CM3).
- 16 • Restore or create at least 24,000 acres of tidal freshwater emergent wetland in CZs 1, 2, 4, 5, 6,  
17 and/or 7 (Objective TFEWNC1.1, associated with CM4).
- 18 • Create at least 1,200 acres of nontidal marsh consisting of a mosaic of nontidal perennial aquatic  
19 and nontidal freshwater emergent wetland natural communities (Objective NFEW/NPANC1.1,  
20 associated with CM10).
- 21 • Create 500 acres of managed wetlands in CZs 3, 4, 5, or 6 (Objectives GSHC1.3 and GSHC1.4,  
22 associated with CM10).
- 23 • Increase prey availability and accessibility for grassland-foraging species (Objectives  
24 ASWNC2.4, VPNC2.5, and GNC2.4, associated with CM11).
- 25 • Maintain and protect the small patches of important wildlife habitats that occur in cultivated  
26 lands within the reserve system, including isolated valley oak trees, trees and shrubs along field  
27 borders and roadsides, remnant groves, riparian corridors, water conveyance channels,  
28 grasslands, ponds, and wetlands (Objective CLNC1.3, associated with CM3).
- 29 • Establish 20- to 30-foot-wide hedgerows along field borders and roadsides within protected  
30 cultivated lands at a minimum rate of 400 linear feet per 100 acres (Objective SH2.2, associated  
31 with CM3).

32 As explained below, with the restoration or protection of these amounts of habitat, in addition to  
33 implementation of AMMs and Mitigation Measure BIO-75, impacts on Modesto song sparrow would  
34 not be adverse for NEPA purposes and would be less than significant for CEQA purposes.

1 **Table 12-9-52. Changes in Modesto Song Sparrow Modeled Habitat Associated with Alternative 9**  
2 **(acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	Nesting	133	133	418	418	NA	NA
<b>Total Impacts CM1</b>		<b>133</b>	<b>133</b>	<b>418</b>	<b>418</b>	<b>NA</b>	<b>NA</b>
CM2–CM18	Nesting	2,444	3,253	133	169	81-158	284
<b>Total Impacts CM2–CM18</b>		<b>2,444</b>	<b>3,253</b>	<b>133</b>	<b>169</b>	<b>81-158</b>	<b>284</b>
<b>TOTAL IMPACTS</b>		<b>2,2,577</b>	<b>3,386</b>	<b>551</b>	<b>587</b>	<b>81-158</b>	<b>284</b>

<sup>a</sup> See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-142: Loss or Conversion of Habitat for and Direct Mortality of Modesto Song**  
5 **Sparrow**

6 Alternative 9 conservation measures would result in the combined permanent and temporary loss  
7 of up to 3,973 acres of modeled habitat for Modesto song sparrow (of which 3,386 acres would be a  
8 permanent loss and 587 acres would be a temporary loss of habitat, Table 12-9-52). Conservation  
9 measures that would result in these losses are conveyance facilities and transmission line  
10 construction, and establishment and use of borrow and spoil areas (CM1), Yolo Bypass  
11 improvements (CM2), tidal habitat restoration (CM4), and floodplain restoration (CM5). Habitat  
12 enhancement and management activities (CM11), which would include ground disturbance and  
13 removal of nonnative vegetation, could result in local adverse habitat effects. In addition,  
14 maintenance activities associated with the long-term operation of the water conveyance facilities  
15 and other BDCP physical facilities could degrade or eliminate Modesto song sparrow modeled  
16 habitat. Each of these individual activities is described below. A summary statement of the combined  
17 impacts and NEPA effects, and a CEQA conclusion follows the individual conservation measure  
18 discussions.

- 19 • *CM1 Water Facilities and Operation:* Construction of Alternative 9 conveyance facilities would  
20 result in the combined permanent and temporary loss of up to 551 acres of modeled Modesto  
21 song sparrow habitat (133 acres of permanent loss, 418 acres of temporary loss) from CZ 4, 5, 6,  
22 7, and 8. Most of the permanent loss would occur as wider and deeper channels are dredged in  
23 Middle River and Victoria Canal, and as operable barriers and new Sacramento River diversions  
24 are constructed in various waterways across the Delta. Temporary losses of habitat would occur  
25 primarily along Middle River between Victoria Canal and Mildred Island, where large dredging

1 work areas and operable barrier work areas would be placed. Some of this vegetation may be  
2 temporarily removed as dredging progresses, while other areas could remain in place but be  
3 temporarily affected by sedimentation and equipment movement associated with dredging. The  
4 Modesto song sparrow is ubiquitous throughout the study area. The CM1 construction footprint  
5 of permanent impacts overlaps with 63 occurrences of Modesto song sparrow. Permanent  
6 impacts include the construction of the canal south of Clifton Court Forebay, channel dredging,  
7 instream island dredging, and channel enlargement in Middle River and Victoria Canal, an  
8 operable barrier, and a fish screen area. The CM1 footprint of temporary impacts overlaps with  
9 102 occurrences of Modesto song sparrow and the majority of these impacts would be a result  
10 of dredging work areas. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird*  
11 *Surveys and Avoid Disturbance of Nesting Birds*, would require preconstruction surveys and the  
12 establishment of no-disturbance buffers and would be available to address potential effects on  
13 nesting Modesto song sparrows. Refer to the Terrestrial Biology Map Book for a detailed view of  
14 Alternative 9 construction locations. Construction of the water conveyance facilities would  
15 occur in the near-term timeframe.

- 16 ● *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo bypass fisheries enhancement  
17 would permanently remove 143 acres of modeled Modesto song sparrow habitat in the Yolo  
18 Bypass in CZ 2. In addition, 133 acres of habitat would be temporarily removed. These losses  
19 would occur in the near-term timeframe and primarily consist of valley/foothill riparian natural  
20 community and managed wetland. The loss is expected to occur during the first 10 years of  
21 Alternative 9 implementation.
- 22 ● *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and  
23 inundation would result in the conversion of an estimated loss of 3,066 acres of modeled  
24 Modesto song sparrow habitat by the late long-term timeframe.
- 25 ● *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore  
26 seasonally inundated floodplain would permanently and temporarily remove approximately 80  
27 acres of modeled Modesto song sparrow habitat (44 permanent, 36 temporary). These losses  
28 would be expected to occur along the San Joaquin River and other major waterways in CZ 7. The  
29 BDCP is expected to restore approximately 5,000 acres of valley/foothill riparian natural  
30 community. These lands would be managed as a mosaic of seral stages, age classes, and plant  
31 heights, some of which would provide suitable nesting habitat for Modesto song sparrow.
- 32 ● *CM6 Channel Margin Enhancement*: Channel margin habitat enhancement could result in  
33 removal of small amounts of valley/foothill riparian habitat along 20 miles of river and sloughs.  
34 The extent of this loss cannot be quantified at this time, but the majority of the enhancement  
35 activity would occur along waterway margins where riparian habitat stringers exist, including  
36 levees and channel banks. The improvements would occur within the study area on sections of  
37 the Sacramento, San Joaquin and Mokelumne Rivers, and along Steamboat and Sutter Sloughs.  
38 Some of the restored riparian habitat in the channel margin would be expected to support  
39 nesting habitat for Modesto song sparrow.
- 40 ● *CM11 Natural Communities Enhancement and Management*: A variety of habitat management  
41 actions included in *CM11 Natural Communities Enhancement and Management* that are designed  
42 to enhance wildlife values in restored or protected habitats could result in localized ground  
43 disturbances that could temporarily remove small amounts of modeled habitat. Ground-  
44 disturbing activities, such as removal of nonnative vegetation and road and other infrastructure  
45 maintenance activities, would be expected to have minor adverse effects on available habitat

1 and would be expected to result in overall improvements to and maintenance of habitat values  
2 over the term of the BDCP.

3 Habitat management- and enhancement-related activities could affect Modesto song sparrow  
4 nests. If the individuals were to nest in the vicinity of a worksite, equipment operation could  
5 destroy nests, and noise and visual disturbances could lead to their abandonment, resulting in  
6 mortality of eggs and nestlings. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting*  
7 *Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to address these effects.

- 8 ● Operations and Maintenance: Postconstruction operation and maintenance of the above-ground  
9 water conveyance facilities and restoration infrastructure could result in ongoing but periodic  
10 disturbances that could affect Modesto song sparrow use of the surrounding habitat.  
11 Maintenance activities would include vegetation management, levee and structure repair, and  
12 re-grading of roads and permanent work areas. These effects, however, would be reduced by  
13 AMMs, and conservation actions as described below.
- 14 ● Injury and Direct Mortality: Construction-related activities would not be expected to result in  
15 direct mortality of adult or fledged Modesto song sparrow if they were present in the Plan Area,  
16 because they would be expected to avoid contact with construction and other equipment. If  
17 either species were to nest in the construction area, construction-related activities, including  
18 equipment operation, noise and visual disturbances could destroy nests or lead to their  
19 abandonment, resulting in mortality of eggs and nestlings. Mitigation Measure BIO-75 would be  
20 available to address these effects.

21 The following paragraphs summarize the combined effects discussed above and describe other  
22 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also  
23 included.

#### 24 ***Near-Term Timeframe***

25 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
26 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
27 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
28 effects of construction would not be adverse under NEPA. Alternative 9 would remove 3,128 acres  
29 of modeled habitat (2,557 permanent, 551 temporary) for Modesto song sparrow in the study area  
30 in the near-term. These effects would result from the construction of the water conveyance facilities  
31 (CM1, 551 acres), and implementing other conservation measures (*CM2 Yolo Bypass Fisheries*  
32 *Enhancement*, *CM4 Tidal Natural Communities Restoration*, and *CM5 Seasonally Inundated Floodplain*  
33 *Restoration—2,577 acres*).

34 Typical NEPA and CEQA project-level mitigation ratios for those natural communities that would be  
35 affected would be 1:1 for restoration/creation and 1:1 protection of habitat. Using these ratios  
36 would indicate that 551 acres of suitable habitat should be restored/created and 551 acres should  
37 be protected to compensate for the CM1 losses of 551 acres of Modesto song sparrow habitat. The  
38 near-term effects of other conservation actions would remove 2,577 acres of modeled habitat, and  
39 therefore require 2,577 acres of restoration/creation and 2,577 acres of protection of Modesto song  
40 sparrow habitat using the same typical NEPA and CEQA ratios (1:1 for restoration/creation and 1:1  
41 for protection).

42 The BDCP has committed to near-term goals of protecting 750 acres and restoring 800 acres of the  
43 valley/foothill riparian natural community, restoring 2,000 acres of tidal freshwater emergent

1 wetland, restoring 500 acres of managed wetland, and restoring 400 acres of nontidal marsh in the  
2 Plan Area (Table 3-4 in Chapter 3, *Description of Alternatives*). These conservation actions are  
3 associated with CM3, CM4, CM7, and CM10 and would occur in the same timeframe as the  
4 construction and early restoration losses, thereby avoiding adverse effects of habitat loss on  
5 Modesto song sparrow. The majority of the riparian restoration acres would occur in CZ 7 as part of  
6 a reserve system with extensive wide bands or large patches of valley/foothill riparian natural  
7 community (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*) and  
8 would provide suitable Modesto song sparrow nesting habitat. The tidal freshwater emergent  
9 wetland would be restored in CZs 1, 2, 4, 5, 6, and/or 7 (Objective TFEWNC1.1) and would be  
10 restored in a way that creates topographic heterogeneity and in areas that increase connectivity  
11 among protected lands (Objective TFEWNC2.2). The nontidal marsh restoration would occur in  
12 CZs 2, 4, and/or 5, and the managed wetland restoration would occur in CZs 3, 4, 5, or 6. Both the  
13 nontidal marsh and managed wetland restoration are associated with CM10 and would provide  
14 nesting habitat for Modesto song sparrow.

15 The Plan also includes commitments to protect patches of important wildlife habitat on cultivated  
16 lands such as trees and shrubs along borders and roadside, riparian corridors, and wetlands  
17 (Objective CLNC1.3). In addition, 20- to 30-foot-wide hedgerows would be established along field  
18 borders and roadsides, which would provide additional habitat for the species (Objective SH2.2).  
19 The management of protected grasslands to increase insect prey through techniques such as the  
20 avoidance of use of pesticides (Objectives ASWNC2.4, VPNC2.5, and GNC2.4) would provide further  
21 benefits to foraging Modesto song sparrows. These Plan objectives represent performance  
22 standards for considering the effectiveness of conservation actions. The acres of restoration and  
23 protection contained in the near-term Plan goals and the additional detail in the biological objectives  
24 satisfy the typical mitigation that would be applied to the project-level effects of CM1 on Modesto  
25 song sparrow, as well as mitigate the near-term effects of the other conservation measures.

26 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
27 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
28 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
29 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
30 *Material* and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
31 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
32 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

33 Modesto song sparrow is not a covered species under the BDCP. For the BDCP to avoid an adverse  
34 effect on individuals, preconstruction surveys for noncovered avian species would be required to  
35 ensure that nests are detected and avoided. Mitigation Measure BIO-75, *Conduct Preconstruction*  
36 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to address this  
37 adverse effect.

### 38 **Late Long-Term Timeframe**

39 Alternative 9 as a whole would result in the permanent loss of and temporary effects on 3,973 acres  
40 (3,386 acres of permanent loss, 587 acres of temporary loss) of modeled Modesto song sparrow  
41 habitat during the term of the Plan. The locations of these losses are described above in the analyses  
42 of individual conservation measures. The Plan includes conservation commitments through *CM3*  
43 *Natural Communities Protection and Restoration*, *CM4 Tidal Natural Communities Restoration*, and  
44 *CM10 Nontidal Marsh Restoration* to protect 750 acres and restore 5,000 acres of the valley/foothill

1 riparian natural community, restore 24,000 acres of tidal freshwater emergent wetland, restore 500  
2 acres of managed wetland, and restore 1,200 acres of nontidal marsh in the Plan Area (Table 3-4 in  
3 Chapter 3, *Description of Alternatives*). Additional acres of valley/foothill riparian habitat would be  
4 restored as a component of channel margin enhancement actions (CM6) along 20 miles of river and  
5 slough channels in the Delta, some of which would be expected to support nesting habitat for  
6 Modesto song sparrow. Of the 5,000 acres of restored riparian natural communities, a minimum of  
7 3,000 acres of valley/foothill riparian would be restored within the seasonally inundated floodplain,  
8 and 1,000 acres would be managed as dense early to mid-successional riparian forest (Objectives  
9 VFRNC1.1 and VFRNC1.2). Goals and objectives in the Plan for riparian restoration also include the  
10 maintenance and enhancement of structural heterogeneity (Objective VFRNC2.1) which would  
11 provide suitable nesting habitat for Modesto song sparrow.

12 The tidal freshwater emergent wetland would be restored in CZs 1, 2, 4, 5, 6, and/or 7 (Objective  
13 TFEWNC1.1) and would be restored in a way that creates topographic heterogeneity and in areas  
14 that increase connectivity among protected lands (Objective TFEWNC2.2). The nontidal marsh  
15 restoration would occur in CZs 2, 4, and/or 5, and the managed wetland restoration would occur in  
16 CZs 3, 4, 5, or 6. Both the nontidal marsh and managed wetland restoration are associated with  
17 CM10 and would provide nesting habitat for Modesto song sparrow.

18 The Plan includes commitments to protect patches of important wildlife habitat on cultivated lands  
19 such as trees and shrubs along borders and roadside, riparian corridors, and wetlands (Objective  
20 CLNC1.3). In addition, 20- to 30-foot-wide hedgerows would be established along field borders and  
21 roadsides, which would provide additional habitat for the species (Objective SH2.2). The  
22 management of protected grasslands to increase insect prey through techniques such as the  
23 avoidance of use of pesticides (Objectives ASWNC2.4, VPNC2.5, and GNC2.4) would provide further  
24 benefits to foraging Modesto song sparrows. These Plan objectives represent performance  
25 standards for considering the effectiveness of conservation actions. The acres of restoration and  
26 protection contained in the near-term Plan goals and the additional detail in the biological objectives  
27 satisfy the typical mitigation that would be applied to the project-level effects of CM1 on Modesto  
28 song sparrow, as well as mitigate the near-term effects of the other conservation measures.

29 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
30 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
31 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
32 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
33 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
34 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
35 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*. Modesto song  
36 sparrow is not a covered species under the BDCP. For the BDCP to avoid an adverse effect on  
37 individuals, preconstruction surveys for noncovered avian species would be required to ensure that  
38 nests are detected and avoided. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird*  
39 *Surveys and Avoid Disturbance of Nesting Birds*, would be available to address this adverse effect.

40 **NEPA Effects:** The loss of Modesto song sparrow habitat and potential mortality of this special-  
41 status species under Alternative 9 would represent an adverse effect in the absence of other  
42 conservation actions. With habitat protection and restoration associated with CM3, CM4, CM6, CM7,  
43 and CM11, guided by biological goals and objectives and by AMM1–AMM7, which would be in place  
44 throughout the construction period, the effects of habitat loss on Modesto song sparrow under  
45 Alternative 9 would not be adverse. The Modesto song sparrow is not a covered species under the

1 BDCP, and potential mortality would be an adverse effect without preconstruction surveys to ensure  
2 that nests are detected and avoided. Mitigation Measure BIO-75 would be available to address this  
3 effect.

4 **CEQA Conclusion:**

5 ***Near-Term Timeframe***

6 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
7 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
8 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
9 effects of construction would be less than significant under CEQA. Alternative 9 would remove 3,128  
10 acres of modeled habitat (2,557 permanent, 551 temporary) for Modesto song sparrow in the study  
11 area in the near-term. These effects would result from the construction of the water conveyance  
12 facilities (CM1, 551 acres), and implementing other conservation measures (*CM2 Yolo Bypass*  
13 *Fisheries Enhancement*, *CM4 Tidal Natural Communities Restoration*, and *CM5 Seasonally Inundated*  
14 *Floodplain Restoration—2,577 acres*).

15 Typical NEPA and CEQA project-level mitigation ratios for those natural communities that would be  
16 affected would be 1:1 for restoration/creation and 1:1 protection of habitat. Using these ratios  
17 would indicate that 551 acres of suitable habitat should be restored/created and 551 acres should be  
18 protected to compensate for the CM1 losses of 551 acres of Modesto song sparrow habitat. The  
19 near-term effects of other conservation actions would remove 2,577 acres of modeled habitat, and  
20 therefore require 2,577 acres of restoration/creation and 2,577 acres of protection of Modesto song  
21 sparrow habitat using the same typical NEPA and CEQA ratios (1:1 for restoration/creation and 1:1  
22 for protection).

23 The BDCP has committed to near-term goals of protecting 750 acres and restoring 800 acres of the  
24 valley/foothill riparian natural community, restoring 2,000 acres of tidal freshwater emergent  
25 wetland, restoring 500 acres of managed wetland, and restoring 400 acres of nontidal marsh in the  
26 Plan Area (Table 3-4 in Chapter 3, *Description of Alternatives*). These conservation actions are  
27 associated with CM3, CM4, CM7, and CM10 and would occur in the same timeframe as the  
28 construction and early restoration losses, thereby avoiding a significant impact of habitat loss on  
29 Modesto song sparrow. The majority of the riparian restoration acres would occur in CZ 7 as part of  
30 a reserve system with extensive wide bands or large patches of valley/foothill riparian natural  
31 community (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*) and  
32 would provide suitable Modesto song sparrow nesting habitat. The tidal freshwater emergent  
33 wetland would be restored in CZs 1, 2, 4, 5, 6, and/or 7 (Objective TFEWNC1.1) and would be  
34 restored in a way that creates topographic heterogeneity and in areas that increase connectivity  
35 among protected lands (Objective TFEWNC2.2). The nontidal marsh restoration would occur in  
36 CZs 2, 4, and/or 5, and the managed wetland restoration would occur in CZs 3, 4, 5, or 6. Both the  
37 nontidal marsh and managed wetland restoration are associated with CM10 and would provide  
38 nesting habitat for Modesto song sparrow.

39 The Plan also includes commitments to protect patches of important wildlife habitat on cultivated  
40 lands such as trees and shrubs along borders and roadside, riparian corridors, and wetlands  
41 (Objective CLNC1.3). In addition, 20- to 30-foot-wide hedgerows would be established along field  
42 borders and roadsides, which would provide additional habitat for the species (Objective SH2.2).  
43 The management of protected grasslands to increase insect prey through techniques such as the

1 avoidance of use of pesticides (Objectives ASWNC2.4, VPNC2.5, and GNC2.4) would provide further  
2 benefits to foraging Modesto song sparrows. These Plan objectives represent performance  
3 standards for considering the effectiveness of conservation actions. The acres of restoration and  
4 protection contained in the near-term Plan goals and the additional detail in the biological objectives  
5 satisfy the typical mitigation that would be applied to the project-level effects of CM1 on Modesto  
6 song sparrow, as well as mitigate the near-term effects of the other conservation measures.

7 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
8 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
9 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
10 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
11 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
12 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
13 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*. Modesto song  
14 sparrow is not a covered species under the BDCP. For the BDCP to have a less-than-significant  
15 impact on individuals, preconstruction surveys for noncovered avian species would be required to  
16 ensure that nests were detected and avoided. Implementation of Mitigation Measure BIO-75,  
17 *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would reduce  
18 this impact to a less-than-significant level.

#### 19 **Late Long-Term Timeframe**

20 Alternative 9 as a whole would result in the permanent loss of and temporary effects on 3,973 acres  
21 (3,386 acres of permanent loss, 587 acres of temporary loss) of modeled Modesto song sparrow  
22 habitat during the term of the Plan. The locations of these losses are described above in the analyses  
23 of individual conservation measures. The Plan includes conservation commitments through *CM3*  
24 *Natural Communities Protection and Restoration*, *CM4 Tidal Natural Communities Restoration*, and  
25 *CM10 Nontidal Marsh Restoration* to protect 750 acres and restore 5,000 acres of the valley/foothill  
26 riparian natural community, restore 24,000 acres of tidal freshwater emergent wetland, restore 500  
27 acres of managed wetland, and restore 1,200 acres of nontidal marsh in the Plan Area (Table 3-4 in  
28 Chapter 3, *Description of Alternatives*). Additional acres of valley/foothill riparian habitat would be  
29 restored as a component of channel margin enhancement actions (CM6) along 20 miles of river and  
30 slough channels in the Delta, some of which would be expected to support nesting habitat for  
31 Modesto song sparrow. Of the 5,000 acres of restored riparian natural communities, a minimum of  
32 3,000 acres of valley/foothill riparian would be restored within the seasonally inundated floodplain,  
33 and 1,000 acres would be managed as dense early to mid-successional riparian forest (Objectives  
34 VFRNC1.1 and VFRNC1.2). Goals and objectives in the Plan for riparian restoration also include the  
35 maintenance and enhancement of structural heterogeneity (Objective VFRNC2.1) which would  
36 provide suitable nesting habitat for Modesto song sparrow.

37 The tidal freshwater emergent wetland would be restored in CZs 1, 2, 4, 5, 6, and/or 7 (Objective  
38 TFEWNC1.1) and would be restored in a way that creates topographic heterogeneity and in areas  
39 that increase connectivity among protected lands (Objective TFEWNC2.2). The nontidal marsh  
40 restoration would occur in CZs 2, 4, and/or 5, and the managed wetland restoration would occur in  
41 CZs 3, 4, 5, or 6. Both the nontidal marsh and managed wetland restoration are associated with  
42 CM10 and would provide nesting habitat for Modesto song sparrow.

43 The Plan includes commitments to protect patches of important wildlife habitat on cultivated lands  
44 such as trees and shrubs along borders and roadside, riparian corridors, and wetlands (Objective

1 CLNC1.3). In addition, 20- to 30-foot-wide hedgerows would be established along field borders and  
2 roadsides, which would provide additional habitat for the species (Objective SH2.2). The  
3 management of protected grasslands to increase insect prey through techniques such as the  
4 avoidance of use of pesticides (Objectives ASWNC2.4, VPNC2.5, and GNC2.4) would provide further  
5 benefits to foraging Modesto song sparrows. These Plan objectives represent performance  
6 standards for considering the effectiveness of conservation actions. The acres of restoration and  
7 protection contained in the near-term Plan goals and the additional detail in the biological objectives  
8 satisfy the typical mitigation that would be applied to the project-level effects of CM1 on Modesto  
9 song sparrow, as well as mitigate the near-term effects of the other conservation measures.

10 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
11 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
12 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
13 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
14 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
15 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
16 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*. Modesto song  
17 sparrow is not a covered species under the BDCP. For the BDCP to minimize direct mortality of  
18 individuals, preconstruction surveys for noncovered avian species would be required to ensure that  
19 nests are detected and avoided. Implementation of Mitigation Measure BIO-75, *Conduct*  
20 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would reduce this  
21 impact to a less-than-significant level.

22 Considering Alternative 9's protection and restoration provisions, which would provide acreages of  
23 new high-value or enhanced habitat in amounts suitable to compensate for habitats lost to  
24 construction and restoration activities, and with the implementation of AMM1-AMM7 and  
25 Mitigation Measure BIO-75, the loss of habitat or direct mortality through implementation of  
26 Alternative 9 would not result in a substantial adverse effect through habitat modifications and  
27 would not substantially reduce the number or restrict the range of Modesto song sparrow.  
28 Therefore, the loss of habitat or potential mortality under this alternative would have a less-than-  
29 significant impact on Modesto song sparrow.

30 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**  
31 **Disturbance of Nesting Birds**

32 See Mitigation Measure BIO-75 under Impact BIO-75.

33 **Impact BIO-143: Effects on Modesto Song Sparrow Associated with Electrical Transmission**  
34 **Facilities**

35 New transmission lines would increase the risk for bird-power line strikes, which could result in  
36 injury or mortality of Modesto song sparrow. Existing lines currently pose this risk for Modesto song  
37 sparrow and the incremental increased risk from the construction of new transmission lines is not  
38 expected to adversely affect the population.

39 **NEPA Effects:** The incremental increased risk of bird-powerline strikes from the construction of new  
40 transmission lines would not adversely affect the Modesto song sparrow population.

1 **CEQA Conclusion:** The incremental increased risk of bird-powerline strikes from the construction of  
2 new transmission lines would have a less-than-significant impact on the Modesto song sparrow  
3 population.

#### 4 **Impact BIO-144: Indirect Effects of Plan Implementation on Modesto Song Sparrow**

5 **Indirect construction- and operation-related effects:** Noise and visual disturbances associated  
6 with construction-related activities could result in temporary disturbances that affect Modesto song  
7 sparrow use of modeled habitat. Construction noise above background noise levels (greater than 50  
8 dBA) could extend 1,900 to 5,250 feet from the edge of construction activities (BDCP Appendix 5.J,  
9 Attachment 5J.D, *Indirect Effects of the Construction of the BDCP Conveyance Facility on Sandhill*  
10 *Crane*, Table 4), although there are no available data to determine the extent to which these noise  
11 levels could affect Modesto song sparrow. Indirect effects associated with construction include  
12 noise, dust, and visual disturbance caused by grading, filling, contouring, and other ground-  
13 disturbing operations. Construction-related noise and visual disturbances could disrupt nesting and  
14 foraging behaviors, and reduce the functions of suitable habitat which could result in an adverse  
15 effect on these species. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and*  
16 *Avoid Disturbance of Nesting Birds*, would be available to minimize effects on active nests. The use of  
17 mechanical equipment during water conveyance construction could cause the accidental release of  
18 petroleum or other contaminants that could affect these species or their prey in the surrounding  
19 habitat. AMM1–AMM7 including *AMM2 Construction Best Management Practices and Monitoring*  
20 would minimize the likelihood of such spills from occurring. The inadvertent discharge of sediment  
21 or excessive dust adjacent to Modesto song sparrow could also have a negative effect on these  
22 species. AMM1–AMM7 would ensure that measures are in place to prevent runoff from the  
23 construction area and the negative effects of dust on wildlife adjacent to work areas.

24 **Methylmercury Exposure:** Marsh (tidal and nontidal) and floodplain restoration have the potential  
25 to increase exposure to methylmercury. Mercury is transformed into the more bioavailable form of  
26 methylmercury in aquatic systems, especially areas subjected to regular wetting and drying such as  
27 tidal marshes and flood plains (Alpers et al. 2008). Thus, BDCP restoration activities that create  
28 newly inundated areas could increase bioavailability of mercury (see BDCP Chapter 3, *Conservation*  
29 *Strategy*, for details of restoration). Species sensitivity to methylmercury differs widely and there is  
30 a large amount of uncertainty with respect to species-specific effects. Increased methylmercury  
31 associated with natural community and floodplain restoration could indirectly affect Modesto song  
32 sparrow, via uptake in lower trophic levels (as described in the BDCP, Appendix 5.D, *Contaminants*).

33 In addition, the potential mobilization or creation of methylmercury within the Plan Area varies  
34 with site-specific conditions and would need to be assessed at the project level. *CM12 Methylmercury*  
35 *Management* contains provisions for project-specific Mercury Management Plans. Site-specific  
36 restoration plans that address the creation and mobilization of mercury, as well as monitoring and  
37 adaptive management as described in CM12 would be available to address the uncertainty of  
38 methylmercury levels in restored tidal marsh and potential impacts on Modesto song sparrow.

39 **NEPA Effects:** Indirect effects on Modesto song sparrow as a result of constructing the Alternative 9  
40 water conveyance facilities could adversely affect individuals in the absence of other conservation  
41 actions. The incorporation of AMM1–AMM7 into the BDCP and the implementation of Mitigation  
42 Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting*  
43 *Birds*, would minimize this adverse effect. The implementation of tidal natural communities  
44 restoration or floodplain restoration could result in increased exposure of Modesto song sparrow to

1 methylmercury. However, it is unknown what concentrations of methylmercury are harmful to the  
2 species and the potential for increased exposure varies substantially within the study area. Site-  
3 specific restoration plans that address the creation and mobilization of mercury, as well as  
4 monitoring and adaptive management as described in *CM12 Methylmercury Management* would  
5 address the potential impacts of methylmercury levels in restored tidal marsh in the study area. The  
6 site-specific planning phase of marsh restoration would be the appropriate place to assess the  
7 potential for risk of methylmercury exposure for Modesto song sparrow, once site specific sampling  
8 and other information could be developed.

9 **CEQA Conclusion:** Indirect effects on Modesto song sparrow as a result of constructing the water  
10 conveyance facilities could have a significant impact on these species. The incorporation of AMM1-  
11 AMM7 into the BDCP and the implementation of Mitigation Measure BIO-75, *Conduct*  
12 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would reduce this  
13 impact to a less-than-significant level. The implementation of tidal natural communities restoration  
14 or floodplain restoration could result in increased exposure of Modesto song sparrow to  
15 methylmercury. However, it is unknown what concentrations of methylmercury are harmful to the  
16 species. Site-specific restoration plans that address the creation and mobilization of mercury, as well  
17 as monitoring and adaptive management as described in *CM12 Methylmercury Management* would  
18 address the potential impacts of methylmercury levels in restored tidal marsh in the study area.

19 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**  
20 **Disturbance of Nesting Birds**

21 See Mitigation Measure BIO-75 under Impact BIO-75.

22 **Impact BIO-145: Periodic Effects of Inundation on Modesto Song Sparrow as a Result of**  
23 **Implementation of Conservation Components**

24 Flooding of the Yolo Bypass (CM2) would inundate 81-158 acres of modeled Modesto song sparrow  
25 habitat. However, inundation would occur during the nonbreeding season. Reduced foraging habitat  
26 availability would be expected during the fledgling period of the nesting season due to periodic  
27 inundation.

28 Based on hypothetical floodplain restoration, construction of setback levees from seasonally  
29 inundated floodplain restoration (CM5) could result in periodic inundation of up to approximately  
30 284 acres of Modesto song sparrow modeled habitat (Table 12-9-52).

31 The periodic inundation of the Yolo Bypass (CM2) and of seasonal floodplains (CM5) is expected to  
32 restore a more natural flood regime in support of wetland and riparian vegetation types that  
33 support Modesto song sparrow habitat, but may reduce the availability of nesting habitat during  
34 years when flooding extends into the nesting season (past March).

35 **NEPA Effects:** Periodic effects of inundation would not result in an adverse effect on Modesto song  
36 sparrow because increased frequency and duration of inundation would be expected to restore a  
37 more natural flood regime in support of wetland and riparian vegetation types that support Modesto  
38 song sparrow habitat.

39 **CEQA Conclusion:** Periodic effects of inundation would have a less-than-significant impact on  
40 Modesto song sparrow because increased frequency and duration of inundation would be expected

1 to restore a more natural flood regime in support of wetland and riparian vegetation types that  
2 support Modesto song sparrow habitat.

3 **Bank Swallow**

4 Bank swallows nest in colonies along rivers, streams, or other water and require fine textured sandy  
5 soils in vertical banks to create their burrows. There is little suitable habitat for bank swallow in the  
6 study area because most of the erodible banks have been stabilized with of levee revetment. The  
7 placement of rock revetment prevents the lateral migration of rivers, removing the natural river  
8 process that creates vertical banks through erosion (Bank Swallow Technical Advisory Committee  
9 2013, Stillwater Sciences 2007). An estimated 70–90% of the bank swallow population in California  
10 nests along the Sacramento and Feather Rivers upstream of the study area (Bank Swallow Technical  
11 Advisory Committee 2013). However, there are three CNDDDB records of bank swallow colonies in  
12 the study area: two in CZ 2 north of Fremont Weir, and one in CZ 5 on Brannan Island, just west of  
13 Twitchell Island.

14 Construction and restoration associated with Alternative 9 conservation measures would not result  
15 in any direct loss of modeled habitat for bank swallow (Table 12-9-53). However, indirect effects of  
16 noise and visual disturbance from *CM2 Yolo Bypass Fisheries Enhancement* and *CM4 Tidal Natural*  
17 *Communities Restoration* could impact bank swallow colonies if they are present near work areas. In  
18 addition, there is uncertainty with respect to how water flows upstream of the study area would  
19 affect bank swallow habitat. As explained below, impacts on bank swallow under Alternative 9  
20 would not be adverse for NEPA purposes and would be less than significant for CEQA purposes with  
21 the implementation of mitigation measures to monitor colonies and address the uncertainty of  
22 upstream operations on the species.

23 **Table 12-9-53. Changes in Bank Swallow Modeled Habitat Associated with Alternative 9 (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	Breeding	0	0	0	0	NA	NA
<b>Total Impacts CM1</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>NA</b>	<b>NA</b>
CM2–CM18	Breeding	0	0	0	0	0	0
<b>Total Impacts CM2–CM18</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>TOTAL IMPACTS</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

<sup>a</sup> See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only.

NT = near-term

LLT = late long-term

NA = not applicable

24

1 **Impact BIO-146: Indirect Effects of Implementation of Conservation Components on Bank**  
2 **Swallow**

3 Noise and visual disturbances during restoration activities from *CM2 Yolo Bypass Fisheries*  
4 *Enhancement*, and *CM4 Tidal Natural Communities Restoration* including operation of earthmoving  
5 equipment and human activities at work sites, could result in temporary disturbances that cause  
6 bank swallow to abandon active nest burrows adjacent to construction areas. Bank swallow colonies  
7 with occupied burrows have been recorded in CZ 2 and CZ 5 and construction-related disturbances  
8 could result in an adverse effect on individuals. Various activities related to *CM11 Natural*  
9 *Communities Enhancement and Management* could also have indirect impacts on bank swallow.

10 **NEPA Effects:** Construction activities associated with habitat restoration could adversely affect bank  
11 swallow colonies in the absence of other measures. Noise and visual disturbances could result in  
12 adverse effects on bank swallows if active colonies were present within 500 feet of work areas.  
13 Mitigation Measure BIO-146, *Active Bank Swallow Colonies Shall Be Avoided and Indirect Effects on*  
14 *Bank Swallow Will Be Minimized*, would be available to address this effect.

15 **CEQA Conclusion:** Construction activities associated with habitat restoration could result in a  
16 significant impact on bank swallow colonies in the absence of other measures. Noise and visual  
17 disturbances could result in significant impacts on bank swallows if active colonies were present  
18 within 500 feet of work areas. Implementation of Mitigation Measure BIO-146, *Active Bank Swallow*  
19 *Colonies Shall Be Avoided and Indirect Effects on Bank Swallow Will Be Minimized*, would reduce this  
20 impact to a less-than-significant level.

21 **Mitigation Measure BIO-146: Active Bank Swallow Colonies Shall Be Avoided and Indirect**  
22 **Effects on Bank Swallow Will Be Minimized**

23 To the extent practicable, BDCP proponents will not construct conservation components during  
24 the bank swallow nesting season (April 1 through August 31). If construction activities cannot  
25 be avoided during nesting season, a qualified biologist will conduct preconstruction surveys to  
26 determine if active bank swallow nesting colonies are present within 500 feet of work areas. If  
27 no active nesting colonies are present, no further mitigation is required.

28 If active colonies are detected, BDCP proponents will establish a nondisturbance buffer  
29 (determined in coordination with CDFW and the Bank Swallow Technical Advisory Committee)  
30 around the colony during the breeding season. In addition, a qualified biologist will monitor any  
31 active colony within 500 feet of construction to ensure that construction activities do not affect  
32 nest success.

33 **Impact BIO-147: Effects of Upstream Reservoir and Water Conveyance Facilities Operations**  
34 **on Bank Swallow**

35 Bank swallows are a riparian species that have evolved to deal with a dynamic system that changes  
36 with annual variation in variables such as rainfall, or late snowpack runoff. The primary threat to the  
37 species is loss of nesting habitat from the placement of rock revetment for levee stabilization.  
38 Because of this limited available habitat, and the reduction of natural river process, the species is  
39 highly sensitive to 1) reductions in winter flows which are necessary to erode banks for habitat  
40 creation, and 2) high flows during the breeding season. The potential impacts of changes in  
41 upstream flows during the breeding season on bank swallows are the flooding of active burrows and  
42 destruction of burrows from increased bank sloughing. Bank swallows arrive in California and begin

1 to excavate their burrows in March, and the peak egg-laying occurs during April and May (Bank  
2 Swallow Technical Advisory Committee 2013). Therefore, increases in flows after March when the  
3 swallows have nested and laid eggs in the burrows could result in the loss of nests. On the  
4 Sacramento River, breeding season flows between 14,000 and 30,000 cfs have been associated with  
5 localized bank collapses, which resulted in partial or complete colony failure (Stillwater Sciences  
6 2007).

7 The CALSIM II modeling results of mean monthly flow were analyzed for three flow gauge stations  
8 on the Sacramento River (Sacramento River at Keswick, Sacramento River upstream of Red Bluff,  
9 Sacramento River at Verona) and two flow gauge stations on the Feather River (Feather River high-  
10 flow channel at Thermalito Dam, and Feather River at the confluence with the Sacramento River).  
11 Flows were estimated for wet years, above normal years, below normal years, dry years, and critical  
12 years. An average also was estimated (see Chapter 5, Section 5.3.1, *Methods for Analysis*, for a  
13 description of the model).

14 On the Sacramento River at the Keswick and Red Bluff gauges, mean monthly flows under  
15 Alternative 9 would increase between April and August in average water years (Table 1 in Section  
16 11C.9.1.1 and Table 3 Section 11C.9.1.2 of Appendix 11C, *CALSIM II Model Results Utilized in the Fish  
17 Analysis*) which could lead to inundation of active colonies. However, the flows under Existing  
18 Conditions and the predicted flows in the late long-term without the project (NAA) show increases  
19 in flows during the breeding season (April through August) in these water year types. Similar trends  
20 are shown for the Feather River (Table 15 in Section 11C.9.1.8 and Table 17 in Section 11C.9.1.9 of  
21 Appendix 11C, *CALSIM II Model Results Utilized in the Fish Analysis*). In addition, at the Keswick flow  
22 gauge on the Sacramento River in above normal water years (Table 1 in Section 11C.9.1.1 of  
23 Appendix 11C, *CALSIM II Model Results Utilized in the Fish Analysis*) flows are predicted to be greater  
24 than 14,000 cfs during the breeding season, which could lead to bank collapse. However, flows of  
25 this height are recorded under Existing Conditions at this flow gauge and are also predicted for the  
26 late long-term without the project (NAA).

27 **NEPA Effects:** High spring flows on the Sacramento and Feather Rivers may already be impacting  
28 bank swallow colonies during the breeding season, and predicted flows under Alternative 9 would  
29 not be substantially greater than under the No Action Alternative. However, because of the  
30 complexity of variables that dictate suitable habitat for the species, there is uncertainty regarding  
31 the potential for and magnitude of effects on bank swallow from changes in upstream operations.  
32 Soil type, high winter flows, and low spring flows all contribute to successful nesting of bank  
33 swallow, and even moderate changes in seasonal flows could have an adverse effect on breeding  
34 success for the species. Mitigation Measure BIO-147, *Monitor Bank Swallow Colonies and Evaluate  
35 Winter and Spring Flows Upstream of the Study Area*, would be available to address the uncertainty of  
36 potential adverse effects of upstream operations on bank swallow.

37 **CEQA Conclusion:** High spring flows on the Sacramento and Feather Rivers may already be  
38 impacting bank swallow colonies the breeding season, and predicted flows under Alternative 9  
39 would not be substantially greater than under the No Action Alternative. However, because of the  
40 complexity of variables that dictate suitable habitat for the species, there is uncertainty regarding  
41 the potential for and magnitude of impacts on bank swallow from changes in upstream operations.  
42 There are many variables that dictate suitable habitat for the species that cannot be clearly  
43 quantified, and seasonal changes in flow could increase or decrease suitable habitat for bank  
44 swallow depending on soil type and location of current colonies. Implementation of Mitigation  
45 Measure BIO-147, *Monitor Bank Swallow Colonies and Evaluate Winter and Spring Flows Upstream of*

1 *the Study Area*, would address this potential significant impact and further determine if additional  
2 mitigation is required for bank swallow.

3 **Mitigation Measure BIO-147: Monitor Bank Swallow Colonies and Evaluate Winter and**  
4 **Spring Flows Upstream of the Study Area**

5 To address the uncertainty of the impact of upstream spring flows on existing bank swallow  
6 habitat, DWR will monitor existing colonies upstream of the study area and collect habitat  
7 suitability data including soil type, number of active burrows per colony, and height of average  
8 burrows. In addition, to determine the degree to which reduced winter flows are contributing to  
9 habitat loss, DWR will quantify the winter flows required for river meander to create suitable  
10 habitat through lateral channel migration and bank resurfacing. If impacts of upstream flows on  
11 bank swallow are identified, further mitigation may be required after consultation with CDFW  
12 and the Bank Swallow Technical Advisory Committee. Recommended mitigation for changes in  
13 flow regimes associated with water conveyance includes conservation easements on currently  
14 occupied habitat or revetment removal projects to create habitat for bank swallow (Bank  
15 Swallow Technical Advisory Committee 2013).

16 **Yellow-Headed Blackbird**

17 The habitat model used to assess impacts on yellow-headed blackbird consists of nesting habitat  
18 and foraging habitat. Modeled nesting habitat includes tidal freshwater emergent wetland, other  
19 natural seasonal wetland, nontidal freshwater perennial emergent wetland, and managed wetland.  
20 Modeled foraging habitat for yellow-headed blackbird consists of cultivated lands and noncultivated  
21 land cover types known to support abundant insect populations, including corn, pasture, and  
22 feedlots.

23 Construction and restoration associated with Alternative 9 conservation measures would result in  
24 both temporary and permanent losses of yellow-headed blackbird modeled habitat as indicated in  
25 Table 12-9-54. Full implementation of Alternative 9 would include the following biological  
26 objectives over the term of the BDCP that would benefit yellow-headed blackbird (BDCP Chapter 3,  
27 Section 3.3, *Biological Goals and Objectives*).

- 28 ● Restore or create at least 24,000 acres of tidal freshwater emergent wetland in CZs 1, 2, 4, 5, 6,  
29 and/or 7 (Objective TFEWNC1.1, associated with CM4).
- 30 ● Create at least 1,200 acres of nontidal marsh consisting of a mosaic of nontidal perennial aquatic  
31 and nontidal freshwater emergent wetland natural communities (Objective NFEW/NPANC1.1,  
32 associated with CM10).
- 33 ● Protect and enhance at least 8,100 acres of managed wetland, at least 1,500 acres of which are  
34 in the Grizzly Island Marsh Complex (Objective MWNC1.1, associated with CM3).
- 35 ● Protect at least 8,000 acres of grassland, with at least 2,000 acres protected in CZ 1, at least  
36 1,000 acres protected in CZ 8, at least 2,000 acres protected in CZ 11, and the remainder  
37 distributed among CZs 1, 2, 4, 5, 7, 8, and 11 (Objective GNC1.1, associated with CM3).
- 38 ● Restore at least 2,000 acres of grasslands (Objective GNC1.2, associated with CM8).
- 39 ● Protect at least 150 acres of alkali seasonal wetland and at least 600 acres of existing vernal pool  
40 complex in CZs 1, 8, and/or 11 (Objective ASWNC1.1, Objective VPNC1.1, associated with CM3).

- Maintain and protect the small patches of important wildlife habitats that occur in cultivated lands within the reserve system, including isolated valley oak trees, trees and shrubs along field borders and roadsides, remnant groves, riparian corridors, water conveyance channels, grasslands, ponds, and wetlands (Objective CLNC1.3, associated with CM3).
- Protect at least 11,050 acres of high- to very high-value breeding-foraging habitat (Table 12-9-38) in CZs 1, 2, 3, 4, 7, 8, or 11 (Objective TRBL1.3, associated with CM3).
- Increase prey abundance and accessibility for grassland-foraging species (Objective GNC2.4, associated with CM11).

As explained below, with the restoration or protection of these amounts of habitat, in addition to management activities to enhance habitats for the species, and implementation of AMM1-AMM7, *AMM27 Selenium Management*, and Mitigation Measure BIO-75, impacts on yellow-headed blackbird would not be adverse for NEPA purposes and would be less than significant for CEQA purposes.

**Table 12-9-54. Changes in Yellow-Headed Blackbird Modeled Habitat Associated with Alternative 9**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	Nesting	72	72	169	169	NA	NA
	Foraging	327	327	1,288	1,288	NA	NA
<b>Total Impacts CM1</b>		<b>399</b>	<b>399</b>	<b>1,457</b>	<b>1,457</b>	<b>NA</b>	<b>NA</b>
CM2-CM18	Nesting	5,814	13,902	45	46	961-2,678	18
	Foraging	5,612	26,673	376	905	368-1,476	2,701
<b>Total Impacts CM2-CM18</b>		<b>11,426</b>	<b>40,575</b>	<b>421</b>	<b>951</b>	<b>1,495-4,394</b>	<b>2,719</b>
<b>Total Nesting</b>		<b>5,886</b>	<b>13,974</b>	<b>214</b>	<b>215</b>	961-2,678	18
<b>Total Foraging</b>		<b>5,939</b>	<b>27,000</b>	<b>1,664</b>	<b>2,193</b>	368-1,476	2,701
<b>TOTAL IMPACTS</b>		<b>11,825</b>	<b>40,974</b>	<b>4,878</b>	<b>2,408</b>	<b>1,495-4,394</b>	<b>2,719</b>

<sup>a</sup> See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

**Impact BIO-148: Loss of Habitat for and Direct Mortality of Yellow-Headed Blackbird**

Alternative 9 conservation measures would result in the combined permanent and temporary loss of up to 43,382 acres of suitable habitat for yellow-headed blackbird (14,189 acres of nesting habitat and 29,193 acres foraging habitat; Table 12-9-54). Conservation measures that would result in these

1 losses are conveyance facilities and transmission line construction, and establishment and use of  
2 borrow and spoil areas (CM1), Yolo Bypass improvements (CM2), tidal habitat restoration (CM4),  
3 floodplain restoration (CM5), riparian restoration (CM7), grassland restoration (CM8), marsh  
4 restoration (CM10), and construction of conservation hatcheries (CM18). Habitat enhancement and  
5 management activities (CM11) which include ground disturbance or removal of nonnative  
6 vegetation could result in local adverse habitat effects. In addition, maintenance activities associated  
7 with the long-term operation of the water conveyance facilities and other BDCP physical facilities  
8 could degrade or eliminate yellow-headed blackbird suitable habitat. Each of these individual  
9 activities is described below. A summary statement of the combined impacts and NEPA effects, and a  
10 CEQA conclusion follow the individual conservation measure discussions.

- 11 • *CM1 Water Conveyance Facilities and Operation:* Construction of Alternative 9 water conveyance  
12 facilities would result in the combined permanent and temporary loss of up to 241 acres of  
13 yellow-headed blackbird nesting habitat (72 acres of permanent loss and 169 acres of  
14 temporary loss). In addition, 1,615 acres of foraging habitat would be removed (327 acres of  
15 permanent loss, 1,288 acres of temporary loss, Table 12-9-54). Impacts from CM1 would occur  
16 in the central delta in CZ 4, 5, 6, 7, and 8. Most of the loss of nesting habitat would occur at the  
17 channel dredging sites within the Middle River and Victoria Canal. Middle River dredging would  
18 occur from Victoria Canal north to Mildred Island, while Victoria Canal dredging would extend  
19 from Middle River westward to Old River. Smaller areas would be permanently lost at operable  
20 barrier sites adjacent to Middle River and San Joaquin River. impacts on foraging habitat would  
21 occur from the construction of the canals in CZ 8 east and south of Clifton Court Forebay and  
22 other conveyance structures in CZ 4, 5, 6, 7, and 8. Temporary impacts would primarily occur  
23 from borrow and spoil areas and temporary work areas. There are no occurrences of yellow-  
24 headed blackbird that overlap with the construction footprint for CM1. Mitigation Measure BIO-  
25 75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would  
26 be available to address potential effects on yellow-headed blackbirds if they were to nest in or  
27 adjacent to construction areas. Refer to the Terrestrial Biology Map Book for a detailed view of  
28 Alternative 9 construction locations. Impacts from CM1 would occur within the first 10 years of  
29 Alternative 9 implementation.
- 30 • *CM2 Yolo Bypass Fisheries Enhancement:* Construction of the Yolo bypass fisheries enhancement  
31 (CM2) would result in the permanent removal of 29 acres of breeding habitat and 113 acres of  
32 nonbreeding habitat for yellow-headed blackbird. In addition, CM2 would result in the  
33 temporary loss of 43 acres of breeding habitat for the species. Impacts from CM2 would  
34 primarily occur in the near-term timeframe.
- 35 • *CM4 Tidal Natural Communities Restoration:* Site preparation and inundation from CM4 would  
36 permanently remove or convert an estimated 4,801 acres of breeding habitat. In addition, 3,282  
37 acres of non-breeding habitat would be lost or converted as a result of tidal restoration.  
38 However, the resulting 65,000 acres of tidal natural communities would also provide habitat for  
39 the species, 24,000 acres of which would be tidal freshwater natural communities providing  
40 breeding habitat for yellow-headed blackbird.
- 41 • *CM5 Seasonally Inundated Floodplain Restoration/CM7: Riparian Natural Community Restoration:*  
42 Construction of setback levees to restore seasonally inundated floodplain and riparian  
43 restoration actions (CM5) would permanently and temporarily remove approximately 2,477  
44 acres of suitable yellow-headed blackbird habitat consisting of 2 acres of breeding habitat and  
45 2,475 acres of nonbreeding habitat.

- 1       ● *CM8 Grassland Natural Community Restoration*: Restoration of grassland is expected to be  
2       implemented on agricultural lands and would result in the conversion of 230 acres of yellow-  
3       headed blackbird agricultural foraging habitat to grassland foraging habitat in CZs 1, 8, and/or  
4       11. If agricultural lands supporting higher value foraging habitat than the restored grassland  
5       were removed, there would be a loss of yellow-headed blackbird foraging habitat value. CM8  
6       would result in the restoration of 2,000 acres of grassland foraging habitat in the Plan Area.
  
- 7       ● *CM10 Nontidal Marsh Restoration*: Restoration and creation of nontidal freshwater marsh would  
8       result in the permanent conversion of 133 acres of cultivated lands foraging habitat to nontidal  
9       marsh in CZ 2 and CZ 4. Yellow-headed blackbird nesting habitat may develop along the margins  
10      of restored nontidal marsh and restoration would also provide foraging habitat for the species.
  
- 11      ● *CM11 Natural Communities Enhancement and Management*: Habitat management- and  
12      enhancement-related activities could disturb yellow-headed blackbird nests if they were  
13      present near work sites. A variety of habitat management actions included in CM11 that are  
14      designed to enhance wildlife values in BDCP-protected habitats may result in localized ground  
15      disturbances that could temporarily remove small amounts of yellow-headed blackbird habitat  
16      and reduce the functions of habitat until restoration is complete. Ground-disturbing activities,  
17      such as removal of nonnative vegetation and road and other infrastructure maintenance, would  
18      be expected to have minor effects on available yellow-headed blackbird habitat. These effects  
19      cannot be quantified, but are expected to be minimal and would be avoided and minimized by  
20      the AMMs listed below.
  
- 21      ● *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground  
22      water conveyance facilities and restoration infrastructure could result in ongoing but periodic  
23      disturbances that could affect yellow-headed blackbird use of the surrounding habitat.  
24      Maintenance activities would include vegetation management, levee and structure repair, and  
25      re-grading of roads and permanent work areas. These effects, however, would be reduced by  
26      AMMs and conservation actions as described below.
  
- 27      ● *Injury and Direct Mortality*: Construction-related activities would not be expected to result in  
28      direct mortality of adult or fledged yellow-headed blackbird if they were present in the Plan  
29      Area, because they would be expected to avoid contact with construction and other equipment.
  
- 30      ● If yellow-headed blackbird were to nest in the construction area, construction-related activities,  
31      including equipment operation, noise and visual disturbances could destroy nests or lead to  
32      their abandonment, resulting in mortality of eggs and nestlings. Mitigation Measure BIO-75,  
33      *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be  
34      available to address these adverse effects on yellow-headed blackbird.

35      The following paragraphs summarize the combined effects discussed above and describe other  
36      BDCP conservation actions that offset or avoid these effects. NEPA and CEQA impact conclusions are  
37      also included.

### 38      ***Near-Term Timeframe***

39      Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
40      the near-term BDCP conservation strategy has been evaluated to determine whether it would  
41      provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
42      effects of construction would not be adverse under NEPA. Alternative 9 would remove 6,100 acres  
43      (5,886 acres of permanent loss, 214 acres of temporary loss) of yellow-headed blackbird nesting

1 habitat in the study area in the near-term. These effects would result from the construction of the  
2 water conveyance facilities (CM1, 241 acres), and implementing other conservation measures (CM2  
3 *Yolo Bypass Fisheries Enhancement*, CM4 *Tidal Natural Communities Restoration*, and CM5 *Seasonally*  
4 *Inundated Floodplain Restoration*—5,859 acres). In addition, 7,603 acres (5,939 acres of permanent  
5 loss, 1,664 acres of temporary loss) of yellow-headed blackbird foraging habitat would be removed  
6 or converted in the near-term (CM1, 1,615 acres; CM2 *Yolo Bypass Fisheries Enhancement*, CM4 *Tidal*  
7 *Natural Communities Restoration*, CM5 *Seasonally Inundated Floodplain Restoration*, CM7 *Riparian*  
8 *Natural Community Restoration*, CM8 *Grassland Natural Community Restoration*, CM10 *Nontidal*  
9 *Marsh Restoration*, and CM18 *Conservation Hatcheries*—5,988 acres).

10 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by  
11 CM1 would be 1:1 for restoration/creation and 1:1 protection of nesting habitat, and 1:1 protection  
12 of foraging habitat. Using these ratios would indicate that 241 acres of nesting habitat should be  
13 restored/created and 241 acres should be protected to compensate for the CM1 losses of yellow-  
14 headed blackbird nesting habitat. In addition, 1,615 acres of foraging habitat should be protected to  
15 compensate for the CM1 losses of yellow-headed blackbird foraging habitat. The near-term effects of  
16 other conservation actions would require 5,859 acres each of restoration and protection of breeding  
17 habitat and 5,988 acres of protection of foraging habitat using the same typical NEPA and CEQA  
18 ratios (1:1 for restoration and 1:1 for protection of nesting and 1: protection of foraging habitat).

19 The BDCP has committed to near-term goals of restoring 8,850 acres of tidal freshwater emergent  
20 wetland, protecting 4,800 acres of managed wetland, protecting 25 acres and restoring 900 acres of  
21 nontidal marsh, protecting 2,000 acres and restoring 1,140 acres of grassland natural community,  
22 protecting 400 acres of vernal pool complex, protecting 120 acres of alkali seasonal wetland  
23 complex, and protecting 15,600 acres of cultivated lands in the Plan Area (Table 3-4 in Chapter 3,  
24 *Description of Alternatives*). These conservation actions are associated with CM3, CM4, CM8, and  
25 CM10 and would occur in the same timeframe as the construction and early restoration losses.

26 The tidal freshwater emergent wetland would be restored in CZs 1, 2, 4, 5, 6, and/or 7 (Objective  
27 TFEWNC1.1 in BDCP Chapter 3, *Conservation Strategy*) and would be restored in a way that creates  
28 topographic heterogeneity and in areas that increase connectivity among protected lands (Objective  
29 TFEWNC2.2). The 4,800 acres of managed wetland would be protected and enhanced in CZ 11 and  
30 would benefit yellow-headed blackbird through the enhancement of degraded areas (such as areas  
31 of bare ground or marsh where the predominant vegetation consists of invasive species such as  
32 perennial pepperweed) to vegetation such as pickleweed-alkali heath-American bulrush plant  
33 associations (Objective MWNC1.1). In addition, at least 900 acres of nontidal marsh would be  
34 created, some of which would provide nesting habitat for the species.

35 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1  
36 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali  
37 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous  
38 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would  
39 provide grassland foraging habitat for yellow-headed blackbird. Insect prey availability and  
40 abundance would also be increased on protected lands, enhancing the foraging value of these  
41 natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4). Foraging opportunities would  
42 also be improved by enhancing prey populations through the establishment of 20- to 30-foot-wide  
43 hedgerows along field borders and roadsides within protected cultivated lands (Objective  
44 SWHA2.2). Within the cultivated lands, important wildlife habitat such as grasslands, ponds, and

1 wetlands would also be protected and maintained as part of the cultivated lands reserve system  
2 which would provide additional habitat for yellow-headed blackbird (Objective CLNC1.3).

3 At least 15,600 acres of cultivated lands that provide habitat for covered and other native wildlife  
4 species would be protected in the near-term time period (Objective CLNC1.1), much of which would  
5 provide foraging habitat for yellow-headed blackbird. The acres of restoration and protection  
6 contained in the near-term Plan goals and the additional detail in the biological objectives satisfy the  
7 typical mitigation that would be applied to the project-level effects of CM1 on yellow-headed  
8 blackbird habitat, as well as mitigate the near-term effects of the other conservation measures.

9 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
10 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
11 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
12 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
13 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
14 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
15 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

16 The yellow-headed blackbird is not a covered species under the BDCP. For the BDCP to avoid an  
17 adverse effect on individuals, preconstruction surveys for noncovered avian species would be  
18 required to ensure that nests are detected and avoided. Mitigation Measure BIO-75, *Conduct*  
19 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to  
20 address this adverse effect.

### 21 **Late Long-Term Timeframe**

22 The study area supports approximately 82,005 acres of modeled nesting habitat and 333,956 acres  
23 of modeled foraging habitat for yellow-headed blackbird. Alternative 9 as a whole would result in  
24 the permanent loss of and temporary effects on 14,189 acres of potential nesting habitat (17% of the  
25 potential nesting habitat in the study area) and the loss or conversion of 29,193 acres of foraging  
26 habitat (9% of the foraging habitat in the study area). The locations of these losses are described  
27 above in the analyses of individual conservation measures.

28 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*  
29 *Restoration*, *CM4 Tidal Natural Communities Restoration*, *CM8 Grassland Natural Community*  
30 *Restoration*, and *CM10 Nontidal Marsh Restoration* to protect and enhance at least 8,100 acres of  
31 managed wetland, restore or create at least 24,000 acres of tidal freshwater emergent wetland,  
32 create or restore at least 1,200 acres of nontidal marsh, protect 8,000 acres and restore 2,000 acres  
33 of grassland natural community, protect 600 acres of vernal pool complex, protect 150 acres of  
34 alkali seasonal wetland complex, and protect 48,625 acres of cultivated lands that provide suitable  
35 habitat for native wildlife species (Table 3-4 in Chapter 3, *Description of Alternatives*).

36 The tidal freshwater emergent wetland would be restored in CZs 1, 2, 4, 5, 6, and/or 7 (Objective  
37 TFEWNC1.1 in BDCP Chapter 3, *Conservation Strategy*) and would be restored in a way that creates  
38 topographic heterogeneity and in areas that increase connectivity among protected lands (Objective  
39 TFEWNC2.2). The managed wetland would be protected and enhanced in CZ 11 and would benefit  
40 yellow-headed blackbird through the enhancement of degraded areas (such as areas of bare ground  
41 or marsh where the predominant vegetation consists of invasive species such as perennial  
42 pepperweed) to vegetation such as pickleweed-alkali heath-American bulrush plant associations

1 (Objective MWNC1.1). In addition, at least 1,200 acres of nontidal marsh would be created, some of  
2 which would provide nesting habitat for the species.

3 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1  
4 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali  
5 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous  
6 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would  
7 provide grassland foraging habitat for yellow-headed blackbird. Insect prey availability and  
8 abundance would also be increased on protected lands, enhancing the foraging value of these  
9 natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4). Foraging opportunities would  
10 also be improved by enhancing prey populations through the establishment of 20- to 30-foot-wide  
11 hedgerows along field borders and roadsides within protected cultivated lands (Objective  
12 SWHA2.2). Within the cultivated lands, important wildlife habitat such as grasslands, ponds, and  
13 wetlands would also be protected and maintained as part of the cultivated lands reserve system  
14 which would provide additional habitat for yellow-headed blackbird (Objective CLNC1.3). Of the  
15 48,625 acres of cultivated lands that would be protected and enhanced by the late long-term time  
16 period (Objective CLNC1.1), 26,300 acres would be managed in moderate to high-value crop types  
17 for tricolored blackbird (BDCP Chapter 3, Table 3.3-6). These crop types include pasture, sunflower,  
18 alfalfa, and other crop types that would provide high-value foraging habitat for yellow-headed  
19 blackbird.

20 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
21 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
22 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
23 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
24 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
25 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
26 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

27 The yellow-headed blackbird is not a covered species under the BDCP. For the BDCP to avoid an  
28 adverse effect on individuals, preconstruction surveys for noncovered avian species would be  
29 required to ensure that nests are detected and avoided. Mitigation Measure BIO-75, *Conduct*  
30 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to  
31 address this adverse effect.

32 **NEPA Effects:** The loss of yellow-headed blackbird habitat and potential direct mortality of this  
33 special-status species associated with Alternative 9 would represent an adverse effect in the  
34 absence of other conservation actions. With habitat protection and restoration associated with CM3,  
35 CM4, CM8, CM10, and CM11, guided by biological goals and objectives and by AMM1–AMM7, which  
36 would be in place throughout the construction phase, the effects of habitat loss would not be  
37 adverse under Alternative 9. The yellow-headed blackbird is not a covered species under the BDCP.  
38 For the BDCP to avoid an adverse effect on individuals, preconstruction surveys for noncovered  
39 avian species would be required to ensure that nests are detected and avoided. Mitigation Measure  
40 BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would  
41 be available to address this effect.

42 **CEQA Conclusion:**

1 **Near-Term Timeframe**

2 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
3 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
4 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
5 effects of construction would be less than significant under CEQA. Alternative 9 would remove 6,100  
6 acres (5,886 acres of permanent loss, 214 acres of temporary loss) of yellow-headed blackbird  
7 nesting habitat in the study area in the near-term. These effects would result from the construction  
8 of the water conveyance facilities (CM1, 241 acres), and implementing other conservation measures  
9 (CM2 Yolo Bypass Fisheries Enhancement, CM4 Tidal Natural Communities Restoration, and CM5  
10 Floodplain Restoration—5,859 acres). In addition, 7,603 acres (5,939 acres of permanent loss, 1,664  
11 acres of temporary loss) of yellow-headed blackbird foraging habitat would be removed or  
12 converted in the near-term (CM1, 1,615 acres; CM2 Yolo Bypass Fisheries Enhancement, CM4 Tidal  
13 Natural Communities Restoration, CM5 Seasonally Inundated Floodplain Restoration, CM7 Riparian  
14 Natural Community Restoration, CM8 Grassland Natural Community Restoration, CM10 Nontidal  
15 Marsh Restoration, and CM18 Conservation Hatcheries—,988,985 acres).

16 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by  
17 CM1 would be 1:1 for restoration/creation and 1:1 protection of nesting habitat, and 1:1 protection  
18 of foraging habitat. Using these ratios would indicate that 241 acres of nesting habitat should be  
19 restored/created and 241 acres should be protected to compensate for the CM1 losses of yellow-  
20 headed blackbird nesting habitat. In addition, 1,615 acres of foraging habitat should be protected to  
21 compensate for the CM1 losses of yellow-headed blackbird foraging habitat. The near-term effects of  
22 other conservation actions would require 5,859 acres each of restoration and protection of breeding  
23 habitat and 5,988 acres of protection of foraging habitat using the same typical NEPA and CEQA  
24 ratios (1:1 for restoration and 1:1 for protection of nesting and 1: protection of foraging habitat).

25 The BDCP has committed to near-term goals of restoring 8,850 acres of tidal freshwater emergent  
26 wetland, protecting 4,800 acres of managed wetland, protecting 25 acres and restoring 900 acres of  
27 nontidal marsh, protecting 2,000 acres and restoring 1,140 acres of grassland natural community,  
28 protecting 400 acres of vernal pool complex, protecting 120 acres of alkali seasonal wetland  
29 complex, and protecting 15,600 acres of cultivated lands in the Plan Area (Table 3-4 in Chapter 3,  
30 *Description of Alternatives*). These conservation actions are associated with CM3, CM4, CM8, and  
31 CM10 and would occur in the same timeframe as the construction and early restoration losses.

32 The tidal freshwater emergent wetland would be restored in CZs 1, 2, 4, 5, 6, and/or 7 (Objective  
33 TFEWNC1.1 in BDCP Chapter 3, *Conservation Strategy*) and would be restored in a way that creates  
34 topographic heterogeneity and in areas that increase connectivity among protected lands (Objective  
35 TFEWNC2.2). The 4,800 acres of managed wetland would be protected and enhanced in CZ 11 and  
36 would benefit yellow-headed blackbird through the enhancement of degraded areas (such as areas  
37 of bare ground or marsh where the predominant vegetation consists of invasive species such as  
38 perennial pepperweed) to vegetation such as pickleweed-alkali heath-American bulrush plant  
39 associations (Objective MWNC1.1). In addition, at least 900 acres of nontidal marsh would be  
40 created, some of which would provide nesting habitat for the species.

41 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1  
42 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali  
43 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous  
44 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would

1 provide grassland foraging habitat for yellow-headed blackbird. Insect prey availability and  
2 abundance would also be increased on protected lands, enhancing the foraging value of these  
3 natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4). Foraging opportunities would  
4 also be improved by enhancing prey populations through the establishment of 20- to 30-foot-wide  
5 hedgerows along field borders and roadsides within protected cultivated lands (Objective  
6 SWHA2.2). Within the cultivated lands, important wildlife habitat such as grasslands, ponds, and  
7 wetlands would also be protected and maintained as part of the cultivated lands reserve system  
8 which would provide additional habitat for yellow-headed blackbird (Objective CLNC1.3).

9 At least 15,400 acres of cultivated lands that provide habitat for covered and other native wildlife  
10 species would be protected in the near-term time period (Objective CLNC1.1), much of which would  
11 provide foraging habitat for yellow-headed blackbird. The acres of restoration and protection  
12 contained in the near-term Plan goals and the additional detail in the biological objectives satisfy the  
13 typical mitigation that would be applied to the project-level effects of CM1 on yellow-headed  
14 blackbird habitat, as well as mitigate the near-term effects of the other conservation measures.

15 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
16 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
17 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
18 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
19 *Material*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements that would avoid or  
20 minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are  
21 described in detail in BDCP Appendix 3.C, *Avoidance and Minimization Measures*.

22 The yellow-headed blackbird is not a covered species under the BDCP. For the BDCP to avoid an  
23 adverse effect on individuals, preconstruction surveys for noncovered avian species would be  
24 required to ensure that nests are detected and avoided. The implementation of Mitigation Measure  
25 BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would  
26 reduce potential impacts on nesting yellow-headed blackbird to a less-than-significant level.

### 27 ***Late Long-Term Timeframe***

28 The study area supports approximately 82,005 acres of modeled nesting habitat and 333,956 acres  
29 of modeled foraging habitat for yellow-headed blackbird. Alternative 9 as a whole would result in  
30 the permanent loss of and temporary effects on 14,189 acres of potential nesting habitat (17% of the  
31 potential nesting habitat in the study area) and the loss or conversion of 29,193 acres of foraging  
32 habitat (9% of the foraging habitat in the study area). The locations of these losses are described  
33 above in the analyses of individual conservation measures.

34 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*  
35 *Restoration*, *CM4 Tidal Natural Communities Restoration*, *CM8 Grassland Natural Community*  
36 *Restoration*, and *CM10 Nontidal Marsh Restoration* to protect and enhance at least 8,100 acres of  
37 managed wetland, restore or create at least 24,000 acres of tidal freshwater emergent wetland,  
38 create or restore at least 1,200 acres of nontidal marsh, protect 8,000 acres and restore 2,000 acres  
39 of grassland natural community, protect 600 acres of vernal pool complex, protect 150 acres of  
40 alkali seasonal wetland complex, and protect 48,625 acres of cultivated lands that provide suitable  
41 habitat for native wildlife species (Table 3-4 in Chapter 3, *Description of Alternatives*).

42 The tidal freshwater emergent wetland would be restored in CZs 1, 2, 4, 5, 6, and/or 7 (Objective  
43 TFEWNC1.1 in BDCP Chapter 3, *Conservation Strategy*) and would be restored in a way that creates

1 topographic heterogeneity and in areas that increase connectivity among protected lands (Objective  
2 TFEWNC2.2). The managed wetland would be protected and enhanced in CZ 11 and would benefit  
3 yellow-headed blackbird through the enhancement of degraded areas (such as areas of bare ground  
4 or marsh where the predominant vegetation consists of invasive species such as perennial  
5 pepperweed) to vegetation such as pickleweed-alkali heath-American bulrush plant associations  
6 (Objective MWNC1.1). In addition, at least 1,200 acres of nontidal marsh would be created, some of  
7 which would provide nesting habitat for the species.

8 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1  
9 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali  
10 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous  
11 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would  
12 provide grassland foraging habitat for yellow-headed blackbird. Insect prey availability and  
13 abundance would also be increased on protected lands, enhancing the foraging value of these  
14 natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4). Foraging opportunities would  
15 also be improved by enhancing prey populations through the establishment of 20- to 30-foot-wide  
16 hedgerows along field borders and roadsides within protected cultivated lands (Objective  
17 SWHA2.2). Within the cultivated lands, important wildlife habitat such as grasslands, ponds, and  
18 wetlands would also be protected and maintained as part of the cultivated lands reserve system  
19 which would provide additional habitat for yellow-headed blackbird (Objective CLNC1.3). Of the  
20 48,625 acres of cultivated lands that would be protected and enhanced by the late long-term time  
21 period (Objective CLNC1.1), 26,300 acres would be managed in moderate to high-value crop types  
22 for tricolored blackbird (BDCP Chapter 3, Table 3.3-6). These crop types include pasture, sunflower,  
23 alfalfa, and other crop types that would provide high-value foraging habitat for yellow-headed  
24 blackbird.

25 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*  
26 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*  
27 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
28 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
29 *Material, and AMM7 Barge Operations Plan. All of these AMMs include elements that would avoid or*  
30 *minimize the risk of affecting individuals and species habitats adjacent to work areas. The AMMs are*  
31 *described in detail in BDCP Appendix 3.C, Avoidance and Minimization Measures.*

32 The yellow-headed blackbird is not a covered species under the BDCP. For the BDCP to avoid an  
33 adverse effect on individuals, preconstruction surveys for noncovered avian species would be  
34 required to ensure that nests are detected and avoided. Implementation of Mitigation Measure BIO-  
35 75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would  
36 reduce this impact to a less-than-significant level.

37 Considering Alternative 9's protection and restoration provisions, which would provide acreages of  
38 new or enhanced habitat in amounts necessary to compensate for habitat lost to construction and  
39 restoration activities, and with the implementation of AMM1-AMM7 and Mitigation Measure BIO-  
40 75, the loss of habitat or direct mortality through implementation of Alternative 9 would not result  
41 in a substantial adverse effect through habitat modifications and would not substantially reduce the  
42 number or restrict the range of either species. Therefore, the loss of habitat or potential mortality  
43 under this alternative would have a less-than-significant impact on yellow-headed blackbird.

1           **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**  
2           **Disturbance of Nesting Birds**

3           See Mitigation Measure BIO-75 under Impact BIO-75.

4           **Impact BIO-149: Effects on Yellow-Headed Blackbird Associated with Electrical Transmission**  
5           **Facilities**

6           New transmission lines would increase the risk for bird-power line strikes, which could result in  
7           injury or mortality of yellow-headed blackbirds. Transmission line poles and towers also provide  
8           perching substrate for raptors, which could result in increased predation pressure on yellow-headed  
9           blackbirds. The existing network of transmission lines in the study area currently poses this risk for  
10          yellow-headed blackbirds, and any incremental risk associated with the new transmission line  
11          corridors would be expected to be low. *AMM20 Greater Sandhill Crane* would further minimize the  
12          risk for bird-power line strikes with the installation of flight diverters on new and selected existing  
13          transmission lines.

14          **NEPA Effects:** New transmission lines would increase the risk for bird-power line strikes, which  
15          could result in injury or mortality of yellow-headed blackbird. Transmission line poles and towers  
16          also provide perching substrate for raptors, which could result in increased predation pressure on  
17          yellow-headed blackbirds. The existing network of transmission lines in the study area currently  
18          poses this risk for yellow-headed blackbirds, and any incremental risk associated with the new  
19          transmission line corridors would not be expected to have an adverse effect on yellow-headed  
20          blackbirds. *AMM20 Greater Sandhill Crane* would further minimize the risk for bird-power line  
21          strikes.

22          **CEQA Conclusion:** New transmission lines would increase the risk for bird-power line strikes, which  
23          could result in injury or mortality of yellow-headed blackbird. Transmission line poles and towers  
24          also provide perching substrate for raptors, which could result in increased predation pressure on  
25          yellow-headed blackbirds. The existing network of transmission lines in the study area currently  
26          poses this risk for yellow-headed blackbirds, and any incremental risk associated with the new  
27          transmission line corridors would have a less-than-significant impact on yellow-headed blackbird.  
28          *AMM20 Greater Sandhill Crane* would further minimize the risk for bird-power line strikes.

29          **Impact BIO-150: Indirect Effects of Plan Implementation on Yellow-Headed Blackbird**

30          **Indirect construction- and operation-related effects:** Noise and visual disturbances associated  
31          with construction-related activities could result in temporary disturbances that affect yellow-  
32          headed blackbird use of suitable habitat. Construction noise above background noise levels (greater  
33          than 50 dBA) could extend 1,900 to 5,250 feet from the edge of construction activities (BDCP  
34          Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of the BDCP Conveyance Facility on*  
35          *Sandhill Crane*, Table 4), although there are no available data to determine the extent to which these  
36          noise levels could affect yellow-headed blackbird. Indirect effects associated with construction  
37          include noise, dust, and visual disturbance caused by grading, filling, contouring, and other ground-  
38          disturbing operations. Construction-related noise and visual disturbances could disrupt nesting and  
39          foraging behaviors, and reduce the functions of suitable habitat which could result in an adverse  
40          effect on these species. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and*  
41          *Avoid Disturbance of Nesting Birds*, would be available to minimize adverse effects on active nests.  
42          The use of mechanical equipment during water conveyance construction could cause the accidental

1 release of petroleum or other contaminants that could affect the species in the surrounding habitat.  
2 AMM1–AMM7, including *AMM2 Construction Best Management Practices and Monitoring*, would  
3 minimize the likelihood of such spills from occurring. The inadvertent discharge of sediment or  
4 excessive dust adjacent to yellow-headed blackbird habitat could also have a negative effect on the  
5 species. AMM1–AMM7 would ensure that measures are in place to prevent runoff from the  
6 construction area and the negative effects of dust on wildlife adjacent to work areas.

7 **Methylmercury Exposure:** Covered activities have the potential to exacerbate bioaccumulation of  
8 mercury in avian species, including yellow-headed blackbird. Marsh (tidal and nontidal) and  
9 floodplain restoration have the potential to increase exposure to methylmercury. Mercury is  
10 transformed into the more bioavailable form of methylmercury in aquatic systems, especially areas  
11 subjected to regular wetting and drying such as tidal marshes and flood plains (Alpers et al. 2008).  
12 Thus, BDCP restoration activities that create newly inundated areas could increase bioavailability of  
13 mercury (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Species sensitivity  
14 to methylmercury differs widely and there is a large amount of uncertainty with respect to species-  
15 specific effects. Increased methylmercury associated with natural community and floodplain  
16 restoration could indirectly affect yellow-headed blackbird, via uptake in lower trophic levels (as  
17 described in the BDCP, Appendix 5.D, *Contaminants*).

18 In addition, the potential mobilization or creation of methylmercury within the study area varies  
19 with site-specific conditions and would need to be assessed at the project level. *CM12 Methylmercury*  
20 *Management* contains provisions for project-specific Mercury Management Plans. Site-specific  
21 restoration plans that address the creation and mobilization of mercury, as well as monitoring and  
22 adaptive management as described in CM12 would be available to address the uncertainty of  
23 methylmercury levels in restored tidal marsh and potential impacts on yellow-headed blackbird.

24 **NEPA Effects:** Noise and visual disturbances from the construction of water conveyance facilities  
25 could reduce yellow-headed blackbird use of modeled habitat adjacent to work areas. Moreover,  
26 operation and maintenance of the water conveyance facilities, including the transmission facilities,  
27 could result in ongoing but periodic postconstruction disturbances that could affect yellow-headed  
28 blackbird use of the surrounding habitat. Mitigation Measure BIO-75, *Conduct Preconstruction*  
29 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to address adverse  
30 effects on nesting individuals in addition to AMM1–AMM7. The implementation of tidal natural  
31 communities restoration or floodplain restoration could result in increased exposure of yellow-  
32 headed blackbird to methylmercury, in restored tidal areas. However, it is unknown what  
33 concentrations of methylmercury are harmful to these species and the potential for increased  
34 exposure varies substantially within the study area. Site-specific restoration plans that address the  
35 creation and mobilization of mercury, as well as monitoring and adaptive management as described  
36 in CM12, would address the uncertainty of methylmercury levels in restored tidal marsh in the study  
37 area and better inform potential impacts on yellow-headed blackbird. The site-specific planning  
38 phase of marsh restoration would be the appropriate place to assess the potential for risk of  
39 methylmercury exposure for yellow-headed blackbird, once site specific sampling and other  
40 information could be developed.

41 **CEQA Conclusion:** Noise, the potential for hazardous spills, increased dust and sedimentation, and  
42 operations and maintenance of the water conveyance facilities under Alternative 9 would have a  
43 less-than-significant impact on yellow-headed blackbird with the implementation of Mitigation  
44 Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting*  
45 *Birds*, and AMM1–AMM7. The implementation of tidal natural communities restoration or floodplain

1 restoration could result in increased exposure of yellow-headed blackbird to methylmercury.  
2 However, it is unknown what concentrations of methylmercury are harmful to this species. Site-  
3 specific restoration plans that address the creation and mobilization of mercury, as well as  
4 monitoring and adaptive management as described in CM12, would better inform potential impacts  
5 and address the uncertainty of methylmercury levels in restored tidal marsh in the study area.

6 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**  
7 **Disturbance of Nesting Birds**

8 See Mitigation Measure BIO-75 under Impact BIO-75.

9 **Impact BIO-151: Periodic Effects of Inundation of Yellow-Headed Blackbird Nesting Habitat**  
10 **as a Result of Implementation of Conservation Components**

11 Flooding of the Yolo Bypass (CM2) would inundate 961–2,678 acres of nesting habitat and 368–  
12 2,678 acres of foraging habitat (Table 12-9-54). Based on hypothetical floodplain restoration,  
13 construction of setback levees for *CM5 Seasonally Inundated Floodplain Restoration* could result in  
14 periodic inundation of approximately 18 acres of nesting habitat and 2,701 acres of nonbreeding  
15 habitat (Table 12-9-54) resulting in the temporary loss of these habitats. Foraging yellow-headed  
16 blackbirds would be expected to move to adjacent suitable foraging habitat when the bypass is  
17 inundated, as they do under the current flooding regime. However, this inundation could reduce the  
18 availability of nesting habitat during years when flooding extends into the nesting season (past  
19 March). The periodic inundation of the Yolo Bypass (CM2) and of other floodplains (CM5) is  
20 expected to restore a more natural flood regime in support of wetland and riparian vegetation types  
21 that support nesting habitat.

22 **NEPA Effects:** Implementation of CM2 and CM5 would result in periodic inundation of nesting and  
23 foraging habitat for yellow-headed blackbird. Periodic inundation would have a less-than-significant  
24 impact on yellow-headed blackbird because inundation is expected to take place outside of the  
25 breeding season, and although foraging habitat may be temporarily unavailable, birds would be  
26 expected to move to adjacent foraging habitat.

27 **CEQA Conclusion:** Implementation of CM2 and CM5 would result in periodic inundation of nesting  
28 and foraging habitat for yellow-headed blackbird. Periodic inundation would have a less-than-  
29 significant impact on yellow-headed blackbird because inundation is expected to take place outside  
30 of the breeding season, and although foraging habitat would be temporarily unavailable, birds  
31 would be expected to move to adjacent foraging habitat.

32 **Riparian Brush Rabbit**

33 The habitat model used to assess effects on the riparian brush rabbit consists of 38 vegetation  
34 associations within the valley/foothill riparian natural community and adjacent grasslands. The  
35 vegetation associations were selected based on a review of understory and overstory composition  
36 from Hickson and Keeler-Wolf (2007) and species habitat requirements.

37 Just until recently, the only known naturally occurring populations of riparian brush rabbits were  
38 confined to Caswell Memorial State Park (MSP), a 258-acre park supporting riparian oak woodland  
39 on the Stanislaus River immediately southeast of the study area, and in the south Delta southwest of  
40 Lathrop, which is within the study area (Williams and Basey 1986; Williams et al. 2002) (Figure 12-  
41 46). On October 11, 2012 a single female riparian brush rabbit was captured near Durham Ferry

1 Road in riparian habitat along the San Joaquin River between Caswell MSP and Lathrop (Bradbury  
2 pers. comm.). This is only the second naturally occurring population documented outside of Caswell  
3 MSP. Factors considered in assessing the value of adversely affected habitat for riparian brush  
4 rabbit, to the extent information was available, included size and degree of isolation of habitat  
5 patches, proximity to recorded species occurrences, and adjacency to conserved lands.

6 Construction and restoration associated with Alternative 9 conservation measures would result in  
7 both temporary and permanent losses of riparian brush rabbit modeled habitat as indicated in Table  
8 12-9-55. Full implementation of Alternative 9 would also include biological objectives over the term  
9 of the BDCP to benefit the riparian brush rabbit (BDCP Chapter 3, *Conservation Strategy*). The  
10 conservation strategy for the riparian brush rabbit, with conservation principles involves  
11 protecting, restoring or creating, and maintaining habitat and corridors near the largest remaining  
12 fragments of habitat and extant populations; providing high-water refugia from flooding; and  
13 managing feral predators (dogs and cats) in areas occupied by the species. The conservation  
14 measures that would be implemented to achieve the biological goals and objectives are summarized  
15 below.

- 16 • Provide a range of elevations in restored floodplains that transition from frequently flooded  
17 (e.g., every 1 to 2 years) to infrequently flooded (e.g., every 10 years or more) areas to provide a  
18 range of habitat conditions, upland habitat values, and refugia from flooding during most flood  
19 events (Objective L1.5, associated with CM3, CM5, and CM8).
- 20 • Increase the size and connectivity of the reserve system by acquiring lands adjacent to and  
21 between existing conservation lands (Objective L1.6, associated with CM3).
- 22 • Allow floods to promote fluvial processes, such that bare mineral soils are available for natural  
23 recolonization of vegetation, desirable natural community vegetation is regenerated, and  
24 structural diversity is promoted, or implement management actions that mimic those natural  
25 disturbances (Objective L2.1, associated with CM3, CM5, and CM11).
- 26 • Protect and improve habitat linkages that allow terrestrial covered and other native species to  
27 move between protected habitats within and adjacent to the Plan Area (Objective L3.1,  
28 associated with CM3–CM8, and CM11).
- 29 • Restore or create 5,000 acres of valley/foothill riparian natural community, with at least 3,000  
30 acres occurring on restored seasonally inundated floodplain (Objective VFRNC1.1, associated  
31 with CM3 and CM7).
- 32 • Protect 750 acres of existing valley/foothill riparian natural community in CZ 7 by year 10  
33 (Objective VFRNC1.2, associated with CM3).
- 34 • Maintain 1,000 acres of early- to mid-successional vegetation with a well-developed understory  
35 of dense shrubs on restored seasonally inundated floodplain (Objective VFRNC2.2, associated  
36 with CM5, CM7, and CM11).
- 37 • Of the 750 acres of protected valley/foothill riparian natural community protected under  
38 Objective VFRNC1.2, protect at least 200 acres of suitable riparian brush rabbit habitat (defined  
39 in CM7 Riparian Natural Community Restoration) that is occupied by the species or contiguous  
40 with occupied habitat (Objective RBR1.1, associated with 3).
- 41 • Of the 1,000 acres of early- to midsuccessional riparian habitat maintained under VFRNC2.2,  
42 maintain at least 800 acres within the range of the riparian brush rabbit (CZ 7), in areas that are

- 1 adjacent to or that facilitate connectivity with occupied or potentially occupied habitat  
2 (Objective RBR1.2, associated with CM3, CM7, and CM11).
- 3 ● Of the 5,000 acres of valley/foothill riparian natural community restored under Objective  
4 VFRNC1.1, restore/create and maintain at least 300 acres of early- to mid-successional riparian  
5 habitat that meets the ecological requirements of the riparian brush rabbit and that is within or  
6 adjacent to or that facilitates connectivity with existing occupied or potentially occupied habitat  
7 (Objective 1.3, associated with CM3, CM7, and CM11).
  - 8 ● Create and maintain high-water refugia in the 300 acres of restored riparian brush rabbit  
9 habitat and the 200 acres of protected riparian brush rabbit habitat, through the retention,  
10 construction and/or restoration of high-ground habitat on mounds, berms, or levees, so that  
11 refugia are no further apart than 66 feet (Objective RBR1.4, associated with CM7 and CM11).
  - 12 ● In protected riparian areas that are occupied by riparian brush rabbit, monitor for and control  
13 nonnative predators that are known to prey on riparian brush rabbit (Objective RBR1.5,  
14 associated with CM11).
  - 15 ● Of the 8,000 acres of grasslands protected under Objective GNC1.1 and the 2,000 acres of  
16 grasslands restored under Objective GNC1.2, protect or restore grasslands on the landward side  
17 of levees adjacent to restored floodplain to provide flood refugia and foraging habitat for  
18 riparian brush rabbit (Objective RBR1.6m, associated with CM3 and CM8).
- 19 As explained below, with the restoration and protection of these amounts of habitat, in addition to  
20 implementation of the AMMs to reduce potential effects, impacts on riparian brush rabbit would not  
21 be adverse for NEPA purposes and would be less than significant for CEQA purposes.

1 **Table 12-9-55. Changes in Riparian Brush Rabbit Modeled Habitat Associated with Alternative 9**  
2 **(acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	Riparian	8	8	6	6	NA	NA
	Grassland	58	58	139	139	NA	NA
<b>Total Impacts CM1</b>		<b>66</b>	<b>66</b>	<b>145</b>	<b>145</b>		
CM2–CM18	Riparian	0	62	0	35	0	264
	Grassland	0	44	0	20	0	423
<b>Total Impacts CM2–CM18</b>		<b>0</b>	<b>106</b>	<b>0</b>	<b>55</b>	<b>0</b>	<b>687</b>
<b>TOTAL IMPACTS</b>		<b>66</b>	<b>172</b>	<b>145</b>	<b>200</b>	<b>0</b>	<b>687</b>

<sup>a</sup> See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only.

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-152: Loss or Conversion of Habitat for and Direct Mortality of Riparian Brush**  
5 **Rabbit**

- 6 • Alternative 9 conservation measures would result in the permanent loss of up to 111 acres of  
7 riparian habitat and 261 acres of associated grassland habitat for the riparian brush rabbit in  
8 the study area (Table 12-9-55). The hypothetical footprint for levee construction overlaps with  
9 one occurrence record for riparian brush rabbit, south of the Interstate 5/Interstate 205  
10 interchange. Conservation measures resulting in permanent habitat loss include conveyance  
11 facilities construction (CM1), tidal natural communities restoration (CM4), and floodplain  
12 restoration (CM5). Each of these individual activities is described below. A summary statement  
13 of the combined impacts and NEPA effects and a CEQA conclusion follow the individual  
14 conservation measure discussions.
- 15 • *CM1 Water Facilities and Operation*: Development of Alternative 9 water conveyance facilities  
16 would result in the permanent removal of approximately 8 acres of riparian habitat and 58 acres  
17 of associated grassland habitat and in the temporary removal of 6 acres of riparian habitat and  
18 139 acres of grassland habitat for riparian brush rabbit in CZ 8 (Table 12-9-55). The riparian  
19 habitat that would be removed is of low value for the riparian brush rabbit as is consists of  
20 several small, isolated patches surrounded by agricultural lands northeast of Clifton Court  
21 Forebay. The associated grasslands are also of low-quality for the species: They consist of long,  
22 linear strips that abut riparian habitat, but extend several miles from the riparian habitat and,  
23 therefore, provide few if any opportunities for adjacent cover. Trapping efforts conducted for  
24 the riparian brush rabbit in this area were negative (BDCP Appendix 3.E, *Conservation Principles*)

1           for the Riparian Brush Rabbit and Riparian Woodrat). Refer to the Terrestrial Biology Map Book  
2           for a detailed view of Alternative 9 construction locations.

- 3           ● *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and  
4           inundation would permanently remove approximately 19 acres of riparian habitat and 18 acres  
5           of associated grassland habitat for the riparian brush rabbit in CZ 7 in the late long-term. The  
6           riparian habitat that would be removed consists of relatively small and isolated patches along  
7           canals and irrigation ditches surrounded by agricultural lands in the Union Island and Roberts  
8           Island areas, and several small patches along the San Joaquin River. The habitat that would be  
9           removed is not adjacent to any existing conserved lands, and is several miles north and  
10          northeast of the northernmost riparian brush rabbit record located northeast of Paradise Cut  
11          (Williams et al. 2002). Although the final footprint for tidal natural communities restoration  
12          would differ from the hypothetical footprint, compliance monitoring would be implemented to  
13          ensure that acreage limits are not exceeded, and the measures described in *AMM25 Riparian*  
14          *Woodrat and Riparian Brush Rabbit* require that tidal natural communities restoration avoid  
15          removal of any habitat occupied by the riparian brush rabbit.
- 16          ● *CM5 Seasonally Inundated Floodplain Restoration*: Levee construction associated with floodplain  
17          restoration would result in the permanent removal of approximately 43 acres of riparian habitat  
18          and 26 acres of associated grassland habitat for the riparian brush rabbit in CZ 7 in the late long-  
19          term. Levee construction would also result in the temporary removal of 35 acre riparian habitat  
20          and 20 acres of grassland habitat for the riparian brush rabbit. Although the effects are  
21          considered temporary, 5 years to several decades may be required for ecological succession to  
22          occur and for restored riparian habitat to replace the function of habitat that has been affected.

23          The value of this habitat for riparian brush rabbit is high: although it consists of small patches  
24          and narrow bands of riparian vegetation, these areas are in proximity to, or contiguous with,  
25          habitat with recorded occurrences of riparian brush rabbit. The hypothetical footprint for levee  
26          construction overlaps with one occurrence record for riparian brush rabbit, south of the  
27          Interstate 5/Interstate 205 interchange.

28          Although the final floodplain restoration design would differ from the hypothetical footprint  
29          used for this effects analysis, restoration of the river floodplain in CZ 7 would be targeted in the  
30          general area of the riparian brush rabbit population. Implementation of adaptive management  
31          described in *AMM25* would ensure that riparian brush rabbit habitat permanently removed as a  
32          result of floodplain restoration does not exceed the maximum allowable habitat loss for this  
33          species.

- 34          ● *CM11 Natural Communities Enhancement and Management*: A variety of habitat management  
35          actions included in CM11 that are designed to enhance wildlife values in BDCP protected  
36          habitats may result in localized ground disturbances that could temporarily remove small  
37          amounts of riparian brush rabbit habitat. Enhancement and management actions in riparian  
38          brush rabbit habitat within the reserve system may include invasive plant removal, planting and  
39          maintaining vegetation to improve and sustain habitat characteristics for the species, and  
40          creating and maintaining flood refugia. These activities are expected to have minor adverse  
41          effects on available riparian brush rabbit habitat and are expected to result in overall  
42          improvements to and maintenance of riparian brush rabbit habitat values over the term of the  
43          BDCP. These effects cannot be quantified, but are expected to be minimal and would be avoided  
44          and minimized through the AMMs listed below.

1 Passive recreation in the reserve system could result in disturbance of individual riparian brush  
2 rabbits foraging in the ecotone between riparian and adjacent open habitats. However, *AMM37*  
3 *Recreation* limits trail development adjacent to riparian corridors within the range of the  
4 riparian brush rabbit. With this minimization measure in place, recreation-related effects on the  
5 riparian brush rabbit are expected to be minimal.

- 6 • Operations and maintenance: Ongoing maintenance of BDCP facilities are not expected to  
7 adversely affect the riparian brush rabbit because the species is not expected to occur in the  
8 vicinity of proposed facilities.
- 9 • Injury and direct mortality: Water conveyance facility construction is not is not likely to result in  
10 injury or mortality of individual riparian brush rabbit because the species is not likely to be  
11 present in the areas that would be affected by this activity, based on live trapping results (BDCP  
12 Appendix 3.E, *Conservation Principles for the Riparian Brush Rabbit and Riparian Woodrat*). Tidal  
13 natural communities restoration would not result in injury or mortality of the riparian brush  
14 rabbit because tidal natural communities restoration projects would be designed to avoid  
15 occupied riparian brush rabbit habitat and, if that is not possible, rabbits would be trapped and  
16 relocated as described in AMM25 (see BDCP Appendix 3.C). Activities associated with  
17 construction of setback levees for floodplain restoration could result in injury or mortality of  
18 riparian brush rabbits: however, preconstruction surveys, construction monitoring, and other  
19 measures would be implemented to avoid and minimize injury or mortality of this species  
20 during construction (AMM25).

21 The following paragraphs summarize the combined effects discussed above and describe other  
22 BDCP conservation actions that offset or avoid these effects. NEPA effects and a CEQA conclusion are  
23 also included.

#### 24 ***Near-Term Timeframe***

25 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,  
26 the near-term BDCP conservation strategy has been evaluated to determine whether it would  
27 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the  
28 effects of construction would not be adverse under NEPA.

29 Alternative 9 would result in permanent and temporary effects combined on 14 acres of riparian  
30 habitat and 197 acres of grassland habitat for riparian brush rabbit in the near-term as a result of  
31 construction of the water conveyance facilities (CM1). The habitat would be lost in the  
32 valley/foothill riparian and grassland natural communities. Most of the near-term loss of riparian  
33 brush rabbit habitat would be in an area the species is unlikely to occupy in CZ 8. Habitat loss in CZ  
34 7, in areas known or likely to be occupied, would occur during the early long-term and late long-  
35 term timeframes. Riparian restoration would be phased to minimize temporal habitat loss. There  
36 would be no near-term losses from CM2–CM18.

37 Typical NEPA project-level mitigation ratios for those natural communities that would be affected  
38 and that are identified in the biological goals and objectives for riparian brush rabbit in Chapter 3 of  
39 the BDCP would be 1:1 for restoration and protection of the valley/foothill riparian natural  
40 community, and 2:1 for protection of grassland. Using these ratios would indicate that 14 acres of  
41 riparian habitat should be restored, 14 acres of riparian habitat should protected, and 394 acres of  
42 grassland should be protected for riparian brush rabbit to mitigate near-term losses.

1 The BDCP has committed to near-term restoration of 800 acres of riparian (Objective VFRNC1.1 and  
2 an unknown number of associated acres of grassland and protection of 750 acres of riparian  
3 (Objective VFRNC1.2) with an unknown number of associated acres of grassland (Table 3-4 in  
4 Chapter 3, *Description of Alternatives*). In addition, the species-specific biological goals and  
5 objectives (RBR1.1-RBR1.6) would inform the near-term protection and restoration efforts. The  
6 natural community restoration and protection activities are expected to be concluded during the  
7 first 10 years of Plan implementation, which is close enough in time to the occurrence of impacts to  
8 constitute adequate mitigation for NEPA purposes. These commitments are more than sufficient to  
9 support the conclusion that the near-term effects of Alternative 9 would not be adverse under  
10 NEPA, because the number of acres required to meet the typical ratios described above would be 14  
11 acres of riparian habitat restored, 14 acres protected, and 394 acres of grassland protected.

12 The plan also contains commitments to implement *AMM1 Worker Awareness Training, AMM2*  
13 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*  
14 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
15 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
16 *Material, AMM7 Barge Operations Plan, AMM10 Restoration of Temporarily Affected Natural*  
17 *Communities, AMM25 Riparian Woodrat and Riparian Brush Rabbit, and AMM37 Recreation*. These  
18 AMMs contain elements that avoid or minimize the risk of BDCP activities affecting habitats and  
19 species adjacent to work areas and storage sites. The AMMs are described in detail in BDCP  
20 Appendix 3.C, *Avoidance and Minimization Measures*.

### 21 **Late Long-Term Timeframe**

22 There are 6,012 acres of modeled riparian brush rabbit habitat in the Plan Area, consisting of  
23 2,909 acres of riparian habitat and 3,103 acres of associated grassland habitat. Alternative 9 a whole  
24 would result in permanent and temporary effects combined on 111 acres of modeled riparian  
25 habitat and 261 acres of modeled grassland habitat for riparian brush rabbit, representing 4% and  
26 8% of the riparian and grassland modeled habitat. The BDCP would restore 5,000 acres and protect  
27 750 acres of valley/foothill riparian natural community, a portion of which is expected to consist of  
28 suitable riparian brush rabbit habitat (Objectives VFRNC1.1 and VFRNC1.2). Objective RBR1.2  
29 requires that at least 800 acres of early- to midsuccessional riparian natural community be  
30 conserved in CZ 7, in areas that are adjacent to or that facilitate connectivity with existing occupied  
31 or potentially occupied habitat. This would consist of 200 acres of protected habitat (Objective  
32 RBR1.1) and 600 acres of restored habitat. The 800 acres to be conserved would consist of early  
33 successional riparian vegetation suitable for riparian brush rabbit. The conserved habitat would  
34 also be part of a larger, more contiguous, and less patchy area of protected and restored riparian  
35 natural community than what currently exists in CZ 7 and would be contiguous with existing  
36 modeled riparian brush rabbit habitat. The species-specific objectives further require that the 200  
37 acres of protected riparian habitat (Objective RBR1.4) and at least 300 acres of the restored riparian  
38 habitat (Objective RBR1.3) meet more specific ecological requirements of riparian brush rabbit,  
39 including large patches of dense riparian brush; ecotonal edges that transition from brush species to  
40 grasses and forbs, scaffolding plants to support vines that grow above flood levels; a tree canopy  
41 that is open, if present; and high-ground refugia from flooding. In protected riparian areas that are  
42 occupied by riparian brush rabbit, nonnative predators that are known to prey on riparian brush  
43 rabbit would be monitored and controlled (Objective RBR1.5).

1 In addition to restoration and protection of riparian habitat for the riparian brush rabbit, the BDCP  
2 would protect, and, if necessary, create or restore grasslands adjacent to suitable riparian vegetation  
3 in areas outside the floodplain levees (Objective RBR1.6). These grasslands are expected to provide  
4 additional foraging opportunities for the riparian brush rabbit and upland refugia during flood  
5 events. The actual acreage of grassland to be restored or protected for riparian brush rabbit would  
6 depend on site-specific needs adjacent to restored and protected riparian habitat (CM3). Grasslands  
7 on the landward side of levees adjacent to restored floodplain would be restored or protected as  
8 needed to provide flood refugia and foraging habitat for riparian brush rabbit (Objective RBR1.6).

9 In addition to grasslands protected and restored outside the levees for riparian brush rabbit as  
10 needed, the floodplains would transition from areas that flood frequently (e.g., every 1 to 2 years) to  
11 areas that flood infrequently (e.g., every 10 years or more) (Objective L1.5): these infrequently  
12 flooded areas would provide refuge for the riparian brush rabbit during most years. The BDCP  
13 would also create and maintain mounds, levee sections, or other high areas in restored and  
14 protected riparian areas (Objective RBR1.4) that are designed specifically to provide flood refugia  
15 for the riparian brush rabbit (BDCP Appendix 3.F, *Conservation Principles for the Riparian Brush  
16 Rabbit and Riparian Woodrat*). Additionally, nonnative predators that are known to prey on riparian  
17 brush rabbit (e.g., feral dogs and cats) would be monitored in protected and restored riparian areas  
18 that are occupied by riparian brush rabbit (Objective RBR1.5), and controlled as needed (CM11).

19 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and  
20 Plant Species*) estimates that the restoration and protection actions discussed above, as well as the  
21 restoration of valley/foothill riparian and grassland that could overlap with the species model,  
22 would result in the restoration of 800 acres of riparian and 79 acres of grassland modeled habitat  
23 for riparian brush rabbit. In addition, protection of valley/foothill riparian and grassland could  
24 overlap with the species model and would result in the protection of 200 acres of riparian and 317  
25 acres of grassland riparian brush rabbit modeled habitat.

26 **NEPA Effects:** In the near-term, the loss of riparian brush rabbit habitat under Alternative 9 would  
27 not be adverse because there is little likelihood of riparian brush rabbits being present and the  
28 BDCP has committed to protecting and restoring the acreage required to meet the typical mitigation  
29 ratios described above. In the late long-term, the losses of riparian brush rabbit riparian and  
30 grassland habitat associated with Alternative 9, in the absence of other conservation actions, would  
31 represent an adverse effect as a result of habitat modification and potential direct mortality of a  
32 special-status species. However, with habitat protection and restoration associated with the  
33 conservation components, guided by landscape-scale goals and objectives and by AMM1–AMM6,  
34 AMM10, AMM25, and AMM37, the effects of Alternative 9 as a whole on riparian brush rabbit would  
35 not be adverse.

### 36 **CEQA Conclusion:**

#### 37 **Near-Term Timeframe**

38 Because the water conveyance facilities construction is being evaluated at the project level, the near-  
39 term BDCP conservation strategy has been evaluated to determine whether it would provide  
40 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the effects of  
41 construction would be less than significant under CEQA.

42 Alternative 9 would result in permanent and temporary effects combined on 14 acres of riparian  
43 habitat and 197 acres of grassland habitat for riparian brush rabbit in the near-term as a result of

1 construction of the water conveyance facilities (CM1). The habitat would be lost in the  
2 valley/foothill riparian and grassland natural communities. Most of the near-term loss of riparian  
3 brush rabbit habitat would be in an area unlikely to be occupied by the species in CZ 8. Habitat loss  
4 in CZ 7, in areas known or likely to be occupied, would occur during the early long-term and late  
5 long-term timeframes. Riparian restoration would be phased to minimize temporal habitat loss.  
6 There would be no near-term losses resulting from CM2–CM18.

7 Typical CEQA project-level mitigation ratios for those natural communities that would be affected  
8 and that are identified in the biological goals and objectives for riparian brush rabbit in Chapter 3 of  
9 the BDCP would be 1:1 for restoration and protection of the valley/foothill riparian natural  
10 community, and 2:1 for protection of grassland. Using these ratios would indicate that 14 acres of  
11 riparian habitat should be restored, 14 acres of riparian habitat should be protected, and 394 acres of  
12 grassland should be protected for riparian brush rabbit to mitigate CM1 losses.

13 The BDCP has committed to near-term restoration of 800 acres of riparian (Objective VFRNC1.1 and  
14 an unknown number of associated acres of grassland and protection of 750 acres of riparian  
15 (Objective VFRNC1.2) with an unknown number of associated acres of grassland (Table 3-4 in  
16 Chapter 3, *Description of Alternatives*). In addition, the species-specific biological goals and  
17 objectives (RBR1.1–RBR1.6) would inform the near-term protection and restoration efforts. The  
18 natural community restoration and protection activities are expected to be concluded during the  
19 first 10 years of Plan implementation, which is close enough in time to the occurrence of impacts to  
20 constitute adequate mitigation for CEQA purposes. These commitments are more than sufficient to  
21 support the conclusion that the near-term effects of Alternative 9 would be less than significant  
22 under CEQA, because the number of acres required to meet the typical ratios described above would  
23 be 14 acres of riparian habitat protected, 14 acres of riparian habitat restored, and 394 acres of  
24 grassland habitat protected.

25 The plan also contains commitments to implement AMM1–AMM7, AMM10, AMM25, and AMM37.  
26 These AMMs contain elements that avoid or minimize the risk of BDCP activities affecting habitats  
27 and species adjacent to work areas. The AMMs are described in detail in BDCP Appendix 3.C,  
28 *Avoidance and Minimization Measures*.

### 29 ***Late Long-Term Timeframe***

30 There are 6,012 acres of modeled riparian brush rabbit habitat in the Plan Area, consisting of  
31 2,909 acres of riparian habitat and 3,103 acres of associated grassland habitat. Alternative 9 would  
32 result in permanent and temporary effects combined on 111 acres of modeled riparian habitat and  
33 261 acres of modeled grassland habitat for riparian brush rabbit, representing 4% and 8% of the  
34 riparian and grassland modeled habitat.

35 The BDCP would restore 5,000 acres and protect 750 acres of valley/foothill riparian natural  
36 community, a portion of which is expected to consist of suitable riparian brush rabbit habitat  
37 (Objectives VFRNC1.1 and VFRNC1.2). Objective RBR1.2 requires that at least 800 acres of early- to  
38 midsuccessional riparian natural community be conserved in CZ 7, in areas that are adjacent to or  
39 that facilitate connectivity with existing occupied or potentially occupied habitat. This would  
40 consist of 200 acres of protected habitat (Objective RBR1.1) and 600 acres of restored habitat. The  
41 800 acres to be conserved would consist of early successional riparian vegetation suitable for  
42 riparian brush rabbit. The conserved habitat would also be part of a larger, more contiguous, and  
43 less patchy area of protected and restored riparian natural community than what currently exists in

1 CZ 7 and would be contiguous with existing modeled riparian brush rabbit habitat. The species-  
2 specific objectives further require that the 200 acres of protected riparian habitat (Objective  
3 RBR1.4) and at least 300 acres of the restored riparian habitat (Objective RBR1.3) meet more  
4 specific ecological requirements of riparian brush rabbit, including large patches of dense riparian  
5 brush; ecotonal edges that transition from brush species to grasses and forbs, scaffolding plants to  
6 support vines that grow above flood levels; a tree canopy that is open, if present; and high-ground  
7 refugia from flooding. In protected riparian areas that are occupied by riparian brush rabbit,  
8 nonnative predators that are known to prey on riparian brush rabbit would be monitored and  
9 controlled (Objective RBR1.5).

10 In addition to restoration and protection of riparian habitat for the riparian brush rabbit, the BDCP  
11 would protect, and, if necessary, create or restore grasslands adjacent to suitable riparian vegetation  
12 in areas outside the floodplain levees (Objective RBR1.6). These grasslands are expected to provide  
13 additional foraging opportunities for the riparian brush rabbit and upland refugia during flood  
14 events. The actual acreage of grassland to be restored or protected for riparian brush rabbit would  
15 depend on site-specific needs adjacent to restored and protected riparian habitat (CM3). Grasslands  
16 on the landward side of levees adjacent to restored floodplain would be restored or protected as  
17 needed to provide flood refugia and foraging habitat for riparian brush rabbit (Objective RBR1.6).

18 In addition to grasslands protected and restored outside the levees for riparian brush rabbit as  
19 needed, the floodplains would transition from areas that flood frequently (e.g., every 1 to 2 years) to  
20 areas that flood infrequently (e.g., every 10 years or more) (Objective L1.5): these infrequently  
21 flooded areas would provide refuge for the riparian brush rabbit during most years. The BDCP  
22 would also create and maintain mounds, levee sections, or other high areas in restored and  
23 protected riparian areas (Objective RBR1.4) that are designed specifically to provide flood refugia  
24 for the riparian brush rabbit (BDCP Appendix 3.E, *Conservation Principles for the Riparian Brush  
25 Rabbit and Riparian Woodrat*). Additionally, nonnative predators that are known to prey on riparian  
26 brush rabbit (e.g., feral dogs and cats) would be monitored in protected and restored riparian areas  
27 that are occupied by riparian brush rabbit (Objective RBR1.5), and controlled as needed (CM11).

28 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and  
29 Plant Species*) estimates that the restoration and protection actions discussed above, as well as the  
30 restoration of valley/foothill riparian and grassland that could overlap with the species model,  
31 would result in the restoration of 800 acres of riparian and 79 acres of grassland modeled habitat  
32 for riparian brush rabbit. In addition, protection of valley/foothill riparian and grassland could  
33 overlap with the species model and would result in the protection of 200 acres of riparian and 317  
34 acres of grassland riparian brush rabbit modeled habitat.

35 Only a small proportion of the lost habitat would be considered occupied and of high-value.  
36 Alternative 9 conservation measures provide for large acreages of riparian brush rabbit riparian and  
37 grassland habitat to be protected and restored, and the BDCP includes AMM1-AMM7, AMM10,  
38 AMM25, and AMM37, which are directed at minimizing or avoiding potential effects during  
39 construction and operation of the conservation measures. Overall, the BDCP would provide a  
40 substantial net benefit to the riparian brush rabbit through the increase in available habitat and  
41 habitat in protected status. These protected areas would be managed to support the species.

42 Considering the habitat restoration and protection associated with CM3, CM7, CM8 and CM11,  
43 guided by species-specific goals and objectives and by AMM1-AMM7, AMM10, AMM25, and AMM37,  
44 the temporary and permanent losses of riparian and grassland habitat and potential direct mortality

1 of riparian brush rabbit as a result of implementing Alternative 9 would not represent a substantial  
2 adverse effect through habitat modifications and would not substantially reduce the number or  
3 restrict the range of the species. The loss of habitat and potential mortality of riparian brush rabbits  
4 would be a less-than-significant impact under CEQA.

### 5 **Impact BIO-153: Indirect Effects of Plan Implementation on Riparian Brush Rabbit**

6 Noise and visual disturbance adjacent to construction activities could indirectly affect the use of  
7 modeled riparian brush rabbit riparian habitat and of associated grassland habitat in the study area.  
8 These construction activities would include water conveyance (including transmission line)  
9 construction in CZ 8, tidal natural communities restoration construction, and construction of  
10 setback levees. Water conveyance construction would potentially affect acres of adjacent riparian  
11 habitat and of associated grassland habitat: this construction would occur in CZ 8 where there is  
12 suitable habitat for the species but surveys by ESRP did not indicate the species is present in this  
13 area;; therefore, the potential for adverse noise and visual effects from conveyance facility  
14 construction would be minimal. Tidal natural communities restoration construction would also  
15 potentially affect adjacent riparian habitat and associated grassland habitat for this species:  
16 however, adverse effects on the species are unlikely because tidal natural communities restoration  
17 projects would be sited to avoid areas occupied by riparian brush rabbit. The activity most likely to  
18 result in noise and visual disturbance to riparian brush rabbit is the construction of setback levees  
19 for floodplain restoration, which would take place in CZ 7, where the species is known to occur. The  
20 use of mechanical equipment during construction might cause the accidental release of petroleum or  
21 other contaminants that would affect the riparian brush rabbit in adjacent habitat, if the species is  
22 present.

23 **NEPA Effects:** Implementation of AMM1–AMM7, AMM10, AMM25, and AMM37 as part of  
24 implementing BDCP Alternative 9 would avoid the potential for substantial adverse effects on  
25 riparian brush rabbits, either indirectly or through habitat modifications or result in a substantial  
26 reduction in numbers or a restriction in the range of riparian brush rabbits. Therefore, indirect  
27 effects of Alternative 9 would not have an adverse effect on riparian brush rabbit.

28 **CEQA Conclusion:** Indirect effects from conservation measure operations and maintenance as well  
29 as construction-related noise and visual disturbances could affect riparian brush rabbit in riparian  
30 and grassland habitats. The use of mechanical equipment during construction could cause the  
31 accidental release of petroleum or other contaminants that could affect riparian brush rabbit. The  
32 inadvertent discharge of sediment or excessive dust adjacent to riparian brush rabbit habitat could  
33 also have a negative effect on the species. With implementation of AMM1–AMM7, AMM10, AMM25,  
34 and AMM37 as part of Alternative 9, the BDCP would avoid the potential for substantial adverse  
35 effects on riparian brush rabbits, either indirectly or through habitat modifications and would not  
36 result in a substantial reduction in numbers or a restriction in the range of riparian brush rabbits.  
37 Indirect effects of Alternative 9 would have a less-than-significant impact on riparian brush rabbit.

### 38 **Impact BIO-154: Periodic Effects of Inundation of Riparian Brush Rabbit Habitat as a Result of** 39 **Implementation of Conservation Components**

40 *CM5 Seasonally Inundated Floodplain Restoration* is the only covered activity expected to result in  
41 periodic inundation of riparian brush rabbit habitat. This activity would periodically inundate  
42 approximately 264 acres of riparian habitat (9% of riparian habitat in the Plan Area) and 423 acres  
43 of associated grassland habitat (14% of associated grassland habitat in the Plan Area) for the

1 riparian brush rabbit. The area between existing levees that would be breached and the newly  
2 constructed setback levees would be inundated through seasonal flooding. The potentially  
3 inundated areas consist of high-value habitat for the species: although they consist of small patches  
4 and narrow bands of riparian vegetation, many of these areas are in proximity to, or contiguous  
5 with, habitat with recorded occurrences of riparian brush rabbit. The restored floodplain would  
6 include a range of elevations from lower lying areas that flood frequently (e.g., every 1 to 2 years) to  
7 higher elevation areas that flood infrequently (e.g., every 10 years or more).

8 Seasonal flooding in restored floodplains can result in injury or mortality of individuals if riparian  
9 brush rabbits occupy these areas and cannot escape flood waters. One recorded occurrence of  
10 riparian brush rabbit (Williams et al. 2002), just west of Stewart Road in Mossdale, is in the area that  
11 would be seasonally flooded based on the hypothetical restoration footprint.

12 **NEPA Effects:** Floodplain restoration under CM5 would periodically affect only a small proportion of  
13 the modeled riparian brush rabbit habitat in the study area. The adverse effects of periodic  
14 inundation on the riparian brush rabbit would be minimized through construction and maintenance  
15 of flood refugia to allow riparian brush rabbits to escape inundation. Therefore, implementing  
16 Alternative 9, including AMM1–AMM7, AMM10, AMM25, and AMM37, would not be expected to  
17 result in substantial adverse effects on riparian brush rabbit, either directly or through habitat  
18 modifications and would not result in a substantial reduction in numbers or a restriction in the  
19 range of riparian brush rabbits. Therefore, Alternative 9 would not adversely affect the species.

20 **CEQA Conclusion:** Floodplain restoration under CM5 would periodically affect only a small  
21 proportion of the modeled riparian brush rabbit habitat in the study area. The overall effect of  
22 seasonal inundation on existing riparian natural communities may instead be beneficial. Historically,  
23 flooding was the main natural disturbance regulating ecological processes in riparian areas, and  
24 flooding promotes the germination and establishment of many native riparian plants. In the late  
25 long-term, seasonal inundation in areas currently occupied by riparian vegetation may contribute to  
26 the establishment of high-value habitat for covered riparian species, such as the riparian brush  
27 rabbit. Long-term management of riparian areas would ensure that refugia also exist along the  
28 edges of seasonally inundated habitat.

29 The adverse effects of periodic inundation on the riparian brush rabbit would be minimized through  
30 construction and maintenance of flood refugia to allow riparian brush rabbits to escape inundation.  
31 Therefore, implementing Alternative 9, including AMM1–AMM7, AMM10, AMM25, and AMM37,  
32 would not be expected to result in substantial adverse effects on riparian brush rabbit, either  
33 directly or through habitat modifications and would not result in a substantial reduction in numbers  
34 or a restriction in the range of riparian brush rabbits. Periodic inundation of riparian and grassland  
35 habitat for riparian brush rabbit under Alternative 9 would have a less-than-significant impact on  
36 the species.

### 37 **Riparian Woodrat**

38 The habitat model used to assess effects for the riparian woodrat consists of selected plant alliances  
39 from the valley/foothill riparian natural community, geographically constrained to the south Delta  
40 portion of the BDCP area in CZ 7, south of State Route 4 and Old River Pipeline along the Stanislaus,  
41 San Joaquin, Old, and Middle Rivers. Valley/foothill riparian areas along smaller drainages (Paradise  
42 Cut, Tom Paine Slough), and some larger streams in the northern portion of CZ 7 were excluded  
43 from the riparian woodrat habitat model due to a lack of trees or riparian corridors that were too

1 narrow. Factors considered in assessing the value of affected habitat for the riparian woodrat, to the  
2 extent that information is available, include habitat patch size and connectivity.

3 The riparian woodrat is not known to occur in the study area. The only verified extant population of  
4 riparian woodrats rangewide is 2 miles east of the southern end of the study area in Caswell  
5 Memorial State Park along the Stanislaus River (Williams 1986:1–112; 1993). Riparian woodrat may  
6 occur in small patches of valley oak riparian forest along the San Joaquin River from the southern tip  
7 of the study area north to approximately the Interstate 5 overcrossing near Lathrop (Figure 12-47).  
8 Construction and restoration associated with Alternative 9 conservation measures would result in  
9 both temporary and permanent losses of riparian woodrat modeled habitat as indicated in Table 12-  
10 9-56. Tidal habitat restoration, floodplain restoration, and protection and management of natural  
11 communities could affect modeled riparian woodrat habitat. However, because the species is not  
12 known to occur in the study area it is not expected to be affected by BDCP actions unless the species  
13 were to establish in the study area over the term of the BDCP. Full implementation of Alternative 9  
14 would also include biological objectives over the term of the BDCP to benefit the riparian woodrat  
15 (BDCP Chapter 3, *Conservation Strategy*). The conservation strategy for the riparian woodrat  
16 involves providing opportunities for population expansion into the Plan Area from adjacent lands to  
17 the south and southeast. The strategy focuses on restoring and maintaining suitable habitat at the  
18 southernmost end of CZ 7, providing connectivity with existing populations to the south and  
19 southeast, and creating and maintaining flood refugia. This conservation approach is consistent with  
20 the recovery plan (U.S. Fish and Wildlife Service 1998) and conservation principles (BDCP Appendix  
21 3.E). The conservation measures that would be implemented to achieve the biological goals and  
22 objectives are summarized below.

- 23 • Provide a range of elevations in restored floodplains that transition from frequently flooded  
24 (e.g., every 1 to 2 years) to infrequently flooded (e.g., every 10 years or more) areas to provide a  
25 range of habitat conditions, upland habitat values, and refugia from flooding during most flood  
26 events (Objective L1.5, associated with CM3, CM5, and CM8).
- 27 • Increase the size and connectivity of the reserve system by acquiring lands adjacent to and  
28 between existing conservation lands (Objective L1.6, associated with CM3).
- 29 • Protect and improve habitat linkages that allow terrestrial covered and other native species to  
30 move between protected habitats within and adjacent to the Plan Area (Objective L3.1,  
31 associated with CM3-CM8, and CM11).
- 32 • Restore or create 5,000 acres of valley/foothill riparian natural community, with 3,000 acres  
33 occurring on restored seasonally inundated floodplain (Objective VFRNC1.1, associated with  
34 CM3 and CM7).
- 35 • Protect 750 acres of existing valley/foothill riparian natural community in CZ 7 by year 10  
36 (Objective VFRNC1.2, associated with CM3).
- 37 • Restore, maintain and enhance structural heterogeneity with adequate vertical and horizontal  
38 overlap among vegetation components and over adjacent riverine channels, freshwater  
39 emergent wetlands, and grasslands (Objective VFRNC2.1, associated with CM5, CM7, and CM11).
- 40 • Of the 5,000 acres of valley/foothill riparian natural community restored under Objective  
41 VFRNC1.1, restore/create and maintain 300 acres riparian habitat in CZ 7 that meets the  
42 ecological requirements of the riparian woodrat (i.e., dense willow understory and oak

overstory) and that is adjacent to or facilitates connectivity with existing occupied or potentially occupied habitat (Objective RW1.1, associated with CM3, CM7, CM11).

- Provide and maintain high-water refugia in the 300 acres of riparian woodrat habitat restored under Objective RW1.1 through the retention, construction, and/or restoration of high-ground habitat on mounds, berms, or levees, so that refugia are no further apart than 67 feet (Objective RW1.2, associated with CM7 and CM11).

As explained below, with the restoration and protection of these amounts of habitat, in addition to implementation of the AMMs to reduce potential effects, impacts on riparian woodrat would not be adverse for NEPA purposes and would be less than significant for CEQA purposes.

**Table 12-9-56. Changes in Riparian Woodrat Modeled Habitat Associated with Alternative 9 (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	Riparian	2	2	1	1	NA	NA
<b>Total Impacts CM1</b>		<b>2</b>	<b>2</b>	<b>1</b>	<b>1</b>	<b>NA</b>	<b>NA</b>
CM2–CM18	Riparian	0	51	0	33	0	203
<b>Total Impacts CM2–CM18</b>		<b>0</b>	<b>51</b>	<b>0</b>	<b>33</b>	<b>0</b>	<b>203</b>
<b>TOTAL IMPACTS</b>		<b>2</b>	<b>53</b>	<b>1</b>	<b>34</b>	<b>0</b>	<b>203</b>

<sup>a</sup> See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only.

NT = near-term

LLT = late long-term

NA = not applicable

### Impact BIO-155: Loss or Conversion of Habitat for and Direct Mortality of Riparian Woodrat

Alternative 9 conservation measures would result in the permanent loss of up to 53 acres of habitat and temporary loss of up to 34 acres of habitat for riparian woodrat (Table 12-9-56). Construction of Alternative 9 water conveyance facilities (CM1) would not affect modeled habitat; however, tidal natural communities restoration (CM4) and seasonally inundated floodplain restoration (CM5) would remove habitat. Each of these individual activities is described below. A summary statement of the combined impacts and NEPA effects and a CEQA conclusion follow the individual conservation measure discussions.

- *CM1 Water Facilities and Operation*: Development of Alternative 9 water conveyance facilities would result in the permanent and temporary removal of approximately 3 acres of modeled habitat for riparian woodrat in CZ 8 (Table 12-9-56). The modeled habitat that would be removed is of low value for the riparian woodrat as it consists of several small, isolated patches surrounded by agricultural lands northeast of Clifton Court Forebay in CZ 8. Trapping efforts

1 conducted for the riparian woodrat in this area were negative (BDCP Appendix 3.E, *Conservation*  
2 *Principles for the Riparian Brush Rabbit and Riparian Woodrat*). Refer to the Terrestrial Biology  
3 Map Book for a detailed view of Alternative 9 construction locations.

- 4 ● *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and  
5 inundation would permanently remove approximately 10 acres of modeled habitat for the  
6 riparian woodrat in CZ 7. This habitat is of low value, consisting of a small, isolated patch  
7 surrounded by agricultural lands, and the species has a relatively low likelihood of being present  
8 in these areas. The measures described in *AMM25 Riparian Woodrat and Riparian Brush Rabbit*,  
9 require that tidal natural communities restoration avoid removal of any habitat occupied by the  
10 riparian woodrat as determined by presence/absence surveys. Because the estimates of habitat  
11 loss due to tidal inundation are based on projections of where restoration may occur, actual  
12 habitat loss is expected to be lower because sites would be selected to minimize effects on  
13 riparian woodrat.
- 14 ● *CM5 Seasonally Inundated Floodplain Restoration*: Levee construction associated with floodplain  
15 restoration would result in the permanent removal of approximately 41 acres of modeled  
16 habitat for the riparian woodrat in CZ 7. The value of this habitat for riparian woodrat is  
17 moderate. Although the habitat consists of small patches and narrow bands of riparian  
18 vegetation and no riparian woodrats have been detected in CZ 7, the riparian patches are in proximity  
19 to each other along the San Joaquin River. There are two species occurrences immediately south  
20 of CZ 7, one of which is less than 1.5 mile from the southernmost patch of riparian habitat  
21 potentially affected by levee construction.

22 The final floodplain restoration design would differ from the hypothetical footprint used for this  
23 effects analysis. However, monitoring and adaptive management described in *CM11 Natural*  
24 *Communities Enhancement and Management* and *AMM25 Riparian Woodrat and Riparian Brush*  
25 *Rabbit* would ensure that riparian woodrat habitat permanently removed as a result of  
26 floodplain restoration does not exceed the amount estimated based on the hypothetical  
27 footprint. Habitat loss is expected to be lower than 41 acres because sites would be selected and  
28 restoration designed to minimize effects on the riparian woodrat. If natural flooding is  
29 insufficient to maintain appropriate riparian woodrat vegetation structure, the vegetation  
30 would be actively managed to provide suitable habitat structure as described in *CM11 Natural*  
31 *Communities Enhancement and Management*.

32 Levee construction would also result in the temporary removal of 33 acres of modeled habitat  
33 for the riparian woodrat. Although the effects are considered temporary, 5 years to several  
34 decades may be required for ecological succession to occur and for restored riparian habitat to  
35 replace the function of habitat that has been affected.

- 36 ● *CM11 Natural Communities Enhancement and Management*: A variety of habitat management  
37 actions included in CM11 that are designed to enhance wildlife values in BDCP protected  
38 habitats may result in localized ground disturbances that could temporarily remove small  
39 amounts of riparian woodrat habitat. Enhancement and management actions in riparian  
40 woodrat habitat within the reserve system may include invasive plant removal, planting and  
41 maintaining vegetation to improve and sustain habitat characteristics for the species, and  
42 creating and maintaining flood refugia. These activities are expected to have minor adverse  
43 effects on available riparian woodrat habitat and are expected to result in overall improvements  
44 to and maintenance of riparian woodrat habitat values over the term of the BDCP. These effects

1 cannot be quantified, but are expected to be minimal and would be avoided and minimized  
2 through the AMMs listed below.

- 3 • Operations and maintenance: The only ongoing effects on the riparian woodrat are those  
4 potentially resulting from habitat enhancement and management activities. Enhancement and  
5 management actions in riparian woodrat habitat within the reserve system may include invasive  
6 plant removal, planting and maintaining vegetation to improve and sustain habitat  
7 characteristics for the species, and creating and maintaining flood refugia. These activities may  
8 result in harassment of riparian woodrats through noise and visual disturbance which would be  
9 minimized with implementation of AMM1–AMM7, AMM10, and AMM25.
- 10 • Injury and direct mortality: Construction vehicle activity is not likely to result in injury or  
11 mortality of individual riparian woodrats because the species is not likely to be present in the  
12 areas that would be affected by this activity, based on live trapping results (BDCP Appendix 3.E,  
13 *Conservation Principles for the Riparian Woodrat and Riparian Brush Rabbit*). Tidal natural  
14 communities restoration would not result in injury or mortality of the riparian woodrats  
15 because under AMM25 tidal natural communities restoration projects would be designed to  
16 avoid occupied riparian woodrat habitat and if that is not possible to trap and relocate the  
17 species. Activities associated with construction of setback levees for floodplain restoration could  
18 result in injury or mortality of riparian woodrats; however, preconstruction surveys,  
19 construction monitoring, and other measures would be implemented under AMM25 to avoid  
20 and minimize injury or mortality of this species during construction, as described in BDCP  
21 Appendix 3.C. If occupied riparian woodrat habitat cannot be avoided, mortality would be  
22 avoided through implementation of a trapping and relocation program. The program would be  
23 developed in coordination with USFWS, and relocation would be to a site approved by USFWS  
24 prior to construction activities.

25 The following paragraphs summarize the combined effects discussed above and describe other  
26 BDCP conservation actions that offset or avoid these effects. NEPA effects and a CEQA conclusion are  
27 also included.

### 28 ***Near-Term Timeframe***

29 Because water conveyance facilities construction is being evaluated at the project level, the near-  
30 term BDCP strategy has been analyzed to determine whether it would provide sufficient habitat  
31 protection or restoration in an appropriate timeframe to ensure that the construction effects would  
32 not be adverse under NEPA.

33 Alternative 9 would result in permanent and temporary effects on 3 acres of modeled habitat for  
34 riparian woodrat in the near-term as a result of construction of the water conveyance facilities  
35 (CM1). The habitat would be lost in the valley/foothill riparian. All the near-term loss of riparian  
36 woodrat habitat would result from CM1 conveyance facility construction in CZ 8, and would occur in  
37 an area not likely to be occupied by the species. Habitat loss in CZ 7, in areas known or likely to be  
38 occupied, would occur during the early long-term and late long-term implementation periods.  
39 Riparian restoration would be phased to minimize temporal habitat loss. There would be no near-  
40 term losses from CM2–CM18.

41 Typical NEPA project-level mitigation ratios for these natural communities that would be affected  
42 and that are identified in the biological goals and objectives for riparian woodrat in Chapter 3 of the  
43 BDCP would be 1:1 for restoration and 1:1 for protection of the valley/foothill riparian natural

1 community. Using these ratios would indicate that 3 acres of riparian habitat should be restored  
2 and 3 acres of riparian habitat should be protected for riparian woodrat for near-term losses.

3 The BDCP has committed to near-term restoration of 800 acres of riparian (Objective VFRNC1.1) and  
4 protection of 750 acres of riparian (Objective VFRNC1.2) (Table 3-4 in Chapter 3, *Description of*  
5 *Alternatives*). In addition, the species-specific biological goals and objectives (RW1.1 and  
6 RW1.2) would inform the near-term protection and restoration efforts. The natural community  
7 restoration and protection activities are expected to be concluded during the first 10 years of Plan  
8 implementation, which is close enough in time to the occurrence of impacts to constitute adequate  
9 mitigation for NEPA purposes. These commitments are more than sufficient to support the  
10 conclusion that the near-term effects of Alternative 9 would be not be adverse under NEPA, because  
11 no riparian woodrat habitat would be lost and there is only limited potential for minor adverse  
12 effects on woodrats or its habitat from implementation of CM11.

13 These effects cannot be quantified, but are expected to be minimal and would be avoided and  
14 minimized through the BDCP's commitment to *AMM1 Worker Awareness Training, AMM2*  
15 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*  
16 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
17 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
18 *Material, AMM7 Barge Operations Plan, AMM10 Restoration of Temporarily Affected Natural*  
19 *Communities, and AMM25 Riparian Woodrat and Riparian Brush Rabbit. The AMMs are described in*  
20 *detail in BDCP Appendix 3.C, Avoidance and Minimization Measures.*

### 21 **Late Long-Term Timeframe**

22 The study area supports approximately 2,166 acres of modeled riparian woodrat habitat.  
23 Alternative 9 as a whole would result in the permanent loss of and temporary removal of 87 acres of  
24 modeled habitat for riparian woodrat habitat. None of this habitat is considered occupied.

25 The BDCP would restore 5,000 acres and protect 750 acres of valley/foothill riparian natural  
26 community, a portion of which is expected to consist of suitable riparian brush rabbit habitat  
27 (Objectives VFRNC1.1 and VFRNC1.2). Objective RW1.1 requires at least 300 acres of riparian  
28 habitat that meets the ecological requirements of the riparian woodrat (e.g., dense willow  
29 understory and oak overstory) and that is adjacent to or facilitates connectivity with existing  
30 occupied or potentially occupied habitat to be restored in CZ 7. The conserved habitat would also be  
31 part of a larger, more contiguous, and less patchy area of protected and restored riparian natural  
32 community than what currently exists in CZ 7 and would be contiguous with existing modeled  
33 riparian woodrat habitat. The species-specific objective further requires that the 300 acres of  
34 restored riparian habitat meet more specific ecological requirements of riparian woodrat (e.g.,  
35 dense willow understory and oak overstory). Additionally, assuming the protected riparian natural  
36 community would provide riparian woodrat habitat proportional to the amount of modeled habitat  
37 in this natural community in the Plan Area (12% of the riparian natural community in the Plan Area  
38 is modeled riparian woodrat habitat), the protection of 750 acres of riparian natural community  
39 (CM3) would provide an estimated 90 acres of protected riparian woodrat habitat that is  
40 comparable to or of higher value than existing modeled grassland habitat. All riparian protection  
41 would occur during the near-term period, to offset early riparian losses.

42 The BDCP would also create and maintain mounds, levee sections, or other high areas in restored  
43 and protected riparian areas (Objective RW1.2) that are designed specifically to provide flood

1 refugia for the riparian woodrat (BDCP Appendix 3.E, *Conservation Principles for the Riparian Brush*  
2 *Rabbit and Riparian Woodrat*). In addition, the restored floodplains would transition from areas  
3 that flood frequently (e.g., every 1 to 2 years) to areas that flood infrequently (e.g., every 10 years or  
4 more) (Objective L1.5): these infrequently flooded areas would provide refuge for the riparian  
5 woodrat during most years.

6 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*  
7 *Plant Species*) estimates that the restoration and protection actions discussed above, as well as the  
8 restoration of valley/foothill riparian that could overlap with the species model, would result in the  
9 restoration of 300 acres of modeled habitat for riparian woodrat. In addition, protection of  
10 valley/foothill riparian could overlap with the species model and would result in the protection of  
11 90 acres riparian woodrat modeled habitat.

12 Although there are no records of occurrences of the riparian woodrat in the study area, habitat  
13 restoration in CZ 7, in the vicinity of occurrences south of the study area, would increase  
14 opportunities for northward expansion of the species into the study area. Implementation of  
15 Alternative 9 conservation measures is not expected to adversely affect the riparian woodrat for the  
16 following reasons.

- 17 ● There are no riparian woodrat occurrences in the Plan Area.
- 18 ● The habitat that would be removed consists of small patches that are of moderate value for the  
19 species.
- 20 ● The habitat that would be removed permanently is a small proportion of the total habitat in the  
21 Plan Area (2%).
- 22 ● Avoidance and minimization measures would be implemented to avoid injury or mortality of  
23 riparian woodrats, and to minimize loss of occupied habitat.
- 24 ● Floodplain restoration would be designed to provide flood refugia so that flooding would not  
25 adversely affect any riparian woodrats that occupy restored floodplains.

26 **NEPA Effects:** Alternative 9 would provide a substantial benefit to the riparian woodrat through the  
27 net increase in available habitat and a net increase of habitat in protected status. These protected  
28 areas would be managed and monitored to support the species. The habitat that Alternative 9 would  
29 affect is currently unoccupied, and habitat removal is not expected to result in a discernible change  
30 in the abundance or distribution of riparian woodrats if they occupy study area habitats. Should the  
31 species be detected in the study area, implementation of AMM1-AMM7, AMM10, and AMM25 would  
32 avoid and minimize the effects of conservation component construction and implementation.  
33 Therefore, the loss of habitat and potential mortality of individuals would not have an adverse effect  
34 on riparian woodrat.

### 35 **CEQA Conclusion:**

#### 36 **Near-Term Timeframe**

37 Because water conveyance facilities construction is being evaluated at the project level, the near-  
38 term BDCP strategy has been analyzed to determine whether it would provide sufficient habitat  
39 protection or restoration in an appropriate timeframe to ensure that the construction impacts  
40 would be less than significant for CEQA purposes.

1 Alternative 9 would result in permanent and temporary effects on 3 acres of modeled habitat for  
2 riparian woodrat in the near-term as a result of construction of the water conveyance facilities  
3 (CM1). The habitat would be lost in the valley/foothill riparian. All the near-term loss of riparian  
4 woodrat habitat would result from CM1 conveyance facility construction in CZ 8, and would occur in  
5 an area not likely to be occupied by the species. Habitat loss in CZ 7, in areas known or likely to be  
6 occupied, would occur during the early long-term and late long-term implementation periods.  
7 Riparian restoration would be phased to minimize temporal habitat loss. There would be no near-  
8 term losses from CM2–CM18.

9 Typical CEQA project-level mitigation ratios for these natural communities that would be affected  
10 and that are identified in the biological goals and objectives for riparian woodrat in Chapter 3 of the  
11 BDCP would be 1:1 for restoration and 1:1 for protection of the valley/foothill riparian natural  
12 community. Using these ratios would indicate that 3 acres of riparian habitat should be restored  
13 and 3 acres of riparian habitat should be protected for riparian woodrat for near-term losses.

14 The BDCP has committed to near-term restoration of 800 acres of riparian (Objective VFRNC1.1)  
15 and protection of 750 acres of riparian (Objective VFRNC1.2) (Table 3-4 in Chapter 3, *Description of*  
16 *Alternatives*). In addition, the species-specific biological goals and objectives (RW1.1 and  
17 RW1.2) would inform the near-term protection and restoration efforts. The natural community  
18 restoration and protection activities are expected to be concluded during the first 10 years of Plan  
19 implementation, which is close enough in time to the occurrence of impacts to constitute adequate  
20 mitigation for CEQA purposes. The Plan also contains commitments to implement AMM1–AMM7,  
21 AMM10, and AMM25, which contain elements that avoid or minimize the risk of affected habitats  
22 and species adjacent to work areas. The AMMs are described in detail in BDCP Appendix 3.C,  
23 *Avoidance and Minimization Measures*.

24 These commitments are more than sufficient to support the conclusion that the near-term effects of  
25 Alternative 9 would be less than significant under CEQA, because no riparian woodrat habitat would  
26 be lost and there is only limited potential for minor adverse effects on woodrats or its habitat from  
27 implementation of CM11.

### 28 **Late Long-Term Timeframe**

29 The study area supports approximately 2,166 acres of modeled riparian woodrat habitat.  
30 Alternative 9 as a whole would result in the permanent loss of and temporary removal of 87 acres of  
31 modeled habitat for riparian woodrat habitat. None of this habitat is considered occupied.

32 The BDCP would restore 5,000 acres and protect 750 acres of valley/foothill riparian natural  
33 community, a portion of which is expected to consist of suitable riparian brush rabbit habitat  
34 (Objectives VFRNC1.1 and VFRNC1.2). Objective RW1.1 requires at least 300 acres of riparian  
35 habitat that meets the ecological requirements of the riparian woodrat (e.g., dense willow  
36 understory and oak overstory) and that is adjacent to or facilitates connectivity with existing  
37 occupied or potentially occupied habitat to be restored in CZ 7. The conserved habitat would also be  
38 part of a larger, more contiguous, and less patchy area of protected and restored riparian natural  
39 community than what currently exists in CZ 7 and would be contiguous with existing modeled  
40 riparian woodrat habitat. The species-specific objective further requires that the 300 acres of  
41 restored riparian habitat meet more specific ecological requirements of riparian woodrat (e.g.,  
42 dense willow understory and oak overstory). Additionally, assuming the protected riparian natural  
43 community would provide riparian woodrat habitat proportional to the amount of modeled habitat

1 in this natural community in the Plan Area (12% of the riparian natural community in the Plan Area  
2 is modeled riparian woodrat habitat), the protection of 750 acres of riparian natural community  
3 (CM3) would provide an estimated 90 acres of protected riparian woodrat habitat that is  
4 comparable to or of higher value than existing modeled grassland habitat. All riparian protection  
5 would occur during the near-term period, to offset early riparian losses.

6 The BDCP would also create and maintain mounds, levee sections, or other high areas in restored  
7 and protected riparian areas (Objective RW1.2) that are designed specifically to provide flood  
8 refugia for the riparian woodrat (BDCP Appendix 3.E, *Conservation Principles for the Riparian Brush*  
9 *Rabbit and Riparian Woodrat*). In addition, the restored floodplains would transition from areas  
10 that flood frequently (e.g., every 1 to 2 years) to areas that flood infrequently (e.g., every 10 years or  
11 more) (Objective L1.5): these infrequently flooded areas would provide refuge for the riparian  
12 woodrat during most years.

13 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*  
14 *Plant Species*) estimates that the restoration and protection actions discussed above, as well as the  
15 restoration of valley/foothill riparian that could overlap with the species model, would result in the  
16 restoration of 300 acres of modeled habitat for riparian woodrat. In addition, protection of  
17 valley/foothill riparian could overlap with the species model and would result in the protection of  
18 90 acres riparian woodrat modeled habitat.

19 Although there are no records of occurrences of the riparian woodrat in the study area, habitat  
20 restoration in CZ 7, in the vicinity of occurrences south of the study area, would increase  
21 opportunities for northward expansion of the species into the study area Implementation of  
22 Alternative 9 conservation measures is not expected to adversely affect the riparian woodrat for the  
23 following reasons.

- 24 ● There are no riparian woodrat occurrences in the Plan Area.
- 25 ● The habitat that would be removed consists of small patches that are of moderate value for the  
26 species.
- 27 ● The habitat that would be removed permanently is a small proportion of the total habitat in the  
28 Plan Area (2%).
- 29 ● Avoidance and minimization measures would be implemented to avoid injury or mortality of  
30 riparian woodrats, and to minimize loss of occupied habitat.
- 31 ● Floodplain restoration would be designed to provide flood refugia so that flooding would not  
32 adversely affect any riparian woodrats that occupy restored floodplains.

33 Alternative 9 would provide a substantial benefit to the riparian woodrat through the net increase in  
34 available habitat and a net increase of habitat in protected status. These protected areas would be  
35 managed and monitored to support the species. The affected habitat is currently unoccupied and  
36 habitat removal is not expected to result in a discernible change in the abundance or distribution of  
37 riparian woodrats if they occupy study area habitats. Should the species be detected in the study  
38 area, implementation of AMM1–AMM7, AMM10, and AMM25 would avoid and minimize the effects  
39 of conservation component construction and implementation. Therefore, the loss of habitat and  
40 potential mortality of individuals under Alternative 9 would not have a significant impact on  
41 riparian woodrat.

1       **Impact BIO-156: Indirect Effects of Plan Implementation on Riparian Woodrat**

2       Noise and visual disturbance adjacent to construction activities could indirectly affect the use of  
3       modeled habitat for riparian woodrat. These effects are related construction activities associated  
4       with water conveyance construction, tidal natural communities restoration construction, and  
5       construction of setback levees. Indirect effects on the species from construction associated with tidal  
6       natural communities restoration are unlikely because tidal natural communities restoration projects  
7       would be sited to avoid areas occupied by riparian woodrat (AMM25) The activity most likely to  
8       result in noise and visual disturbance to riparian woodrat would be the construction of setback  
9       levees. These adverse effects would be minimized through implementation of AMM1–AMM7,  
10       AMM10, and AMM25.

11       **NEPA Effects:** Implementation of the AMMs listed above as part of implementing BDCP Alternative 9  
12       would avoid the potential for substantial adverse effects on riparian woodrats, either indirectly or  
13       through habitat modifications or result in a substantial reduction in numbers or a restriction in the  
14       range of riparian woodrats. Therefore, indirect effects of Alternative 9 would not have an adverse  
15       effect on riparian woodrat.

16       **CEQA Conclusion:** Should the species be detected in the study area, indirect effects of conservation  
17       measure construction and implementation could impact riparian woodrat and its habitat. AMM1–  
18       AMM7, AMM10, and AMM25 would avoid and minimize the impact.

19       **Impact BIO-157: Periodic Effects of Inundation of Riparian Woodrat Habitat as a Result of**  
20       **Implementation of Conservation Components**

21       *CM5 Seasonally inundated floodplain restoration* is the only covered activity expected to result in  
22       periodic inundation of riparian woodrat habitat. Floodplain restoration would result in periodic  
23       inundation of up to 203 acres of riparian woodrat habitat (9% of the riparian woodrat habitat in the  
24       Plan Area). The area between existing levees that would be breached and the newly constructed  
25       setback levees would be inundated through seasonal flooding. The potentially inundated areas  
26       consist of moderate-value habitat for the species. Although the habitat consists of small patches and  
27       narrow bands of riparian vegetation and no riparian woodrats have detected in CZ 7, the riparian  
28       patches are in proximity to each other along the San Joaquin River and there are two species  
29       occurrences immediately south of CZ 7, one of which is less than 1 mile from the southernmost  
30       patch of riparian habitat potentially affected by levee construction. The restored floodplains would  
31       transition from areas that flood frequently (e.g., every 1 to 2 years) to areas that flood infrequently  
32       (e.g., every 10 years or more).

33       **NEPA Effects:** Alternative 9’s periodic inundation of 203 acres of riparian habitat is not expected to  
34       result in substantial adverse effects on riparian woodrat, either directly or through habitat  
35       modifications and would not result in a substantial reduction in numbers or a restriction in the  
36       range of riparian woodrat. The effects of periodic inundation on the riparian woodrat would be  
37       minimized through construction and maintenance of flood refugia to allow riparian woodrats to  
38       escape inundation. Therefore, the periodic inundation of riparian woodrat habitat would not  
39       adversely affect the species under Alternative 9.

40       **CEQA Conclusion:** Floodplain restoration under CM5 would periodically affect a total of 203 acres of  
41       riparian habitat for riparian woodrat, representing 9% of the 2,166 acres of modeled riparian  
42       woodrat habitat in the study area. The impact of periodic inundation on the riparian woodrat would  
43       be minimized through construction and maintenance of flood refugia to allow riparian woodrats to

1 escape inundation, as described in AMM25. Implementation of CM5 would not be expected to result  
2 in significant impacts on riparian woodrat, either directly or through habitat modifications, and  
3 would not result in a substantial reduction in numbers or a restriction in the range of riparian  
4 woodrats. Periodic inundation of riparian woodrat habitat under Alternative 9 would have a less-  
5 than-significant impact.

### 6 **Salt Marsh Harvest Mouse**

7 The habitat model used to assess effects for the salt marsh harvest mouse includes six habitat types:  
8 primary tidal marsh habitat, secondary tidal marsh habitat (low marsh), secondary upland habitat  
9 adjacent to tidal marsh habitat, primary habitat within managed wetlands, secondary habitat within  
10 managed wetlands (dominated by plants characteristic of low marsh), and upland habitats within  
11 managed wetland boundaries. The tidal and managed wetland habitats were discriminated  
12 recognizing that regardless of habitat value, managed wetlands are at high risk of catastrophic  
13 flooding and have lower long-term conservation value than tidal wetlands.

14 Construction and restoration associated with Alternative 9 conservation measures would result in  
15 effects to modeled salt marsh harvest mouse habitat, which would include permanent losses and  
16 habitat conversions (i.e., existing habitat converted to greater or lesser valued habitat for the species  
17 post-restoration) as indicated in Table 12-9-57. All of the effects to the species would take place  
18 over an extended period of time as tidal marsh is restored in the Plan Area. Full implementation of  
19 Alternative 9 would also include the following conservation actions over the term of the BDCP to  
20 benefit salt marsh harvest mouse (BDCP Chapter 3, *Conservation Strategy*).

- 21 ● Restore or create 6,000 acres of tidal brackish emergent wetland in CZ 11 to be consistent with  
22 the final Recovery Plan for Tidal Marsh Ecosystems of Northern and Central California  
23 (Objective TBEWNC1.1, associated with CM4)
- 24 ● Within the 6,000 acres of tidal brackish emergent wetland restored or created, distribute 1,500  
25 acres of middle and high marsh (primary salt marsh harvest mouse habitat) to contribute to  
26 total (existing and restored) acreage targets for each complex as specified in the final Recovery  
27 Plan for Tidal Marsh Ecosystems of Northern and Central California (Objective TBEWNC1.2,  
28 associated with CM4).
- 29 ● Limit perennial pepperweed to no more than 10% cover in the tidal brackish emergent wetland  
30 natural community within the reserve system (Objective TBEWNC2.1).
- 31 ● Protect and enhance at least 1,500 acres of managed wetland in Grizzly Island Marsh Complex  
32 for the benefit of salt marsh harvest mouse (Objective MWNC1.1, associated with CM3).
- 33 ● Protect or restore grasslands adjacent to restored tidal brackish emergent wetlands to provide  
34 at least 200 feet of adjacent grasslands beyond the sea level rise accommodation area (Objective  
35 GNC1.4, associated with CM3 and CM8).
- 36 ● Provide viable habitat areas for salt marsh harvest mouse within the 1,500 acres of restored or  
37 created middle and high marsh as defined in the final Recovery Plan for Tidal Marsh Ecosystems  
38 of Northern and Central California (Objective SMHM1.1).
- 39 ● Provide viable habitat areas for salt marsh harvest mouse within the 1,500 acres of managed  
40 wetland protected and enhanced in the Grizzly Island Marsh Complex as defined in the final  
41 Recovery Plan for Tidal Marsh Ecosystems of Northern and Central California, and increase  
42 population levels above the current baseline (Objective SMHM1.2).

1 As explained below, with the restoration or protection of these amounts of habitat, impacts on the  
2 salt marsh harvest mouse would not be adverse for NEPA purposes and would be less than  
3 significant for CEQA purposes.

4 **Table 12-9-57. Changes in Salt Marsh Harvest Mouse Modeled Habitat Associated with**  
5 **Alternative 9 (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	(CM1 Outside of species range)	0	0	0	0	NA	NA
<b>Total Impacts CM1</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>		
CM2–CM18	<i>TBEW Primary</i>	64	67	0	0	0	0
	<i>TBEW Secondary</i>	0	0	0	0	0	0
	<i>Upland Secondary</i>	8	9	0	0	0	0
	<i>MW Wetland Primary</i>	1,913	5,323	0	0	0	0
	<i>MW Wetland Secondary</i>	315	807	0	0	0	0
	<i>MW Upland</i>	165	762	0	0	0	0
<b>Total Impacts CM2–CM18</b>		<b>2,465</b>	<b>6,968</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>TOTAL IMPACTS</b>		<b>2,645</b>	<b>6,968</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

<sup>a</sup> See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only.

TBEW = tidal brackish emergent wetland

MW = managed wetland

NT = near-term

LLT = late long-term

NA = not applicable

6

7 **Impact BIO-158: Loss or Conversion of Habitat for and Direct Mortality of Salt Marsh Harvest**  
8 **Mouse**

9 BDCP tidal restoration (CM4) would be the only conservation measure resulting in effects on salt  
10 marsh harvest mouse habitat. Habitat enhancement and management activities (CM11), which  
11 include ground disturbance or removal of nonnative vegetation, could result in local adverse habitat  
12 effects. Each of these activities is described in detail below. A summary statement of the combined  
13 impacts and NEPA and CEQA conclusions follows the individual conservation measure discussions.

- 1 • *CM4 Tidal Natural Communities Restoration* would result in effects to 6,968 acres of salt marsh  
2 harvest mouse modeled habitat, which would include 5,376 acres of permanent losses and  
3 1,592 acres of habitat conversions. Salt marsh harvest mouse may be displaced temporarily from  
4 areas of converted habitat but these areas would ultimately provide suitable habitat for the  
5 species. However, 1,058 of these acres would be downgraded from primary habitat (67 acres of  
6 primary tidal brackish emergent wetland and 991 acres of primary managed wetland) to  
7 secondary tidal brackish emergent wetland. The hypothetical restoration footprints in Suisun  
8 Marsh overlap with 13 CNDDDB records for salt marsh harvest mouse (California Department of  
9 Fish and Wildlife 2013); however, the BDCP's conservation actions assume that all suitable  
10 habitat in Suisun Marsh is occupied by the species.
- 11 • *CM11 Natural Communities Enhancement and Management*: As described in the BDCP, the  
12 restoration of at least 1,500 acres of tidal brackish emergent wetland would be managed to  
13 provide viable habitat for salt marsh harvest mouse and the protection of 1,500 acres of  
14 managed wetland specifically to be managed for salt marsh harvest mouse. A variety of habitat  
15 management actions included in *CM11 Natural Communities Enhancement and Management* that  
16 are designed to enhance and manage these areas for salt marsh harvest mouse and may result in  
17 localized ground disturbances that could temporarily remove small amounts of salt marsh  
18 harvest mouse habitat. The restoration of tidal brackish emergent wetlands, the protection of  
19 managed wetlands, and the protection and/or restoration of grasslands within 200 feet of  
20 restored salt marsh harvest mouse habitat would also have enhancement and management  
21 actions that would include invasive species control, nonnative wildlife control, and vegetation  
22 management. Ground-disturbing activities, such as removal of nonnative vegetation are  
23 expected to have minor effects on habitat and are expected to result in overall improvements to  
24 and maintenance of salt marsh harvest mouse habitat values over the term of the BDCP. These  
25 effects cannot be quantified, but are expected to be minimal and would be avoided and  
26 minimized by the AMMs listed below.
- 27 • *Injury and Direct Mortality*: The use of heavy equipment and handtools may result in injury or  
28 mortality to salt marsh harvest mouse during restoration, enhancement, and management  
29 activities. However, preconstruction surveys, construction monitoring, and other measures  
30 would be implemented to avoid and minimize injury or mortality of this species during these  
31 activities, as required by the AMMs listed below.

32 The following paragraphs summarize the combined effects discussed above and describe other  
33 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA impact conclusions are  
34 also included.

### 35 ***Near-Term Timeframe***

36 The near-term BDCP conservation strategy has been evaluated to determine whether it would  
37 provide sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that  
38 the effects of near-term covered activities would not be adverse under NEPA. Alternative 9 would  
39 affect 2,465 acres of salt marsh harvest mouse modeled habitat in the study area in the near-term.  
40 These effects include 1,517 acres of permanent loss and 948 acres of converted habitat. Most of the  
41 habitat converted would be from primary habitats (599 acres consisting of 64 acres of tidal brackish  
42 emergent wetland and 534 acres of managed wetland) to secondary tidal brackish emergent  
43 wetland.

1 The BDCP has committed to near-term goals of restoring 2,000 acres of tidal brackish emergent  
2 wetland, the protection and/or restoration of grasslands within 200 feet of restored tidal wetlands,  
3 and the protection and enhancement of 1,500 acres of managed wetlands for salt marsh harvest  
4 mouse. Though there would be a net loss of modeled habitat, nearly all of these losses (97%) are to  
5 managed wetlands, which according to the U.S. Fish and Wildlife Service are at high risk of  
6 catastrophic flooding (U.S. Fish and Wildlife Service 2010) and have lower long-term conservation  
7 value than tidal wetlands. The species-specific biological goals and objectives would inform the  
8 near-term protection and restoration efforts. These Plan goals represent performance standards for  
9 considering the effectiveness of restoration actions. The acres of protection and restoration  
10 contained in the near-term Plan goals would keep pace with the loss of habitat and effects to salt  
11 marsh harvest mouse.

12 Other factors relevant to effects on salt marsh harvest mouse are listed here.

- 13 ● Tidal restoration actions would not immediately displace salt marsh harvest mouse in managed  
14 wetlands as noted in the specie's draft recovery plan because the conversion of managed  
15 wetland to tidal marsh would be gradual. Tidal marsh restoration is often accomplished by  
16 breaching levees and converting diked nontidal marsh currently occupied by salt marsh harvest  
17 mouse populations to tidal wetlands, their historic condition. Conversion of these subsided  
18 areas requires sedimentation and accretion over time to restore marsh plains, resulting in a  
19 prolonged period (sometimes a decade or more) in which resident mice populations are  
20 displaced by uninhabitable aquatic areas (U.S. Fish and Wildlife Service 2010). Despite these  
21 temporary adverse effects, the draft recovery plan and Suisun Marsh Plan advocate strongly for  
22 restoration of tidal wetlands through the conversion of managed wetlands. These plans are  
23 based on the premise that managed wetlands are at high risk of loss of salt marsh harvest mouse  
24 habitat from a variety of factors, including flooding from levee failure and cessation of active  
25 management (which is often necessary to maintain habitat values in managed wetlands).  
26 Therefore, the temporary effects under BDCP would be consistent with those deemed  
27 acceptable in the draft recovery plan for salt marsh harvest mouse and the Suisun Marsh Plan.  
28 Restoration in Suisun Marsh would be carefully phased over time to offset adverse effects of  
29 restoration as it occurs. This phasing would ensure that temporal loss as a result of tidal natural  
30 communities restoration does not adversely affect the salt marsh harvest mouse population,  
31 ensure that short-term population loss is relatively small and incremental, and maintain local  
32 source populations to recolonize newly restored areas. The tidal restoration projects in Suisun  
33 Marsh would be implemented in 150-acre or greater patches that provide viable habitat areas  
34 for the salt marsh harvest mouse habitat consistent with the draft tidal marsh recovery plan  
35 (U.S. Fish and Wildlife Service 2010).
- 36 ● The salt marsh harvest mouse population would be monitored during the phasing process (see  
37 BDCP Chapter 3, Section 3.4.4.3.4.), and adaptive management would be applied to ensure  
38 maintenance of the population as described in the BDCP (BDCP Chapter 3, Section 3.4.4.4 and  
39 Section 3.6).
- 40 ● The BDCP commits to manage reserve areas so that perennial pepperweed cover is no more  
41 than 10% in tidal brackish emergent wetlands (Objective TBEWNC2.1), which would benefit  
42 pickleweed production in the marsh. Salt marsh harvest mouse depends on pickleweed for  
43 forage and cover.

1 Because there would be no project-level impacts on salt marsh harvest mouse resulting from CM1,  
2 the analysis of the effects and conservation actions does not include a comparison with standard  
3 ratios used for project-level NEPA analyses.

4 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
5 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
6 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
7 *Countermeasure Plan*, and *AMM26 Salt Marsh Harvest Mouse and Suisun Shrew*. All of these AMMs  
8 include elements that avoid or minimize the risk of affecting habitats and species adjacent to work  
9 areas. The AMMs are described in detail in BDCP Appendix 3.C.

#### 10 **Late Long-Term Timeframe**

11 Based on modeled habitat, the study area supports approximately 35,588 acres of salt marsh  
12 harvest mouse modeled habitat. Alternative 9 as a whole would result in effects to 6,968 acres of  
13 saltmarsh harvest mouse modeled habitat over the term of the Plan, which would include 5,376  
14 acres of permanent losses and 1,592 acres of habitat conversions. These effects (loss and  
15 conversion) would be on 20% of the modeled habitat in the study area. Most of these effects (99%)  
16 would be to managed wetlands, which though are known to be occupied by salt marsh harvest  
17 mouse are at high risk of catastrophic flooding and have a lower long-term conservation value than  
18 tidal wetlands (U.S. Fish and Wildlife Service 2010). Effects on up to 20% of the species' habitat in  
19 the Plan Area may diminish the salt marsh harvest mouse population in the Plan Area and result in  
20 reduced genetic diversity, thereby putting the local population at risk of local extirpation due to  
21 random environmental fluctuations or catastrophic events. This effect is expected to be greatest if  
22 large amounts of habitat are removed at one time in Suisun Marsh and are not effectively restored  
23 for many years, and if there are no adjacent lands with salt marsh harvest mouse populations to  
24 recolonize restored areas.

25 The Plan includes a commitment to restore or create 6,000 acres of tidal brackish emergent wetland,  
26 1,500 acres of which would target middle and high marsh habitat (primary habitat for salt marsh  
27 harvest mouse) (TBEWNC1.1, TBEWNC1.2, SMHM1.1, associated with CM4), the protection of 6,500  
28 acres of managed wetlands, 1,500 acres of which would be specifically managed for salt marsh  
29 harvest mouse (SMHM1.2 and MWNC1.1, associated with CM3), and the protection and/or  
30 restoration of grassland adjacent to tidal restoration (areas within 200 feet of tidal restoration) to  
31 provide upland refugia for salt marsh harvest mouse (GNC1.4, associated with CM3 and CM8). Other  
32 factors relevant to effects on salt marsh harvest mouse include:

- 33 • Tidal restoration actions would not immediately displace salt marsh harvest mouse in managed  
34 wetlands as noted in the draft recovery plan for salt marsh harvest mouse because the  
35 conversion of managed wetland to tidal marsh would be gradual. Tidal marsh restoration is  
36 often accomplished by breaching levees and converting diked nontidal marsh currently  
37 occupied by salt marsh harvest mouse populations to tidal wetlands, their historic condition.  
38 Conversion of these subsided areas requires sedimentation and accretion over time to restore  
39 marsh plains, resulting in a prolonged period (sometimes a decade or more) in which resident  
40 mice populations are displaced by uninhabitable aquatic areas (U.S. Fish and Wildlife Service  
41 2010). Despite these temporary adverse effects, the draft recovery plan and Suisun Marsh Plan  
42 advocate strongly for restoration of tidal wetlands through the conversion of managed wetlands.  
43 These plans are based on the premise that managed wetlands are at high risk of loss of salt  
44 marsh harvest mouse habitat from a variety of factors, including flooding from levee failure and

1 cessation of active management (which is often necessary to maintain habitat values in managed  
2 wetlands). Therefore, the temporary effects under BDCP are consistent with those deemed  
3 acceptable in the draft recovery plan for salt marsh harvest mouse and the Suisun Marsh Plan.

- 4 • In order to ensure that temporal loss as a result of tidal natural communities restoration does  
5 not adversely affect the salt marsh harvest mouse population, restoration in Suisun Marsh  
6 would be carefully phased over time to offset adverse effects of restoration as it occurs, ensure  
7 that short-term population loss is relatively small and incremental, and maintain local source  
8 populations to recolonize newly restored areas. The tidal restoration projects in Suisun Marsh  
9 would be implemented in 150-acre or greater patches that provide viable habitat areas for the  
10 salt marsh harvest mouse habitat consistent with the draft tidal marsh recovery plan (U.S. Fish  
11 and Wildlife Service 2010).
- 12 • The salt marsh harvest mouse population would be monitored during the phasing process (see  
13 BDCP Chapter 3, Section 3.4.4.3.4.), and adaptive management would be applied to ensure  
14 maintenance of the population as described in the BDCP (BDCP Chapter 3, Section 3.4.4.4 and  
15 Section 3.6).
- 16 • The BDCP commits to manage reserve areas so that perennial pepperweed cover is no more  
17 than 10% in tidal brackish emergent wetlands (Objective TBEWNC2.1), which would benefit  
18 pickleweed production in the marsh. Salt marsh harvest mouse depends on pickleweed for  
19 forage and cover.
- 20 • The habitat that would be restored and protected would consist of large blocks of contiguous  
21 tidal brackish emergent wetland that has a large proportion of pickleweed-dominated  
22 vegetation suitable for the species. This would provide greater habitat connectivity and greater  
23 habitat value, which is expected to accommodate larger populations and to therefore increase  
24 population resilience to random environmental events and climate change.

25 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*  
26 *Plant Species*) estimates that the restoration and protection actions discussed above could result in  
27 the restoration of 6,046 acres and the protection of 1,550 acres of modeled habitat for salt marsh  
28 harvest mouse.

29 **NEPA Effects:** In the absence of other conservation actions, the effects on salt marsh harvest mouse  
30 habitat from Alternative 9 would represent an adverse effect as a result of habitat modification and  
31 potential direct mortality of a special-status species. However, the BDCP has committed to habitat  
32 protection, restoration, management, and enhancement associated with CM3, CM4, CM8, and CM11.  
33 This habitat protection, restoration, management, and enhancement would be guided by species-  
34 specific goals and objectives and by AMM1–AMM5 and AMM26, which would be in place throughout  
35 the construction period. Considering these commitments, losses and conversions of salt marsh  
36 harvest mouse habitat and potential mortality of individuals in the near-term and late long-term  
37 under Alternative 9 would not be an adverse effect.

### 38 **CEQA Conclusion:**

#### 39 **Near-Term Timeframe**

40 The near-term BDCP conservation strategy has been evaluated to determine whether it would  
41 provide sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that  
42 the effects of near-term covered activities would be less than significant under CEQA. Alternative 9

1 would affect 2,465 acres of salt marsh harvest mouse modeled habitat in the study area in the near-  
2 term. These effects include 1,517 acres of permanent loss and 948 acres of converted habitat. Most  
3 of the habitat converted would be to primary habitats (599 acres consisting of 64 acres of tidal  
4 brackish emergent wetland and 534 acres of managed wetland) to secondary tidal brackish  
5 emergent wetland.

6 The BDCP has committed to near-term goals of restoring 2,000 acres of tidal brackish emergent  
7 wetland, the protection and/or restoration of grasslands within 200 feet of restored tidal wetlands,  
8 and the protection and enhancement of 3,200 acres of managed wetlands for salt marsh harvest  
9 mouse. Though there would be a net loss of modeled habitat, nearly all of these losses (97%) are to  
10 managed wetlands, which according to the U.S. Fish and Wildlife Service are at high risk of  
11 catastrophic flooding (U.S. Fish and Wildlife Service 2010) and have lower long-term conservation  
12 value than tidal wetlands. The species-specific biological goals and objectives would inform the  
13 near-term protection and restoration efforts. These Plan goals represent performance standards for  
14 considering the effectiveness of restoration actions. The acres of protection and restoration  
15 contained in the near-term Plan goals would keep pace with the loss of habitat and effects to salt  
16 marsh harvest mouse habitat.

17 Other factors relevant to effects on salt marsh harvest mouse are listed here.

- 18 • Tidal restoration actions would not immediately displace salt marsh harvest mouse in managed  
19 wetlands as noted in the specie's draft recovery plan because the conversion of managed  
20 wetland to tidal marsh occurs be gradual. Tidal marsh restoration is often accomplished by  
21 breaching levees and converting diked nontidal marsh currently occupied by salt marsh harvest  
22 mouse populations to tidal wetlands, their historic condition. Conversion of these subsided  
23 areas requires sedimentation and accretion over time to restore marsh plains, resulting in a  
24 prolonged period (sometimes a decade or more) in which resident mice populations are  
25 displaced by uninhabitable aquatic areas (U.S. Fish and Wildlife Service 2010). Despite these  
26 temporary adverse effects, the draft recovery plan and Suisun Marsh Plan advocate strongly for  
27 restoration of tidal wetlands through the conversion of managed wetlands. These plans are  
28 based on the premise that managed wetlands are at high risk of loss of salt marsh harvest mouse  
29 habitat from a variety of factors, including flooding from levee failure and cessation of active  
30 management (which is often necessary to maintain habitat values in managed wetlands).  
31 Therefore, the temporary effects under BDCP would be consistent with those deemed  
32 acceptable in the draft recovery plan for salt marsh harvest mouse and the Suisun Marsh Plan.
- 33 • To ensure that temporal loss as a result of tidal natural communities restoration does not  
34 adversely affect the salt marsh harvest mouse population, restoration in Suisun Marsh would be  
35 carefully phased over time to offset adverse effects of restoration as it occurs, ensure that short-  
36 term population loss is relatively small and incremental, and maintain local source populations  
37 to recolonize newly restored areas. The tidal restoration projects in Suisun Marsh would be  
38 implemented in 150-acre or greater patches that provide viable habitat areas for the salt marsh  
39 harvest mouse habitat consistent with the draft tidal marsh recovery plan (U.S. Fish and Wildlife  
40 Service 2010).
- 41 • The salt marsh harvest mouse population would be monitored during the phasing process (see  
42 BDCP Chapter 3, Section 3.4.4.3.4.), and adaptive management would be applied to ensure  
43 maintenance of the population as described in the BDCP (BDCP Chapter 3, Section 3.4.4.4 and  
44 Section 3.6).

- The BDCP commits to manage reserve areas so that perennial pepperweed cover is no more than 10% in tidal brackish emergent wetlands (Objective TBEWNC2.1), which would benefit pickleweed production in the marsh. Salt marsh harvest mouse depends on pickleweed for forage and cover.

Because there would be no project level impacts on salt marsh harvest mouse resulting from CM1, the analysis of the effects and conservation actions does not include a comparison with standard ratios used for project level CEQA analyses.

The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2 Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and Countermeasure Plan*, and *AMM26 Salt Marsh Harvest Mouse and Suisun Shrew*. All of these AMMs include elements that avoid or minimize the risk of affecting habitats and species adjacent to work areas. The AMMs are described in detail in BDCP Appendix 3.C.

These commitments are more than sufficient to support the conclusion that the near-term effects of Alternative 9 would be less than significant under CEQA.

#### **Late Long-Term Timeframe**

Based on modeled habitat, the study area supports approximately 35,588 acres of salt marsh harvest mouse modeled habitat. Alternative 9 as a whole would result in effects to 6,968 acres of saltmarsh harvest mouse modeled habitat over the term of the Plan, which would include 5,376 acres of permanent losses and 1,592 acres of habitat conversions. The Plan includes a commitment to restore or create 6,000 acres of tidal brackish emergent wetland, 1,500 acres of which would target middle and high marsh habitat (primary habitat for salt marsh harvest mouse) (TBEWNC1.1, TBEWNC1.2, SMHM1.1, associate with CM4); the protection of 6,500 acres of managed wetlands, 1,500 acres of which would be specifically managed for salt marsh harvest mouse (SMHM1.2 and MWNC1.1, associated with CM3), and the protection and/or restoration of grassland adjacent to tidal restoration (areas within 200 feet of tidal restoration) to provide upland refugia for salt marsh harvest mouse (GNC1.4, associated with CM3 and CM8). Other factors relevant to effects on salt marsh harvest mouse include:

- Tidal restoration actions would not immediately displace salt marsh harvest mouse in managed wetlands as noted in the draft recovery plan for salt marsh harvest mouse because the conversion of managed wetland to tidal marsh would be gradual. Tidal marsh restoration is often accomplished by breaching levees and converting diked nontidal marsh currently occupied by salt marsh harvest mouse populations to tidal wetlands, their historic condition. Conversion of these subsided areas requires sedimentation and accretion over time to restore marsh plains, resulting in a prolonged period (sometimes a decade or more) in which resident mice populations are displaced by uninhabitable aquatic areas (U.S. Fish and Wildlife Service 2010). Despite these temporary adverse effects, the draft recovery plan and Suisun Marsh Plan advocate strongly for restoration of tidal wetlands through the conversion of managed wetlands. These plans are based on the premise that managed wetlands are at high risk of loss of salt marsh harvest mouse habitat from a variety of factors, including flooding from levee failure and cessation of active management (which is often necessary to maintain habitat values in managed wetlands). Therefore, the temporary effects under BDCP are consistent with those deemed acceptable in the draft recovery plan for salt marsh harvest mouse and the Suisun Marsh Plan.

- 1 • In order to ensure that temporal loss as a result of tidal natural communities restoration does  
2 not adversely affect the salt marsh harvest mouse population, restoration in Suisun Marsh  
3 would be carefully phased over time to offset adverse effects of restoration as it occurs, ensure  
4 that short-term population loss is relatively small and incremental, and maintain local source  
5 populations to recolonize newly restored areas. The tidal restoration projects in Suisun Marsh  
6 would be implemented in 150-acre or greater patches that provide viable habitat areas for the  
7 salt marsh harvest mouse habitat consistent with the draft tidal marsh recovery plan (U.S. Fish  
8 and Wildlife Service 2010).
- 9 • The salt marsh harvest mouse population would be monitored during the phasing process (see  
10 BDCP Chapter 3, Section 3.4.4.3.4.), and adaptive management would be applied to ensure  
11 maintenance of the population as described in the BDCP (BDCP Chapter 3, Section 3.4.4.4 and  
12 Section 3.6).
- 13 • The BDCP commits to manage reserve areas so that perennial pepperweed cover is no more  
14 than 10% in tidal brackish emergent wetlands (Objective TBEWNC2.1), which would benefit  
15 pickleweed production in the marsh. Salt marsh harvest mouse depends on pickleweed for  
16 forage and cover.
- 17 • The habitat that would be restored and protected would consist of large blocks of contiguous  
18 tidal brackish emergent wetland that has a large proportion of pickleweed-dominated  
19 vegetation suitable for the species. This would provide greater habitat connectivity and greater  
20 habitat value, which is expected to accommodate larger populations and to therefore increase  
21 population resilience to random environmental events and climate change.

22 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*  
23 *Plant Species*) estimates that the restoration and protection actions discussed above could result in  
24 the restoration of 6,046 acres and the protection of 1,550 acres of modeled habitat for salt marsh  
25 harvest mouse.

26 Alternative 9 would result in substantial modifications to salt marsh harvest mouse habitat in the  
27 absence of other conservation actions. However, with habitat protection, restoration, management,  
28 and enhancement associated with CM3, CM4, CM8 and CM11, guided by species-specific goals and  
29 objectives and by AMM1-AMM5 and AMM26, which would be in place throughout the construction  
30 period, Alternative 9 over the term of the BDCP would not result in a substantial adverse effect  
31 through habitat modifications and would not substantially reduce the number or restrict the range  
32 of the species. Therefore, the alternative would have a less-than-significant impact on salt marsh  
33 harvest mouse.

#### 34 **Impact BIO-159: Indirect Effects of Plan Implementation on Salt Marsh Harvest Mouse**

35 Construction/disturbance activities associated tidal restoration (CM4), grassland restoration (CM8),  
36 and management and enhancement activities (CM11) could result in temporary noise and visual  
37 disturbances to salt marsh harvest mouse occurring within 100 feet of these areas over the term of  
38 the BDCP. These potential effects would be minimized or avoided through AMM1-AMM5, and  
39 AMM26, which would be in effect throughout the term of the Plan.

40 The use of mechanical equipment during the implementation of the conservation measures could  
41 cause the accidental release of petroleum or other contaminants that could affect salt marsh harvest  
42 mouse and its habitat. The inadvertent discharge of sediment could also have a negative effect on

1 the species and its habitat. AMM1–AMM5 would minimize the likelihood of such spills and would  
2 ensure measures are in place to prevent runoff from the construction area and potential effects of  
3 sediment on salt marsh harvest mouse.

4 Thus, BDCP restoration activities that create newly inundated areas could increase bioavailability of  
5 mercury. In general, the highest methylation rates are associated with high tidal marshes that  
6 experience intermittent wetting and drying and associated anoxic conditions (Alpers et al. 2008).  
7 High tidal marsh is considered to be primary habitat for salt marsh harvest mouse and thus the  
8 species could be exposed to methyl mercury in tidal restoration areas. Salt marsh harvest mouse  
9 may be exposed to elemental mercury by feeding on pickleweed, which is found concentrated in the  
10 distal tips of pickleweed leaves (Yee et. al., 2008). Though elemental mercury is less bioavailable  
11 than methylmercury, studies have shown that mercury can become methylated in the anaerobic  
12 portions of the intestinal tract (Rudd et al. 1980, Rieder et al. 2013) and could thus become a  
13 pathway for salt marsh harvest exposure to methylmercury. A study of small mammals residing in  
14 pickleweed around the San Francisco Bay showed an absence of salt marsh harvest mouse where  
15 mercury concentrations measured in house mice (*Mus musculus*) livers were  $\geq 0.19$  ug/g (dry  
16 weight) (Clark et al. 1992). Clark et al (1992) also report that the lack of salt marsh harvest mouse  
17 at these locations are not the result of undetected habitat differences or are by chance. Clarke et al  
18 (1992) suggest that the absence of salt marsh harvest mouse at certain locations may be associated  
19 with higher amounts of mercury and polychlorinated biphenyls (PCBs); however, because their  
20 study didn't analyze contaminants in salt marsh harvest mouse and because (at that time) there was  
21 no data in the literature on contaminants in harvest mice, they could not make conclusions on these  
22 associations. Currently, it is unknown what the exact exposure pathways are or what tissue  
23 concentrations are harmful to the salt marsh harvest mouse.

24 The Suisun Marsh Plan (Bureau of Reclamation et al. 2010) anticipates that tidal wetlands restored  
25 under the plan would generate less methylmercury than the existing managed wetlands. The  
26 potential for salt marsh harvest mouse exposure to methyl mercury in Suisun Marsh may decrease  
27 in the long term because the creation of tidal brackish emergent wetland would predominantly  
28 result from the conversion of managed wetlands. *CM12 Methylmercury Management* includes  
29 provisions for project-specific Mercury Management Plans. Along with avoidance and minimization  
30 measures and adaptive management and monitoring, CM12 could reduce the effects of  
31 methylmercury on salt marsh harvest mouse resulting from BDCP tidal restoration.

32 **NEPA Effects:** Implementation of the AMMs listed above as part of implementing BDCP Alternative 9  
33 would avoid and minimize indirect effects on salt marsh harvest mouse. These AMMs would also  
34 avoid and minimize effects that could substantially reduce the number of salt marsh harvest mouse,  
35 or restrict the species' range. Therefore, the indirect effects of Alternative 9 would not have an  
36 adverse effect on salt marsh harvest mouse.

37 **CEQA Conclusion:** Indirect effects from construction-related noise and visual disturbances could  
38 impact salt marsh harvest mouse within 100 feet of these disturbances. The use of mechanical  
39 equipment during construction could cause the accidental release of petroleum or other  
40 contaminants that could impact salt marsh harvest mouse and its habitat. The inadvertent discharge  
41 of sediment adjacent to salt marsh harvest mouse habitat could also impact the species. With  
42 implementation of AMM1–AMM5 and AMM26 as part of Alternative 9 construction, operation and  
43 maintenance, the BDCP would avoid the potential for substantial adverse effects on salt marsh  
44 harvest mouse, either indirectly or through habitat modifications, in that the BDCP would not result  
45 in a substantial reduction in numbers or a restriction in the range of salt marsh harvest mouse. The

1 indirect effects of BDCP Alternative 9 would have a less-than-significant impact on salt marsh  
2 harvest mouse.

3 Salt marsh harvest mouse could experience indirect effects from increased exposure to  
4 methylmercury as a result of tidal habitat restoration (CM4). With implementation of CM12, the  
5 potential indirect effects of methylmercury would not result in a substantial reduction in numbers  
6 or a restriction in the range of salt marsh harvest mouse, and, therefore, would have a less-than-  
7 significant impact on the species.

## 8 **Suisun Shrew**

9 Primary Suisun shrew habitat consists of all *Salicornia*-dominated natural seasonal wetlands and  
10 certain *Scirpus* and *Typha* communities found within Suisun Marsh only. Low marsh dominated by  
11 *Schoenoplectus acutus* and *S. californicus* and upland transitional zones within 150 feet of the tidal  
12 wetland edge were classified separately as secondary habitat because they are used seasonally  
13 (Hays and Lidicker 2000). All managed wetlands were excluded from the habitat model.  
14 Construction and restoration associated with Alternative 9 conservation measures would result in  
15 effects to modeled Suisun shrew habitat, which would include permanent losses and habitat  
16 conversions (i.e., existing habitat converted to greater or lesser valued habitat for the species post-  
17 restoration) as indicated in Table 12-9-58. All of the effects on the species would take place over an  
18 extended period of time as tidal marsh is restored in the Plan Area. Full implementation of  
19 Alternative 9 would also include the following conservation actions over the term of the BDCP to  
20 benefit Suisun shrew (BDCP Chapter 3, *Conservation Strategy*).

- 21 • Restore or create 6,000 acres of tidal brackish emergent wetland in CZ 11 to be consistent with  
22 the final Recovery Plan for Tidal Marsh Ecosystems of Northern and Central California  
23 (TBEWNC1.1, associated with CM4)
- 24 • Within the 6,000 acres of tidal brackish emergent wetland restored or created, distribute 1,500  
25 acres of middle and high marsh (primary Suisun shrew habitat) to contribute to total (existing  
26 and restored) acreage targets for each complex as specified in the final Recovery Plan for Tidal  
27 Marsh Ecosystems of Northern and Central California (TBEWNC1.2, associated with CM4).
- 28 • Limit perennial pepperweed to no more than 10% cover in the tidal brackish emergent wetland  
29 natural community within the reserve system (TBEWNC2.1).
- 30 • Protect or restore grasslands adjacent to restored tidal brackish emergent wetlands to provide at  
31 least 200 feet of adjacent grasslands beyond the sea level rise accommodation area, which  
32 provides refugia during high tides (GNC1.4, associated with CM3 and CM8).

33 As explained below, with the restoration or protection of these amounts of habitat, impacts on the  
34 Suisun shrew would not be adverse for NEPA purposes and would be less than significant for CEQA  
35 purposes.

1 **Table 12-9-58. Changes in Suisun Shrew Modeled Habitat Associated with Alternative 9 (acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	(CM1 Outside of species range)	0	0	0	0	NA	NA
<b>Total Impacts CM1</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>		
CM2-CM18	<i>Primary</i>	58	60	0	0	0	0
	<i>Secondary</i>	47	342	0	0	0	0
<b>Total Impacts CM2-CM18</b>		<b>105</b>	<b>401</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>TOTAL IMPACTS</b>		<b>105</b>	<b>401</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

<sup>a</sup> See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only.

NT = near-term

LLT = late long-term

NA = not applicable

2

3 **Impact BIO-160: Loss or Conversion of Habitat for and Direct Mortality of Suisun shrew**

4 BDCP tidal restoration (CM4) would be the only conservation measure resulting in loss of habitat to  
5 Suisun shrew. Habitat enhancement and management activities (CM11), which include ground  
6 disturbance or removal of nonnative vegetation, could result in local adverse habitat effects. Each of  
7 these activities is described in detail below. A summary statement of the combined impacts and  
8 NEPA and CEQA conclusions follows the individual conservation measure discussions.

- 9
- 10 • *CM4 Tidal Natural Communities Restoration* would result in effects to 401 acres of Suisun shrew modeled habitat, which would include 377 acres of permanent losses and 24 acres of habitat conversions. Suisun shrew may be displaced temporarily from areas of converted habitat but would ultimately provide suitable habitat for the species. However, all 24 acres would be converted from secondary to primary habitat and therefore over would be a net benefit to the species. The hypothetical restoration footprints overlap with two CNDDDB records for Suisun shrew (California Department of Fish and Wildlife 2013).
  - 16 • *CM11 Natural Communities Enhancement and Management*: As described in the BDCP, the restoration of at least 6,000 acres of tidal brackish emergent wetland would be managed to provide habitat for covered species, including Suisun shrew. A variety of habitat management actions included in *CM11 Natural Communities Enhancement and Management* that are designed to enhance and manage these areas may result in localized ground disturbances that could temporarily remove small amounts of Suisun shrew habitat. The areas of grasslands that would be protected and/or restored within 200 feet of restored tidal marsh would also have enhancement and management actions that would include invasive species control, nonnative
- 23

1 wildlife control, and vegetation management. Ground-disturbing activities, such as removal of  
2 nonnative vegetation are expected to have minor effects on habitat and are expected to result in  
3 overall improvements to and maintenance of Suisun shrew habitat values over the term of the  
4 BDCP. These effects cannot be quantified, but are expected to be minimal and would be avoided  
5 and minimized by the AMMs listed below.

- 6 • Injury and Direct Mortality: The use of heavy equipment and handtools may result in injury or  
7 mortality to Suisun shrew during restoration, enhancement, and management activities.  
8 However, preconstruction surveys, construction monitoring, and other measures would be  
9 implemented to avoid and minimize injury or mortality of this species during these activities, as  
10 required by the AMMs listed below.

11 The following paragraphs summarize the combined effects discussed above and describe other  
12 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA impact conclusions are  
13 also included.

#### 14 ***Near-Term Timeframe***

15 The near-term BDCP conservation strategy has been evaluated to determine whether it would  
16 provide sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that  
17 the effects of near-term covered activities would not be adverse under NEPA. Alternative 9 would  
18 affect 105 acres of Suisun shrew modeled habitat in the study area in the near-term. These effects  
19 include 90 acres of permanent loss and 15 acres of converted habitat, which is all secondary habitat  
20 being converted to primary habitat.

21 The BDCP has committed to near-term goals of restoring 2,000 acres of tidal brackish emergent  
22 wetland and the protection and/or restoration of grasslands within 200 feet of restored tidal  
23 wetlands, of which approximately 150 feet of this area would benefit the species. These Plan goals  
24 represent performance standards for considering the effectiveness of restoration actions. The acres  
25 of tidal restoration and the commitment to protection of adjacent uplands contained in the near-  
26 term Plan goals would keep pace with the loss of habitat and effects to Suisun shrew.

27 Other factors relevant to effects on Suisun shrew are listed below.

- 28 • Restoration would be sequenced and oriented in a manner that minimizes any temporary, initial  
29 loss of habitat and habitat fragmentation.
- 30 • The habitat that would be restored and protected would consist of large blocks of contiguous  
31 tidal brackish emergent wetland that has a large proportion of pickleweed-dominated  
32 vegetation suitable for the species. This would provide greater habitat connectivity and greater  
33 habitat value and quantity, with is expected to accommodate larger populations and to therefore  
34 increase population resilience to random environmental events and climate change.
- 35 • The amount of tidal habitat restored in the near term (2,000 acres) greatly exceeds the amount  
36 permanently lost (105 acres).

37 Because there would be no project level impacts on Suisun shrew from CM1, the analysis of the  
38 effects and conservation actions does not include a comparison to standard ratios used for project  
39 level NEPA analyses.

40 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
41 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*

1 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
2 *Countermeasure Plan, and AMM26 Salt Marsh Harvest Mouse and Suisun Shrew. All of these AMMs*  
3 *include elements that avoid or minimize the risk of affecting habitats and species adjacent to work*  
4 *areas. The AMMs are described in detail in BDCP Appendix 3.C.*

5 ***Late Long-Term Timeframe***

6 Based on modeled habitat, the study area supports approximately 7,515 acres of Suisun shrew  
7 modeled habitat. Alternative 9 as a whole would result in effects on 401 acres of Suisun shrew  
8 modeled habitat over the term of the Plan, which would include 377 acres of permanent losses and  
9 24 acres of habitat conversions (roughly 5% of the habitat in the study area).

10 The Plan includes a commitment to restore or create 6,000 acres of tidal brackish emergent wetland,  
11 1,500 acres of which would target middle and high marsh habitat (primary habitat for Suisun  
12 shrew) (Objectives TBEWNC1.1, TBEWNC1.2, SMHM1.1, associated with CM4) and the protection  
13 and/or restoration of grassland adjacent to tidal restoration (areas within 200 feet of tidal  
14 restoration, of which approximately 150 feet would likely benefit the species) to provide upland  
15 refugia for Suisun shrew (Objectives GNC1.4, associated with CM3 and CM8). Other factors relevant  
16 to effects on Suisun shrew are listed below.

- 17 • Restoration would be sequenced and oriented in a manner that minimizes any temporary, initial  
18 loss of habitat and habitat fragmentation.
- 19 • The habitat that would be restored and protected would consist of large blocks of contiguous  
20 tidal brackish emergent wetland that has a large proportion of pickleweed-dominated  
21 vegetation suitable for the species. This would provide greater habitat connectivity and greater  
22 habitat value and quantity, with is expected to accommodate larger populations and to therefore  
23 increase population resilience to random environmental events and climate change.

24 The amount of tidal habitat restored (6,000 acres) greatly exceeds the amount permanently lost and  
25 converted (401 acres). The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on*  
26 *Covered Wildlife and Plant Species*) estimates that the restoration and protection actions discussed  
27 above could result in the restoration of 6,006 acres and the protection of 232 acres of modeled  
28 habitat for Suisun shrew.

29 ***NEPA Effects:*** In the absence of other conservation actions, the effects on Suisun shrew habitat from  
30 Alternative 9 would represent an adverse effect as a result of habitat modification and potential for  
31 direct mortality of a special-status species. However, the BDCP has committed to habitat protection,  
32 restoration, management, and enhancement with CM3, CM4, CM8, and CM11. This habitat  
33 protection, restoration, management, and enhancement would be guided by biological goals and  
34 objectives and by AMM1–AMM5 and AMM26, which would be in place throughout the construction  
35 period. Considering these commitments, losses and conversions of Suisun shrew habitat and  
36 potential mortality of individuals in the near-term and late long-term under Alternative 9 would not  
37 be an adverse effect.

38

1 **CEQA Conclusion:**

2 **Near-Term Timeframe**

3 The near-term BDCP conservation strategy has been evaluated to determine whether it would  
4 provide sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that  
5 the effects of near-term covered activities would be less than significant under CEQA. Alternative 9  
6 would affect 105 acres of Suisun shrew modeled habitat in the study area in the near-term. These  
7 effects include 90 acres of permanent loss and 15 acres of converted habitat, which is all secondary  
8 habitat being converted to primary habitat.

9 The BDCP has committed to near-term goals of restoring 2,000 acres of tidal brackish emergent  
10 wetland and the protection and/or restoration of grasslands within 200 feet of restored tidal  
11 wetlands, of which approximately 150 feet of this area would benefit the species. These Plan goals  
12 represent performance standards for considering the effectiveness of restoration actions. The acres  
13 of tidal restoration and the commitment to protection of adjacent uplands contained in the near-  
14 term Plan goals would keep pace with the loss of habitat and effects to Suisun shrew.

15 Other factors relevant to effects on Suisun shrew are listed below.

- 16
- 17 • Restoration would be sequenced and oriented in a manner that minimizes any temporary, initial  
loss of habitat and habitat fragmentation.
  - 18 • The habitat that would be restored and protected would consist of large blocks of contiguous  
19 tidal brackish emergent wetland that has a large proportion of pickleweed-dominated  
20 vegetation suitable for the species. This would provide greater habitat connectivity and greater  
21 habitat value and quantity, with is expected to accommodate larger populations and to therefore  
22 increase population resilience to random environmental events and climate change.
  - 23 • The amount of tidal habitat restored in the near term (2,000 acres) greatly exceeds the amount  
24 permanently lost (105 acres).

25 Because there are no project level impacts on Suisun shrew from CM1, the analysis of the effects and  
26 conservation actions does not include a comparison with standard ratios used for project level NEPA  
27 analyses.

28 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*  
29 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*  
30 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
31 *Countermeasure Plan, and AMM26 Salt Marsh Harvest Mouse and Suisun Shrew. All of these AMMs*  
32 *include elements that avoid or minimize the risk of affecting habitats and species adjacent to work*  
33 *areas. The AMMs are described in detail in BDCP Appendix 3.C.*

34 These commitments are more than sufficient to support the conclusion that the near-term effects of  
35 Alternative 9 would be less than significant under CEQA.

36 **Late Long-Term Timeframe**

37 Based on modeled habitat, the study area supports approximately 7,515 acres of Suisun shrew  
38 modeled habitat. Alternative 9 as a whole would result in effects to 401 acres of Suisun shrew  
39 modeled habitat over the term of the Plan, which would include 377 acres of permanent losses and  
40 24 acres of habitat conversions (roughly 5% of the habitat in the study area). The Plan includes a

1 commitment to restore or create 6,000 acres of tidal brackish emergent wetland, 1,500 acres of  
2 which would target middle and high marsh habitat (primary habitat for Suisun shrew) (Objectives  
3 TBEWNC1.1, TBEWNC1.2, and SMHM1.1, associated with CM4), and the protection and/or  
4 restoration of grassland adjacent to tidal restoration (areas within 200 feet of tidal restoration, of  
5 which approximately 150 feet of this area would benefit the species) to provide upland refugia for  
6 Suisun shrew (Objective GNC1.4, associated with CM3 and CM8). Other factors relevant to effects on  
7 Suisun shrew are listed below.

- 8 • Restoration would be sequenced and oriented in a manner that minimizes any temporary, initial  
9 loss of habitat and habitat fragmentation.
- 10 • The habitat that would be restored and protected would consist of large blocks of contiguous  
11 tidal brackish emergent wetland that has a large proportion of pickleweed-dominated  
12 vegetation suitable for the species. This would provide greater habitat connectivity and greater  
13 habitat value and quantity, with is expected to accommodate larger populations and to therefore  
14 increase population resilience to random environmental events and climate change.
- 15 • The amount of tidal habitat restored (6,000 acres) greatly exceeds the amount permanently lost  
16 and converted (401 acres).

17 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*  
18 *Plant Species*) estimates that the restoration and protection actions discussed above could result in  
19 the restoration of 6,006 acres and the protection of 232 acres of modeled habitat for Suisun shrew.

20 Alternative 9 would result in substantial modifications to Suisun shrew habitat in the absence of  
21 other conservation actions. However, with habitat protection, restoration, management, and  
22 enhancement associated with CM3, CM4, CM8, and CM11, guided by species-specific goals and  
23 objectives and by AMM1–AMM5, and AMM26, which would be in place throughout the construction  
24 period, Alternative 9 over the term of the BDCP would not result in a substantial adverse effect  
25 through habitat modifications and would not substantially reduce the number or restrict the range  
26 of the species. Therefore, the alternative would have a less-than-significant impact on Suisun shrew.

### 27 **Impact BIO-161: Indirect Effects of Plan Implementation on Suisun Shrew**

28 Construction/disturbance activities associated tidal restoration (CM4), grassland restoration (CM8),  
29 and management and enhancement activities (CM11) could result in temporary noise and visual  
30 disturbances to Suisun shrew occurring within 100 feet of these areas over the term of the BDCP.  
31 These potential effects would be minimized or avoided through AMM1–AMM5, and AMM26, which  
32 would be in effect throughout the term of the Plan.

33 The use of mechanical equipment during the implementation of the conservation measures could  
34 cause the accidental release of petroleum or other contaminants that could affect Suisun shrew and  
35 its habitat. The inadvertent discharge of sediment could also have a negative effect on the species  
36 and its habitat. AMM1–AMM5 would minimize the likelihood of such spills and would ensure  
37 measures are in place to prevent runoff from the construction area and potential effects of sediment  
38 on Suisun shrew.

39 Tidal marsh restoration has the potential to increase Suisun shrew's exposure to mercury. Mercury  
40 is transformed into the more bioavailable form of methylmercury under anaerobic conditions,  
41 which in the environment typically occurs in sediments subjected to regular wetting and drying  
42 such as tidal marshes and flood plains. Thus, BDCP restoration activities that create newly

1 inundated areas could increase bioavailability of mercury. In general, the highest methylation rates  
2 are associated with high tidal marshes that experience intermittent wetting and drying and  
3 associated anoxic conditions (Alpers et al. 2008). High and mid tidal marsh is considered to be  
4 primary habitat for Suisun shrew and thus the species could be exposed to methylmercury in tidal  
5 restoration areas. Suisun shrew could be exposed to methylmercury by feeding on marsh  
6 invertebrates that may bioaccumulate methylmercury from marsh sediments. Toxic concentrations  
7 of methylmercury have been found in the kidneys of shrews that inhabit contaminated sites and  
8 forage on earthworms and other prey that live within contaminated sediments (Talmage and  
9 Walton 1993; Hinton and Veiga 2002).

10 The Suisun Marsh Plan (Bureau of Reclamation et al. 2010) anticipates that tidal wetlands restored  
11 under the plan would generate less methylmercury than the existing managed wetlands. The  
12 potential for Suisun shrew exposure to methyl mercury in Suisun Marsh may decrease in the long  
13 term because the creation of tidal brackish emergent wetland would predominantly result from the  
14 conversion of managed wetlands. *CM12 Methylmercury Management* includes provisions for  
15 project-specific Mercury Management Plans. Along with avoidance and minimization measures and  
16 adaptive management and monitoring, CM12 could reduce the effects of methylmercury on Suisun  
17 shrew resulting from BDCP tidal restoration.

18 **NEPA Effects:** Implementation of the AMMs listed above as part of implementing BDCP Alternative 9  
19 would avoid and minimize the potential for substantial adverse effects on Suisun shrew, either  
20 indirectly or through habitat modifications. These AMMs would also avoid and minimize effects that  
21 could substantially reduce the number of Suisun shrew, or restrict the species' range. Therefore, the  
22 indirect effects of Alternative 9 would not have an adverse effect on Suisun shrew.

23 **CEQA Conclusion:** Indirect effects from construction-related noise and visual disturbances could  
24 impact Suisun shrew within 100 feet of these disturbances. The use of mechanical equipment during  
25 construction could cause the accidental release of petroleum or other contaminants that could  
26 impact Suisun shrew and its habitat. The inadvertent discharge of sediment adjacent to Suisun  
27 shrew habitat could also impact the species. With implementation of AMM1-AMM5, and AMM26 as  
28 part of Alternative 9 construction, operation and maintenance, the BDCP would avoid the potential  
29 for substantial adverse effects on Suisun shrew, either indirectly or through habitat modifications, in  
30 that the BDCP would not result in a substantial reduction in numbers or a restriction in the range of  
31 Suisun shrew. The indirect effects of BDCP Alternative 9 would have a less-than-significant impact  
32 on Suisun shrew.

33 Suisun shrew could experience indirect effects from increased exposure to methylmercury as a  
34 result of tidal habitat restoration (CM4). With implementation of CM12, the potential indirect effects  
35 of methylmercury would not result in a substantial reduction in numbers or a restriction in the  
36 range of Suisun shrew, and, therefore, would have a less-than-significant impact on the species.

### 37 **San Joaquin Kit Fox and American Badger**

38 Within the study area, the modeled habitat for the San Joaquin kit fox and potential habitat for the  
39 American badger is restricted to 5,327 acres of grassland habitat west of Clifton Court Forebay along  
40 the study area's southwestern edge, in CZ 7- CZ 10. The study area represents the extreme  
41 northeastern corner of the species' range in California, which extends westward and southward  
42 from the study area border. The northern range of the San Joaquin kit fox (including the study area)  
43 was most likely marginal habitat historically and has been further degraded due to development

1 pressures, habitat loss, and fragmentation (Clark et al. 2007). CNDDDB (California Department of Fish  
2 and Wildlife 2013) reports eight occurrences of San Joaquin kit foxes along the extreme western  
3 edge of the Plan Area within CZ 8, south of Brentwood (Figure 12-49). However, Clark et al. (2007)  
4 provide evidence that a number of CNDDDB occurrences in the northern portion of the species' range  
5 may be coyote pups misidentified as San Joaquin kit foxes. Smith et al. (2006) suggest that the  
6 northern range may possibly be a population sink for the San Joaquin kit fox.

7 Construction and restoration associated with Alternative 9 conservation measures would result in  
8 both temporary and permanent losses of San Joaquin kit and American badger habitat (Table 12-9-  
9 59). Grassland restoration, and protection and management of natural communities could affect  
10 modeled San Joaquin kit fox habitat and potential American badger habitat. Full implementation of  
11 Alternative 9 would also include biological objectives over the term of the BDCP to benefit the San  
12 Joaquin kit fox which would also benefit American badger which uses similar habitat (BDCP Chapter  
13 3, *Conservation Strategy*). The conservation strategy for the San Joaquin kit fox involves protecting  
14 and enhancing habitat in the northern extent of the species' range to increase the likelihood that San  
15 Joaquin kit fox may reside and breed in the Plan Area; and providing connectivity to habitat outside  
16 the Plan Area. The conservation measures that would be implemented to achieve the biological goals  
17 and objectives are summarized below.

- 18 • Protect and improve habitat linkages that allow terrestrial covered and other native species to  
19 move between protected habitats within and adjacent to the Plan Area (Objective L3.1,  
20 associated with CM3-8, and CM11).
- 21 • Protect 150 acres of alkali seasonal wetland in CZ 1, CZ 8, and/or CZ 11 among a mosaic of  
22 protected grasslands and vernal pool complex (Objective ASWNC1.1, associated with CM3).
- 23 • Restore or create alkali seasonal wetlands in CZ 1, CZ 8, and/or CZ 11 (up to 72 acres of alkali  
24 seasonal wetland complex restoration) (Objective ASWNC1.2, associated with CM3 and CM9).
- 25 • Protect 600 acres of existing vernal pool complex in CZ 1, CZ 8, and/or CZ 11, primarily in core  
26 vernal pool recovery areas identified in the Recovery Plan for Vernal Pool Ecosystems of  
27 California and Southern Oregon (U.S. Fish and Wildlife Service 2005) (Objective VPNC1.1,  
28 associated with CM3).
- 29 • Restore vernal pool complex in CZ 1, CZ 8, and/or CZ 11 to achieve no net loss of vernal pool  
30 acreage (up to 67 acres of vernal pool complex restoration) (Objective VPNC1.2, associated with  
31 CM3 and CM9).
- 32 • Protect 8,000 acres of grassland (Objective GNC1.1, associated with CM3).
- 33 • Restore 2,000 acres of grasslands to connect fragmented patches of protected grassland  
34 (Objective GNC1.2, associated with CM3 and CM8).
- 35 • Increase burrow availability for burrow-dependent species in grasslands surrounding alkali  
36 seasonal wetlands within restored and protected alkali seasonal wetland complex (Objective  
37 ASWNC2.3, associated with CM11).
- 38 • Increase prey, especially small mammals and insects, for grassland-foraging species in  
39 grasslands surrounding alkali seasonal wetlands within restored and protected alkali seasonal  
40 wetland complex (Objective ASWNC2.4, associated with CM11).

- 1 • Increase burrow availability for burrow-dependent species in grasslands surrounding vernal  
2 pools within restored and protected vernal pool complex (Objective VPNC2.4, associated with  
3 CM11).
- 4 • Increase prey, especially small mammals and insects, for grassland-foraging species in  
5 grasslands surrounding vernal pools within restored and protected vernal pool complex  
6 (Objective VPNC2.5, associated with CM11).
- 7 • Increase burrow availability for burrow-dependent species (Objective GNC2.3, associated with  
8 CM11).
- 9 • Increase prey abundance and accessibility, especially small mammals and insects, for grassland-  
10 foraging species (Objective GNC2.4, associated with CM11).

11 As explained below, with the restoration and protection of these amounts of habitat, in addition to  
12 implementation of AMMs to reduce potential effects, impacts on San Joaquin kit fox and American  
13 badger would not be adverse for NEPA purposes and would be less than significant for CEQA  
14 purposes.

15 **Table 12-9-59. Changes in San Joaquin Kit Fox Modeled Habitat Associated with Alternative 9**  
16 **(acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	Grassland	15	15	10	10	NA	NA
<b>Total Impacts CM1</b>		<b>15</b>	<b>15</b>	<b>10</b>	<b>10</b>		
CM2–CM18	Grassland	3	8	0	0	0	0
<b>Total Impacts CM2–CM18</b>		<b>3</b>	<b>8</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>TOTAL IMPACTS</b>		<b>18</b>	<b>23</b>	<b>10</b>	<b>10</b>	<b>0</b>	<b>0</b>

<sup>a</sup> See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only.

NT = near-term

LLT = late long-term

NA = not applicable

17

18 **Impact BIO-162: Loss or Conversion of Habitat for and Direct Mortality of San Joaquin Kit Fox**  
19 **and American Badger**

20 Alternative 9 conservation measures would result in the permanent and temporary loss combined  
21 of 33 acres of modeled habitat for the San Joaquin kit fox (Table 12-9-59). Because American  
22 badger uses grasslands for denning and foraging and shares the same geographic locations as the  
23 San Joaquin kit fox, effects on are anticipated to be the same as those described for San Joaquin kit  
24 fox. There are no San Joaquin kit fox and no American badger occurrences that overlap with the Plan

1 footprint. Construction of Alternative 9 water conveyance facilities (CM1) and recreation facilities  
2 (CM11) would remove habitat. Habitat enhancement and management activities (CM11) could  
3 result in local adverse effects on species. In addition, construction vehicle activity could cause injury  
4 or mortality of San Joaquin kit foxes and badgers. Each of these individual activities is described  
5 below. A summary statement of the combined impacts and NEPA effects and a CEQA conclusion  
6 follow the individual conservation measure discussions.

- 7 • *CM1 Water Facilities and Operation*: Construction of the conveyance facilities would result in the  
8 permanent loss of approximately 15 acres and the temporary loss of 10 acres of modeled San  
9 Joaquin kit fox habitat and American badger habitat. This habitat is located in areas of  
10 naturalized grassland in a highly disturbed or modified setting on lands immediately adjacent to  
11 Clifton Court Forebay, in CZ 8.
- 12 • *CM11 Natural Communities Enhancement and Management*: The creation of recreational trails  
13 and recreational staging areas would result in the permanent removal of 8 acres of San Joaquin  
14 kit fox modeled habitat. *AMM24 San Joaquin Kit Fox*, would be implemented to ensure that San  
15 Joaquin kit fox dens are avoided, as described in BDCP Appendix 3.C, *Avoidance and*  
16 *Minimization Measures*. Passive recreation in the reserve system could result in disturbance of  
17 San Joaquin kit foxes at their den site. Natal and pupping dens would be particularly vulnerable  
18 to human disturbance. Additionally, disease could be transmitted from domestic dogs that enter  
19 the reserve system with recreational users. However, *AMM37 Recreation* would prohibit  
20 construction of new trails within 250 feet of active San Joaquin kit fox dens. Existing trails would  
21 be closed within 250 feet of active natal/pupping dens until young have vacated, and within 50  
22 feet of other active dens. No dogs would be allowed on reserve units with active San Joaquin kit  
23 fox populations. Rodent control would be prohibited even on grazed or equestrian access areas  
24 with San Joaquin kit fox populations. With these restrictions, recreation-related effects on San  
25 Joaquin kit fox are expected to be minimal.

26 The BDCP would require the protection of grasslands in large patch sizes connected to existing  
27 large areas of grassland, habitat corridors and transition habitat areas to improve the ecological  
28 functions of the grasslands necessary to support the San Joaquin kit fox. American badger is  
29 expected to benefit in a similar fashion.

30 The BDCP would require the enhancement and management of these protected existing  
31 grasslands and restored grasslands to improve their function as a natural community of plants  
32 and wildlife and for associated covered species, including San Joaquin kit fox. The BDCP also  
33 includes actions to improve rodent prey availability.

34 However, management activities could result in injury or mortality of San Joaquin kit fox or  
35 American badger if individuals were present in work sites or if dens were located in the vicinity  
36 of habitat management work sites. A variety of habitat management actions included in *CM11*  
37 that are designed to enhance wildlife values on protected lands may result in localized ground  
38 disturbances that could temporarily remove small amounts of San Joaquin kit fox and American  
39 badger habitat near Clifton Court Forebay, in CZ 8. Ground-disturbing activities, such as removal  
40 of nonnative vegetation and road and other infrastructure maintenance activities, are expected  
41 to have minor effects on available habitat and are expected to result in overall improvements to  
42 and maintenance of San Joaquin kit fox and badger habitat values over the term of the BDCP.  
43 These effects cannot be quantified, but are expected to be minimal and would be avoided and  
44 minimized through the AMMs listed below. These AMMs would remain in effect throughout the  
45 BDCP's construction phase.

- 1       • Operations and maintenance: Ongoing maintenance of BDCP facilities would be expected to have  
2 little if any adverse effect on San Joaquin kit fox or American badger. Postconstruction  
3 operations and maintenance of the above-ground water conveyance facilities and restoration  
4 infrastructure could result in ongoing but periodic disturbances that could affect either species'  
5 use of the surrounding habitat near Clifton Court Forebay, in CZ 8. Maintenance activities would  
6 include vegetation management, levee and structure repair, and regrading of roads and  
7 permanent work areas. These effects, however, would be minimized with implementation of  
8 AMM1–AMM6, AMM10, and AMM24 and with preconstruction surveys for the American badger,  
9 as required by Mitigation Measure BIO-162, *Conduct Preconstruction Survey for American*  
10 *Badger*.
- 11       • Injury and direct mortality: Construction vehicle activity may cause injury to or mortality of  
12 either species. If San Joaquin kit fox or American badger reside where activities take place (most  
13 likely in the vicinity of Clifton Court Forebay, in CZ 8), the operation of equipment for land  
14 clearing, construction, operations and maintenance, and restoration, enhancement, and  
15 management activities could result in injury to or mortality of either species. Measures would be  
16 implemented to avoid and minimize injury to or mortality of these species as described in AMMs  
17 1–6, 10, and 24 (see BDCP Appendix 3.C) and Mitigation Measure BIO-162, *Conduct*  
18 *Preconstruction Survey for American Badger*.

19       The following paragraphs summarize the combined effects discussed above and describe other  
20 BDCP conservation actions that offset or avoid these effects. NEPA effects and a CEQA conclusion are  
21 also included.

## 22       ***Near-Term Timeframe***

23       Because water conveyance facilities construction is being evaluated at the project level, the near-  
24 term BDCP strategy has been analyzed to determine whether it would provide sufficient habitat  
25 protection or restoration in an appropriate timeframe to ensure that the construction effects would  
26 not be adverse under NEPA.

27       Under Alternative 9 there would be a loss of 28 acres of San Joaquin kit fox modeled habitat and  
28 American badger habitat from CM1 (25 acres) and CM11 (3 acres).

29       Typical NEPA project-level mitigation ratio for the natural community that would be affected and  
30 that is identified in the biological goals and objectives for San Joaquin kit fox in Chapter 3 of the  
31 BDCP would be 2:1 for protection of grassland. Using this ratio would indicate that 56 acres of  
32 grassland should be protected for San Joaquin kit fox to mitigate near-term losses.

33       The BDCP has committed to near-term restoration of 58 acres of alkali seasonal wetland (Objective  
34 ASWNC1.2), 40 acres of vernal pool complex (Objective VPNC1.2), and 1,140 acres of grassland  
35 (Objective GNC1.2). In addition, there would be near-term protection of 120 acres of alkali seasonal  
36 wetland (Objective ASWNC1.1), 400 acres of vernal pool complex (Objective VPNC1.1), and 2,000  
37 acres of grassland (Objective GNC1.1). The natural community restoration and protection activities  
38 are expected to be concluded during the first 10 years of Plan implementation, which is close  
39 enough in time to the occurrence of impacts to constitute adequate mitigation for NEPA purposes.  
40 These commitments are more than sufficient to support the conclusion that the near-term effects of  
41 Alternative 9 would be not be adverse under NEPA, because the number of acres required to meet  
42 the typical ratios described above would be only 56 acres of grassland protected.

1 The effects on San Joaquin kit fox and American badger habitat from Alternative 9 as a whole would  
2 represent an adverse effect as a result of habitat modification of a special-status species and  
3 potential for direct mortality in the absence of other conservation actions. However, the effects of  
4 Alternative 9 would be not be adverse with habitat protection, restoration, and management and  
5 enhancement in addition to implementation of *AMM1 Worker Awareness Training, AMM2*  
6 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*  
7 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
8 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
9 *Material, AMM10 Restoration of Temporarily Affected Natural Communities, AMM24 San Joaquin Kit*  
10 *Fox, and AMM37 Recreation. These AMMs include elements that avoid or minimize the risk of*  
11 *construction activity affecting habitat and species adjacent to work areas and storage sites.*  
12 *Remaining effects would be addressed by implementation of Mitigation Measure BIO-162, Conduct*  
13 *Preconstruction Survey for American Badger. BDCP Appendix 3.C describes the AMMs in detail.*

#### 14 **Late Long-Term Timeframe**

15 There are 5,327 acres of modeled San Joaquin kit fox habitat in the study area. Alternative 9 as a  
16 whole would result in the permanent loss of and temporary effects to 33 acres of modeled habitat  
17 for San Joaquin kit fox and potential habitat for American badger representing less than 1% of the  
18 modeled habitat. \

19 With full implementation of the BDCP, at least 1,000 acres of grassland would be protected in CZ 8,  
20 where the San Joaquin kit fox is most likely to occur if present in the Plan Area. Additionally, a  
21 portion of the 2,000 acres of grassland restoration would likely occur in CZ 8. Assuming the restored  
22 grasslands would provide suitable San Joaquin kit fox habitat proportional to the amount of  
23 modeled habitat in this natural community in the Plan Area (6.8% of the grasslands in the Plan Area  
24 consist of modeled San Joaquin kit fox habitat), an estimated 132 acres of restored grasslands would  
25 be suitable for the species (6.6% of 2,000 acres).

26 Because San Joaquin kit fox home ranges are large (ranging from around 1 to 12 square miles; see  
27 BDCP Appendix 2.A, *Covered Species Accounts*), habitat connectivity is key to the conservation of the  
28 species. Grasslands would be acquired for protection in locations that provide connectivity to  
29 existing protected breeding habitats in CZ 8 (Objective L3.1) and to other adjoining San Joaquin kit  
30 fox habitat within and adjacent to the Plan Area. Connectivity to occupied habitat adjacent to the  
31 Plan Area would help ensure the movement of San Joaquin kit foxes, if present, to larger habitat  
32 patches outside of the Plan Area in Contra Costa County. Grassland protection would focus in  
33 particular on acquiring the largest remaining contiguous patches of unprotected grassland habitat,  
34 which are located south of SR 4 in CZ 8 (BDCP Appendix 2.A). This area connects to over 620 acres of  
35 existing habitat that was protected under the East Contra Costa County HCP/NCCP.

36 Grasslands in CZ 8 would also be managed and enhanced to increase prey availability and to  
37 increase mammal burrows, which could benefit the San Joaquin kit fox by increasing potential den  
38 sites, which are a limiting factor for the San Joaquin kit fox in the northern portion of its range  
39 (Objectives ASWNC2.3, ASWNC2.4, VPNC2.4, Objective VPNC2.5, Objective GNC2.3, Objective  
40 GNC2.4). These management and enhancement actions are expected to benefit the San Joaquin kit  
41 fox as well as the American badger by increasing the habitat value of the protected and restoration  
42 grasslands.

1 CZ 8 supports 74% of the modeled San Joaquin kit fox grassland habitat in the study area, and the  
2 remainder of habitat consists of fragmented, isolated patches that are unlikely to support this  
3 species. The BDCP's commitment to protect the largest remaining contiguous habitat patches  
4 (including grasslands and the grassland component of alkali seasonal wetland and vernal pool  
5 complexes) in CZ 8 and to maintain connectivity with the remainder of the satellite population in  
6 Contra Costa County would sufficiently offset the impacts resulting from water conveyance facilities  
7 construction.

8 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*  
9 *Plant Species*) estimates that the restoration and protection actions discussed above, as well as the  
10 restoration of grassland and vernal pool that could overlap with the species model, would result in  
11 the restoration of 131 acres of modeled habitat for San Joaquin kit fox. In addition, protection of  
12 grassland and vernal pool complex could overlap with the species model and would result in the  
13 protection of 1,011 acres of modeled habitat for San Joaquin kit fox.

14 **NEPA Effects:** In the absence of other conservation actions, the effects on San Joaquin kit fox and  
15 American badger habitat from Alternative 9 would represent an adverse effect as a result of habitat  
16 modification and potential direct mortality of special-status species. However, with habitat  
17 protection, restoration, management, and enhancement associated with CM3, CM8, and CM11, and  
18 guided by AMM1–AMM6, AMM10, AMM24, and AMM37, which would be in effect during the  
19 construction period, and with implementation of Mitigation Measure BIO-162, *Conduct*  
20 *Preconstruction Survey for American Badger*, the effects of Alternative 9 as a whole on San Joaquin kit  
21 fox and American badger would not be adverse under NEPA.

## 22 **CEQA Conclusion:**

### 23 **Near-Term Timeframe**

24 Because water conveyance facilities construction (CM1) is being evaluated at the project level, the  
25 near-term BDCP strategy has been analyzed to determine whether it would provide sufficient  
26 habitat protection or restoration in an appropriate timeframe to ensure that the construction  
27 impacts would be less than significant under CEQA.

28 Under Alternative 9 there would be a loss of 28 acres of San Joaquin kit fox modeled habitat and  
29 American badger habitat from CM1 (25 acres) and CM11 (3 acres).

30 Typical CEQA project-level mitigation ratio for the natural community that would be affected and  
31 that is identified in the biological goals and objectives for San Joaquin kit fox in Chapter 3 of the  
32 BDCP would be 2:1 for protection of grassland. Using this ratio would indicate that 56 acres of  
33 grassland should be protected for San Joaquin kit fox to mitigate near-term losses.

34 The BDCP has committed to near-term restoration of 58 acres of alkali seasonal wetland (Objective  
35 ASWNC1.2), 40 acres of vernal pool complex (Objective VPNC1.2), and 1,140 acres of grassland  
36 (Objective GNC1.2). In addition, there would be near-term protection of 120 acres of alkali seasonal  
37 wetland (Objective ASWNC1.1), 400 acres of vernal pool complex (Objective VPNC1.1), and 2,000  
38 acres of grassland (Objective GNC1.1). The natural community restoration and protection activities  
39 are expected to be concluded during the first 10 years of Plan implementation, which is close  
40 enough in time to the occurrence of impacts to constitute adequate mitigation for CEQA purposes.  
41 These commitments are more than sufficient to support the conclusion that the near-term effects of

1 Alternative 9 would not be significant under CEQA, because the number of acres required to meet  
2 the typical ratios described above would be only 56 acres of grassland protected.

3 The BDCP also contains commitments to implement AMM1–AMM6, AMM10, AMM24, and AMM37  
4 which include elements that avoid or minimize the risk of construction activity impacting habitat  
5 and species adjacent to work areas and storage sites. Remaining effects would be addressed by  
6 implementation of Mitigation Measure BIO-162. The AMMs are described in detail in BDCP  
7 Appendix 3.C, *Avoidance and Minimization Measures*.

8 These commitments are more than sufficient to support the conclusion that the near-term effects of  
9 Alternative 9 on San Joaquin kit fox and American badger would be less than significant under CEQA,  
10 because the number of acres required to meet the typical ratios described above would be only 56  
11 acres of grassland protected

### 12 ***Late Long-Term Timeframe***

13 There are 5,327 acres of modeled San Joaquin kit fox habitat in the study area. Alternative 9 as a  
14 whole would result in the permanent loss of and temporary effects to 33 acres of modeled habitat  
15 for San Joaquin kit fox and potential habitat for American badger representing less than 1% of the  
16 modeled habitat.

17 With full implementation of the BDCP, at least 1,000 acres of grassland would be protected in CZ 8,  
18 where the San Joaquin kit fox is most likely to occur if present in the Plan Area. Additionally, a  
19 portion of the 2,000 acres of grassland restoration would likely occur in CZ 8. Assuming the restored  
20 grasslands would provide suitable San Joaquin kit fox habitat proportional to the amount of  
21 modeled habitat in this natural community in the Plan Area (6.8% of the grasslands in the Plan Area  
22 consist of modeled San Joaquin kit fox habitat), an estimated 132 acres of restored grasslands would  
23 be suitable for the species (6.6% of 2,000 acres).

24 Because San Joaquin kit fox home ranges are large (ranging from around 1 to 12 square miles; see  
25 BDCP Appendix 2.A, *Covered Species Accounts*), habitat connectivity is key to the conservation of the  
26 species. Grasslands would be acquired for protection in locations that provide connectivity to  
27 existing protected breeding habitats in CZ 8 (Objective L3.1) and to other adjoining San Joaquin kit  
28 fox habitat within and adjacent to the Plan Area. Connectivity to occupied habitat adjacent to the  
29 Plan Area would help ensure the movement of San Joaquin kit foxes, if present, to larger habitat  
30 patches outside of the Plan Area in Contra Costa County. Grassland protection would focus in  
31 particular on acquiring the largest remaining contiguous patches of unprotected grassland habitat,  
32 which are located south of SR 4 in CZ 8 (BDCP Appendix 2.A). This area connects to over 620 acres of  
33 existing habitat that was protected under the East Contra Costa County HCP/NCCP.

34 Grasslands in CZ 8 would also be managed and enhanced to increase prey availability and to  
35 increase mammal burrows, which could benefit the San Joaquin kit fox by increasing potential den  
36 sites, which are a limiting factor for the San Joaquin kit fox in the northern portion of its range  
37 (Objectives ASWNC2.3, ASWNC2.4, VPNC2.4, Objective VPNC2.5, Objective GNC2.3, Objective  
38 GNC2.4). These management and enhancement actions are expected to benefit the San Joaquin kit  
39 fox as well as the American badger by increasing the habitat value of the protected and restoration  
40 grasslands.

41 CZ 8 supports 74% of the modeled San Joaquin kit fox grassland habitat in the study area, and the  
42 remainder of habitat consists of fragmented, isolated patches that are unlikely to support this

1 species. The BDCP's commitment to protect the largest remaining contiguous habitat patches  
2 (including grasslands and the grassland component of alkali seasonal wetland and vernal pool  
3 complexes) in CZ 8 and to maintain connectivity with the remainder of the satellite population in  
4 Contra Costa County would sufficiently offset the impacts resulting from water conveyance facilities  
5 construction.

6 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*  
7 *Plant Species*) estimates that the restoration and protection actions discussed above, as well as the  
8 restoration of grassland and vernal pool that could overlap with the species model, would result in  
9 the restoration of 131 acres of modeled habitat for San Joaquin kit fox. In addition, protection of  
10 grassland and vernal pool complex could overlap with the species model and would result in the  
11 protection of 1,011 acres of modeled habitat for San Joaquin kit fox.

12 In the absence of other conservation actions, the effects on San Joaquin kit fox and American badger  
13 habitat from Alternative 9 would represent a significant impact as a result of habitat modification  
14 and potential direct mortality of a special-status species. However, with habitat protection,  
15 restoration, management, and enhancement associated with CM3, CM8, and CM11, and guided by  
16 AMM1-AMM6, AMM10, AMM24, and AMM37, which would be in place throughout the time period  
17 of construction, and with implementation of Mitigation Measure BIO-162, the impact of Alternative  
18 9 as a whole on San Joaquin kit fox and American badger would be less than significant. Mitigation  
19 Measure BIO-162: Conduct Preconstruction Survey for American Badger

20 A qualified biologist provided by DWR will survey for American badger concurrent with the  
21 preconstruction survey for San Joaquin kit fox and burrowing owl. If badgers are detected, the  
22 biologist will passively relocate badgers out of the work area prior to construction if feasible. If an  
23 active den is detected within the work area, DWR will avoid the den until the qualified biologist  
24 determines the den is no longer active. Dens that are determined to be inactive by the qualified  
25 biologist will be collapsed by hand to prevent occupation of the den between the time of the survey  
26 and construction activities.

### 27 **Impact BIO-163: Indirect Effects of Plan Implementation on San Joaquin Kit Fox and** 28 **American Badger**

29 Noise and visual disturbances outside the project footprint but within 250 feet of construction  
30 activities could temporarily affect modeled San Joaquin kit fox habitat and potential American  
31 badger. Water conveyance facilities operations and maintenance activities would include vegetation  
32 and weed control, ground squirrel control, canal maintenance, infrastructure and road maintenance,  
33 levee maintenance, and maintenance and upgrade of electrical systems. While maintenance  
34 activities are not expected to remove San Joaquin kit fox and badger habitat, operation of equipment  
35 could disturb small areas of vegetation around maintained structures and could result in injury or  
36 mortality of individual foxes and badgers, if present. Given the remote likelihood of active San  
37 Joaquin kit fox or badger dens in the vicinity of the conveyance facility, the potential for this effect is  
38 small and would further be minimized with the implementation of seasonal no-disturbance buffers  
39 around occupied dens, if any, and other measures as described in AMM24 and Mitigation Measure  
40 BIO-162.

41 **NEPA Effects:** Implementation of the AMMs listed above and Mitigation Measure BIO-162, *Conduct*  
42 *Preconstruction Survey for American Badger*, would avoid the potential for substantial adverse  
43 effects on San Joaquin kit fox or American badger, either indirectly or through habitat modifications.

1 These measures would also avoid and minimize effects that could substantially reduce the number  
2 of San Joaquin kit fox or American badger, or restrict either species' range. Therefore, the indirect  
3 effects of Alternative 9 would not have an adverse effect on San Joaquin kit fox or American badger.

4 **CEQA Conclusion:** Indirect effects from conservation measure operations and maintenance as well  
5 as construction-related noise and visual disturbances could impact San Joaquin kit fox and American  
6 badger. With implementation of AMM1–AMM6, AMM10, AMM24, and AMM37 as part of Alternative  
7 9 construction, operation, and maintenance, the BDCP would avoid the potential for significant  
8 adverse effects on either species, either indirectly or through habitat modifications, and would not  
9 result in a substantial reduction in numbers or a restriction in the range of either species. In  
10 addition, Mitigation Measure BIO-162, *Conduct Preconstruction Survey for American Badger*, would  
11 reduce the impact of indirect effects of Alternative 9 on American badger to a less-than-significant  
12 level.

13 **Mitigation Measure BIO-162: Conduct Preconstruction Survey for American Badger**

14 Please see Mitigation Measure BIO-162 under Impact BIO-162.

15 **San Joaquin Pocket Mouse**

16 Habitat for this species consists of the grassland natural community throughout the Plan Area. The  
17 species requires friable soils for burrowing. Construction and restoration associated with  
18 Alternative 9 conservation measures would result in both temporary and permanent losses of San  
19 Joaquin pocket mouse habitat as indicated in Table 12-9-60. Full implementation of Alternative 9  
20 would also include the following conservation actions over the term of the BDCP that would likely  
21 benefit San Joaquin pocket mouse.

- 22 • Protect 8,000 acres of grasslands (GNC1.1, associated with CM3).
- 23 • Restore 2,000 acres of grasslands to connect fragmented patches of protected grasslands  
24 (GNC1.2, associated with CM8).
- 25 • Restore and sustain a mosaic of grassland vegetation alliances, reflecting localized water  
26 availability, soil chemistry, soil texture, topography, and disturbance regimes, with  
27 consideration of historical states (GNC2.1).

28 As explained below, with the restoration or protection of these amounts of habitat, impacts on San  
29 Joaquin pocket mouse would not be adverse for NEPA purposes and would be less than significant  
30 for CEQA purposes.

31 **Table 12-9-60. Changes in San Joaquin Pocket Mouse Habitat Associated with Alternative 9**  
32 **(acres)<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type	Permanent		Temporary		Periodic <sup>d</sup>	
		NT	LLT <sup>c</sup>	NT	LLT <sup>c</sup>	CM2	CM5
CM1	Grassland	82	82	344	344	NA	NA
<b>Total Impacts CM1</b>		<b>82</b>	<b>82</b>	<b>344</b>	<b>344</b>		
CM2–CM18	Grassland	889	2,057	239	273	385–1,277	514
<b>Total Impacts CM2–CM18</b>		<b>889</b>	<b>2,057</b>	<b>239</b>	<b>273</b>	<b>385–1,277</b>	<b>514</b>
<b>TOTAL IMPACTS</b>		<b>971</b>	<b>2,139</b>	<b>583</b>	<b>617</b>	<b>385–1,277</b>	<b>514</b>

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<sup>a</sup> See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>d</sup> Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

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1 **Impact BIO-164: Loss or Conversion of Habitat for and Direct Mortality of San Joaquin Pocket**  
2 **Mouse**

3 Alternative 9 conservation measures would result in the combined permanent and temporary loss  
4 of up to 2,756 acres of habitat for San Joaquin pocket mouse (of which 2,139 acres would be a  
5 permanent loss and 617 acres would be a temporary loss of habitat, Table 12-9-60). Conservation  
6 measures that would result in these losses are conveyance facilities and transmission line  
7 construction, and establishment and use of borrow and spoil areas (CM1), *CM2 Yolo Bypass Fisheries*  
8 *Enhancement*, *CM4 Tidal Natural Communities Restoration*, *CM5 Seasonally Inundated Floodplain*  
9 *Restoration*, *CM7 Riparian Natural Community Restoration*, *CM9 Vernal Pool and Alkali Seasonal*  
10 *Wetland Complex Restoration*, *CM10 Nontidal Marsh Restoration*, *CM11 Natural Communities*  
11 *Enhancement and Management*, and *CM18 Conservation Hatcheries*. The majority of habitat loss  
12 would result from CM4. Habitat enhancement and management activities (CM11), which include  
13 ground disturbance or removal of nonnative vegetation, could result in local adverse habitat effects.  
14 In addition, maintenance activities associated with the long-term operation of the water conveyance  
15 facilities and other BDCP physical facilities could degrade or eliminate San Joaquin pocket mouse  
16 habitat. Each of these individual activities is described below. A summary statement of the combined  
17 impacts and NEPA and CEQA conclusions follows the individual conservation measure discussions.

- 18 • *CM1 Water Facilities and Operation*: Construction of Alternative 9 conveyance facilities would  
19 result in the combined permanent and temporary loss of up to 426 acres of potential San  
20 Joaquin pocket mouse habitat (82 acres of permanent loss, 344 acres of temporary loss) in CZ 5,  
21 CZ 6, and CZ 8. The majority of grassland that would be removed would be on the existing levees  
22 along the conveyance route. These areas represent poor-value habitat for the species because  
23 most of these areas consists of narrow strips of grass that are often managed to remove  
24 burrowing species.
- 25 • *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo bypass fisheries enhancement  
26 (CM2) would permanently remove 388 acres of potential San Joaquin pocket mouse habitat in  
27 the Yolo Bypass in CZ 2. In addition, 239 acres would be temporarily removed. Most of the  
28 grassland losses would occur at the north end of the bypass below Fremont Weir, along the Toe  
29 Drain/Tule Canal, and along the west side channels.
- 30 • *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration (CM4) site preparation  
31 and inundation would permanently remove an estimated 1,122 acres of potential San Joaquin  
32 pocket mouse habitat. The majority of the losses would likely occur in the vicinity of Cache  
33 Slough, on Decker Island in the West Delta ROA, on the upslope fringes of Suisun Marsh, and

1 along narrow bands adjacent to waterways in the South Delta ROA. Tidal restoration would  
2 directly impact and fragment remaining grassland just north of Rio Vista in and around French  
3 and Prospect Islands, and in an area south of Rio Vista around Threemile Slough.

- 4 ● *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore  
5 seasonally inundated floodplain (CM5) would permanently and temporarily remove  
6 approximately 85 acres of San Joaquin pocket mouse habitat (51 permanent, 34 temporary).  
7 These losses would be expected to occur along the San Joaquin River and other major  
8 waterways in CZ 7.
- 9 ● *CM7 Riparian Natural Community Restoration*: Riparian restoration would impact 410 acres of  
10 grasslands, primarily in CZ 7, as part of tidal natural communities restoration (11 acres) and  
11 seasonal floodplain restoration (399 acres).
- 12 ● *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*: Up to 10 acres of grassland  
13 would be permanently converted to vernal pool complex. The vernal pool and alkali seasonal  
14 wetland restoration would leave intact the grasslands surrounding the vernal pools. Temporary  
15 construction-related disturbance of grassland habitat would result from implementation of *CM9*  
16 in CZ 1, CZ 8, and CZ 11. However, all areas would be restored to their original or higher value  
17 habitat after the construction periods.
- 18 ● *CM11 Natural Communities Enhancement and Management*: The creation of recreational trails  
19 and recreational staging areas would result in the permanent removal of 50 acres of grassland.  
20 The protection of 8,000 acres of grassland for covered species is also expected to benefit San  
21 Joaquin pocket mouse by protecting existing habitats from potential loss or degradation that  
22 otherwise could occur with future changes in existing land use. Habitat management and  
23 enhancement-related activities could cause disturbance to or direct mortality of San Joaquin  
24 pocket mouse if the species is present near work areas.

25 A variety of habitat management actions included in *CM11 Natural Communities Enhancement*  
26 *and Management* that are designed to enhance wildlife values in restored or protected habitats  
27 could result in localized ground disturbances that could temporarily remove small amounts of  
28 San Joaquin pocket mouse habitat. Ground-disturbing activities, such as removal of nonnative  
29 vegetation and road and other infrastructure maintenance activities, would be expected to have  
30 minor adverse effects on habitat and would be expected to result in overall improvements to  
31 and maintenance of habitat values over the term of the BDCP. Noise and visual disturbance from  
32 management-related equipment operation could temporarily displace individuals or alter the  
33 behavior of the species if adjacent to work areas. With full implementation of the BDCP,  
34 enhancement and management actions designed for western burrowing owl would also be  
35 expected to benefit these species. San Joaquin pocket mouse would benefit particularly from  
36 protection of grassland habitat against potential loss or degradation that otherwise could occur  
37 with future changes in existing land use.

- 38 ● *CM18 Conservation Hatcheries*: Implementation of CM18 would remove up to 35 acres of San  
39 Joaquin pocket mouse habitat.
- 40 ● *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground  
41 water conveyance facilities and restoration infrastructure could result in ongoing but periodic  
42 disturbances that could affect San Joaquin pocket mouse use of the surrounding habitat.  
43 Maintenance activities would include vegetation management, levee and structure repair, and

1 re-grading of roads and permanent work areas. These effects, however, would be reduced by  
2 AMMs and conservation actions as described below.

- 3 • Injury and Direct Mortality: Construction could result in direct mortality of San Joaquin pocket  
4 mouse if present in construction areas.

5 The following paragraphs summarize the combined effects discussed above and describe other  
6 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA impact conclusions are  
7 also included.

### 8 ***Near-Term Timeframe***

9 Because the water conveyance facilities construction is being evaluated at the project level, the near-  
10 term BDCP conservation strategy has been evaluated to determine whether it would provide  
11 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the effects of  
12 construction would not be adverse under NEPA. Alternative 9 would remove 1,554 acres of San  
13 Joaquin pocket mouse habitat (971 permanent, 583 temporary) in the study area in the near-term.  
14 These effects would result from the construction of the water conveyance facilities (CM1, 426 acres),  
15 and implementing other conservation measures (*CM2 Yolo Bypass Fisheries Enhancement, CM4 Tidal*  
16 *Natural Communities Restoration, CM5 Seasonally Inundated Floodplain Restoration, CM7 Riparian*  
17 *Natural Community Restoration, CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration,*  
18 *CM11 Natural Communities Enhancement and Management, and CM18 Conservation Hatcheries—*  
19 *1,128 acres).*

20 Typical NEPA project-level mitigation ratios for those natural communities affected by CM1 would  
21 be 2:1 protection of grassland habitat. Using these typical ratios would indicate that 852 acres of  
22 grassland natural communities should be protected to mitigate the CM1 losses of 426 acres of San  
23 Joaquin pocket mouse habitat. The near-term effects of other conservation actions would remove  
24 1,128 acres of modeled habitat, and therefore require 2,256 acres of protection of San Joaquin  
25 pocket mouse habitat using the same typical NEPA and CEQA ratios (2:1 for protection).

26 The BDCP has committed to near-term goals of protecting 2,000 acres and restoring 1,140 acres of  
27 grassland natural community in CZ 1, CZ 2, CZ 4, CZ 5, CZ 7, CZ 8, and CZ 11. The protection and  
28 restoration of grasslands, would result in a contiguous matrix of grassland, alkali seasonal wetland,  
29 and vernal pool natural communities which would expand habitat for San Joaquin pocket mouse and  
30 reduce the effects of current levels of habitat fragmentation. Under *CM11 Natural Communities*  
31 *Enhancement and Management*, San Joaquin pocket mouse would likely benefit from the  
32 management of the grasslands for general wildlife benefit.

33 These natural community biological goals and objectives would inform the near-term protection and  
34 restoration efforts and represent performance standards for considering the effectiveness of  
35 restoration actions for the species. The acres of protection and restoration contained in the near-  
36 term Plan goals would satisfy the typical mitigation ratios that would be applied to the project-level  
37 effects of CM1.

38 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*  
39 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*  
40 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*  
41 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
42 *Material, and AMM10 Restoration of Temporarily Affected Natural Communities.* All of these AMMs

1 include elements that avoid or minimize the risk of affecting habitats and species adjacent to work  
2 areas and RTM storage sites. The AMMs are described in detail in BDCP Appendix 3.C.

### 3 **Late Long-Term Timeframe**

4 Based on the habitat model, the study area supports approximately 78,047 acres of potential habitat  
5 for San Joaquin pocket mouse. Alternative 9 as a whole would result in the permanent loss of and  
6 temporary effects to 2,756 acres of grasslands that could be suitable for San Joaquin pocket mouse  
7 (4% of the habitat in the study area). The locations of these losses are described above in the  
8 analyses of individual conservation measures. The Plan includes a commitment to restore or create  
9 2,000 acres of grassland in CZ 1, 8 and 11 (Objective GNC1.2) and to protect 8,000 acres of grassland  
10 (with at least 2,000 acres protected in CZ 1, at least 1,000 acres in CZ 8, at least 2,000 acres  
11 protected in CZ 11, and the remainder distributed throughout CZ 1, 2, 4, 5, 7, 8, and 11 in the study  
12 area) (Objective GNC1.1). The Plan's commitment to restore grasslands such that they connect  
13 fragmented patches of already protected grasslands (Objective GNC1.2) would improve habitat  
14 connectivity and dispersal abilities of San Joaquin pocket mouse within and outside of the plan area.  
15 All protected habitat would be managed under *CM11 Natural Communities Enhancement and*  
16 *Management*.

17 **NEPA Effects:** In the near-term, the loss of San Joaquin pocket mouse habitat and potential for  
18 direct mortality would not be adverse because the BDCP has committed to protecting and restoring  
19 an acreage that would meet the typical mitigation ratios described above. In the absence of other  
20 conservation actions, the effects on San Joaquin pocket mouse habitat and potential mortality of a  
21 special-status species resulting from Alternative 9 would represent an adverse effect in the late  
22 long-term. However, the BDCP has committed to habitat protection and restoration associated with  
23 CM3, CM8, and CM11. This habitat protection and restoration would be guided by biological goals  
24 and objectives and by AMM1–AMM6 and AMM10, which would be in place throughout the  
25 construction period. Considering these commitments, losses of San Joaquin pocket mouse habitat  
26 and potential mortality under Alternative 9 would not be an adverse effect.

### 27 **CEQA Conclusion:**

#### 28 **Near-Term Timeframe**

29 Because the water conveyance facilities construction is being evaluated at the project level, the near-  
30 term BDCP conservation strategy has been evaluated to determine whether it would provide  
31 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the impacts of  
32 construction would be less than significant. Alternative 9 would remove 1,554 acres of modeled  
33 (971 permanent, 583 temporary) habitat for San Joaquin pocket mouse in the study area in the near-  
34 term. These effects would result from the construction of the water conveyance facilities (CM1, 426  
35 acres), and implementing other conservation measures (*CM2 Yolo Bypass Fisheries Enhancement*,  
36 *CM4 Tidal Natural Communities Restoration*, *CM5 Seasonally Inundated Floodplain Restoration*, *CM7*  
37 *Riparian Natural Community Restoration*, *CM9 Vernal Pool and Alkali Seasonal Wetland Complex*  
38 *Restoration*, *CM11 Natural Communities Enhancement and Management*, and *CM18 Conservation*  
39 *Hatcheries*—1,128 acres).

40 The typical CEQA project-level mitigation ratios for those natural communities affected by CM1  
41 would be 2:1 protection of grassland habitat. Using this ratio would indicate that 852 acres of  
42 grassland natural communities should be protected to mitigate the CM1 losses of 426 acres of San  
43 Joaquin pocket mouse habitat. The near-term effects of other conservation actions would remove

1 1,128 acres of modeled habitat, and therefore require 2,256 acres of protection of San Joaquin  
2 pocket mouse habitat using the same typical NEPA and CEQA ratio (2:1 for protection).

3 The BDCP has committed to near-term goals of protecting 2,000 acres and restoring 1,140 acres of  
4 grassland natural community in CZ 1, CZ 2, CZ 4, CZ 5, CZ 7, CZ 8, and CZ 11. The protection and  
5 restoration of grasslands, would result in a contiguous matrix of grassland, alkali seasonal wetland,  
6 and vernal pool natural communities which would expand habitat for San Joaquin pocket mouse and  
7 reduce the effects of current levels of habitat fragmentation. Under CM11 Natural Communities  
8 Enhancement and Management, San Joaquin pocket mouse would likely benefit from the  
9 management of the grasslands for general wildlife benefit.

10 These natural community biological goals and objectives would inform the near-term protection and  
11 restoration efforts and represent performance standards for considering the effectiveness of  
12 restoration actions for the species. The acres of protection and restoration contained in the near-  
13 term Plan goals would satisfy the typical mitigation ratios that would be applied to the project-level  
14 effects of CM1.

15 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
16 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
17 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
18 *Countermeasure Plan*, and *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
19 *Material*, and *AMM10 Restoration of Temporarily Affected Natural Communities*. All of these AMMs  
20 include elements that avoid or minimize the risk of affecting habitats and species adjacent to work  
21 areas and RTM storage sites. The AMMs are described in detail in BDCP Appendix 3.C.

22 These commitments are more than sufficient to support the conclusion that the near-term effects of  
23 Alternative 9 would be less than significant under CEQA.

#### 24 **Late Long-Term Timeframe**

25 Based on the habitat model, the study area supports approximately 78,047 acres of potential habitat  
26 for San Joaquin pocket mouse. Alternative 9 as a whole would result in the permanent loss of and  
27 temporary impacts on 2,756 acres of grasslands that could be suitable for San Joaquin pocket mouse  
28 (4% of the habitat in the study area). The locations of these losses are described above in the  
29 analyses of individual conservation measures. The Plan includes a commitment to restore or create  
30 2,000 acres of grassland in CZ 1, 8 and 11 (Objective GNC1.2) and to protect 8,000 acres of grassland  
31 (with at least 2,000 acres protected in CZ 1, at least 1,000 acres in CZ 8, at least 2,000 acres  
32 protected in CZ 11, and the remainder distributed throughout CZ 1, 2, 4, 5, 7, 8, and 11 in the study  
33 area) (Objective GNC1.1). The Plan's commitment to restore grasslands such that they connect  
34 fragmented patches of already protected grasslands (Objective GNC1.2) would improve habitat  
35 connectivity and dispersal abilities of San Joaquin pocket mouse within and outside of the plan area.  
36 All protected habitat would be managed under *CM11 Natural Communities Enhancement and*  
37 *Management*.

38 Considering these protection and restoration provisions, which would provide acreages of new  
39 high-value or enhanced habitat in amounts suitable to compensate for habitats lost to construction  
40 and restoration activities, and with implementation of AMM1-AMM6 and AMM10, the loss of habitat  
41 or direct mortality through implementation of Alternative 9 would not result in a substantial  
42 adverse effect through habitat modifications and would not substantially reduce the number or

1 restrict the range of San Joaquin pocket mouse. Therefore, the loss of habitat or potential mortality  
2 under this alternative would have a less-than-significant impact on San Joaquin pocket mouse.

### 3 **Impact BIO-165: Indirect Effects of Plan Implementation on San Joaquin Pocket Mouse**

4 Construction activities associated with water conveyance facilities, conservation components and  
5 ongoing habitat enhancement, as well as operations and maintenance of above-ground water  
6 conveyance facilities, including the transmission facilities, could result in ongoing periodic  
7 postconstruction disturbances and noise with localized effects on San Joaquin kit pocket mouse and  
8 its habitat over the term of the BDCP. These potential effects would be minimized and avoided  
9 through AMM1–AMM6, and AMM10, which would be in effect throughout the plan’s construction  
10 phase.

11 Water conveyance facilities operations and maintenance activities would include vegetation and  
12 weed control, ground squirrel control, canal maintenance, infrastructure and road maintenance,  
13 levee maintenance, and maintenance and upgrade of electrical systems. While maintenance  
14 activities are not expected to remove pocket mouse habitat, operation of equipment could disturb  
15 small areas of vegetation around maintained structures and could result in injury or mortality of  
16 individual pocket mice, if present.

17 **NEPA Effects:** Implementation of the AMMs listed above would avoid the potential for substantial  
18 adverse effects on San Joaquin pocket mouse, either indirectly or through habitat modifications.  
19 These measures would also avoid and minimize effects that could substantially reduce the number  
20 of San Joaquin pocket mouse, or restrict the species’ range. Therefore, the indirect effects of  
21 Alternative 9 would not have an adverse effect on San Joaquin pocket mouse.

22 **CEQA Conclusion:** Indirect effects from conservation measure operations and maintenance as well  
23 as construction-related noise and visual disturbances could impact San Joaquin pocket mouse. With  
24 implementation of AMM1–AMM6 and AMM10, as part of Alternative 9 construction, operation, and  
25 maintenance, the BDCP would avoid the potential for significant adverse effects on either species,  
26 either indirectly or through habitat modifications, and would not result in a substantial reduction in  
27 numbers or a restriction in the range of the species. Therefore, the indirect effects under this  
28 alternative would have a less-than-significant impact on San Joaquin pocket mouse.

### 29 **Special-Status Bat Species**

30 Special-status bat species with potential to occur in the study area employ varied roost strategies,  
31 from solitary roosting in foliage of trees to colonial roosting in trees and artificial structures, such as  
32 tunnels, buildings, and bridges. Various roost strategies could include night roosts, maternity roosts,  
33 migration stopover, or hibernation. The habitat types used to assess effects for special-status bats  
34 roosting habitat includes valley/foothill riparian natural community, developed lands and  
35 landscaped trees, including eucalyptus, palms and orchards. Potential foraging habitat includes all  
36 riparian habitat types, cultivated lands, developed lands, grasslands, and wetlands.

37 There is potential for at least thirteen different bat species to be present in the study area (Figure  
38 12-51), including four California species of special concern and nine species ranked from low to  
39 moderate priority by the Western Bat Working Group (Table 12A-2 in Appendix 12A, *Special-Status*  
40 *Species with Potential to Occur in the Study Area*). In 2009, DHCCP conducted a large-scale effort that  
41 involved habitat assessments, bridge surveys, and passive acoustic monitoring surveys for bats (see

1 Appendix 12C, 2009 to 2011 Bay Delta Conservation Plan EIR/EIS Environmental Data Report for  
2 details on methods and results).

3 The majority of the parcels assessed during field surveys contained bat foraging and roosting  
4 features and were considered highly suitable habitat. At the time of the 2009 field surveys, DWR  
5 biologists initially identified 145 bridges in their survey area. Eleven of the 145 bridges were not  
6 accessible and thirteen were determined to not be suitable for bats. Evidence of bat presence was  
7 observed at six of the bridges and bat sign (guano, urine staining, odor, or vocalizations) was  
8 observed at 26 of the bridges. biologists observed Mexican free-tailed bats at four of the bridges and  
9 unidentified species at the remaining two bridges. One of these bridges, over the Yolo Causeway,  
10 was used by approximately 10,000 Mexican free-tailed bats, indicating a maternity roost. A second  
11 roost site of about 50 individuals was observed under a bridge in eastern Solano County.

12 The remaining 89 bridges contained structural features that were considered conducive to  
13 maternity, solitary, day and/or night roosting. Night roosts may have crevices and cracks but more  
14 often have box beams or other less protected roosting spots where bats rest temporarily while  
15 feeding. Day roosts are commonly found in bridges with expansion joints, crevices, or cracks where  
16 bats are protected from predators and weather. Seventeen bridges in the survey area had no  
17 potential for roosting because they lacked surface features from which bats could hang and offered  
18 no protection from weather or predators.

19 Construction and restoration associated with Alternative 9 conservation measures would result in  
20 both temporary and permanent losses of foraging and roosting habitat for special-status bats as  
21 indicated in Table 12-4-61. Protection and restoration for special-status bat species focuses on  
22 habitats and does not include manmade structures such as bridges. The conservation measures that  
23 would be implemented to achieve the biological goals and objectives that would also benefit special-  
24 status bats are summarized below.

- 25 • Protect or restore 142,200 acres of high-value natural communities (Objective L1.1, associated  
26 with CM3). This objective includes protecting and restoring a variety of habitat types described  
27 below (BDCP Chapter 3, Table 3.3-4).
  - 28 ○ Protect 150 acres of alkali seasonal wetland in CZ 1, CZ 8, and/or CZ 11 among a mosaic of  
29 protected grasslands and vernal pool complex (Objective ASWNC1.1, associated with CM3).
  - 30 ○ Protect 600 acres of existing vernal pool complex (Objective VPNC1.1, associated with  
31 CM3).
  - 32 ○ Protect 8,000 acres of grassland (Objective GNC1.1, associated with CM3).
  - 33 ○ Protect 8,100 acres of managed wetland (Objective MWNC1,1, associated with CM3 and  
34 CM11).
  - 35 ○ Protect 48,625 acres of cultivated lands (Objective CLNC1.1, associated with CM3 and  
36 CM11).
  - 37 ○ Protect, restore, or create 2,740 acres of rice land or equivalent habitat type for the giant  
38 garter snake (Objective GGS3.1, associated with CM3, CM4, and CM10).
  - 39 ○ Restore 2,000 acres of grasslands to connect fragmented patches of protected (Objective  
40 GNC1.2, associated with CM3 and 8).
  - 41 ○ Restore 67 acres of vernal pool complex (Objective VPNC1.2, associated with CM3 and 9).

- 1           ○ Restore and protect 65,000 acres of tidal natural communities (Objective L1.2, associated
- 2           with CM2, 3, and 4).
- 3           ○ Restore or create 5,000 acres of valley/foothill riparian natural community (Objective
- 4           VFRNC1.1, associated with CM3 and CM7).
- 5           ○ Protect 750 acres of existing valley/foothill riparian natural community in CZ 7 by year 10
- 6           (Objective VFRNC1.2, associated with CM3).

7 As explained below, with the restoration and protection of these amounts of habitat, in addition to  
 8 mitigation measures to reduce potential effects, impacts on special-status bats would not be adverse  
 9 for NEPA purposes and would be less than significant for CEQA purposes.

10 **Table 12-9-61. Changes in Special-Status Bat Roosting and Foraging Habitat Associated with**  
 11 **Alternative 9<sup>a</sup>**

Conservation Measure <sup>b</sup>	Habitat Type <sup>c</sup>	Permanent		Temporary		Periodic <sup>e</sup>	
		NT	LLT <sup>d</sup>	NT	LLT <sup>d</sup>	CM2	CM5
CM1	Roosting	74	74	284	284	NA	NA
	Foraging	1,289	1,289	3,583	3,583	NA	NA
<b>Total Impacts CM1</b>		<b>1,363</b>	<b>1,363</b>	<b>3,867</b>	<b>3,867</b>	<b>NA</b>	<b>NA</b>
CM2-CM18	Roosting	524	1,570	167	212	324	411
	Foraging	14,497	60,399	773	2,126	21,265	10,137
<b>Total Impacts CM2-CM18</b>		<b>15,021</b>	<b>61,969</b>	<b>940</b>	<b>2,338</b>	<b>21,589</b>	<b>10,548</b>
<b>TOTAL IMPACTS</b>		<b>16,384</b>	<b>65,391</b>	<b>4,807</b>	<b>6,205</b>	<b>21,589</b>	<b>10,548</b>

<sup>a</sup> See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

<sup>b</sup> See discussion below for a description of applicable CMs.

<sup>c</sup> Affected roosting habitat acreages include valley/foothill riparian habitat and orchards. An unknown number of buildings, bridges, tunnels, and individual trees could also be affected but were not included in this analysis. Foraging habitat includes all natural communities, cultivated lands, and developed lands in the study area. Foraging habitat effects for CM2-CM18 were not considered adverse as they reflect a conversion from one foraging habitat type (mostly cultivated lands) to another foraging habitat (wetlands).

<sup>d</sup> LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

<sup>e</sup> Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as the maximum possible based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

12

13 **Impact BIO-166: Loss or Conversion of Habitat for and Direct Mortality of Special-Status Bats**

14 Alternative 9 conservation measure CM1 would result in the permanent and temporary loss  
 15 combined of up to 358 acres of roosting habitat and 4,872 acres of foraging habitat for special-  
 16 status bats in the study area. DWR identified 12 bridges that could be affected by Alternative 9

1 construction in CM1. Conservation measures Fremont Weir/Yolo Bypass improvements (CM2),  
2 tidal habitat restoration (CM4), and floodplain restoration (CM5) and would result in the permanent  
3 and temporary loss of 1,782 acres of roosting habitat and the conversion of approximately 65,525  
4 acres of foraging habitat from mostly cultivated lands and managed wetlands to tidal and nontidal  
5 wetlands. Foraging habitat effects for CM2-CM18 were not considered adverse as they reflect a  
6 conversion from one foraging habitat type (mostly cultivated lands) to another foraging habitat  
7 (wetlands). Habitat enhancement and management activities (CM11) could result in local adverse  
8 effects. In addition, maintenance activities associated with the long-term operation of the water  
9 conveyance facilities and other BDCP physical facilities could affect special-status bat habitat. A  
10 summary of combined impacts and NEPA effects and a CEQA conclusion follows the individual  
11 conservation measure discussions.

- 12 ● *CM1 Water Facilities and Operation*: Construction of Alternative 9 conveyance facilities would  
13 result in the permanent loss of approximately 74 acres of roosting habitat and 1,289 acres of  
14 foraging habitat in the study area. Development of the water conveyance facilities would also  
15 result in the temporary removal of up to 284 acres of roosting habitat and up to 3,583 acres of  
16 foraging habitat for special-status bats in the study area (Table 12-9-61). DWR identified twelve  
17 bridges within the area of channel dredging, fish screen, and operable barrier that provide  
18 potential roosting habitat that could be affected by construction for CM1. Two of these bridges  
19 had positive sign for bats.
- 20 ● *CM2 Yolo Bypass Fisheries Enhancement*: Improvements in the Yolo Bypass would result in the  
21 conversion of approximately 2,025 acres of foraging habitat into wetlands that could still be  
22 used by bats for foraging. CM2 would also result in the permanent removal of 89 acres and  
23 temporary removal of 167 acres of roosting habitat for special-status bats. The maternity colony  
24 of Mexican free-tailed bats located at both ends of the Yolo Causeway bridge could also be  
25 affected during construction for CM2. Implementation of Mitigation Measure BIO-166, *Conduct*  
26 *Preconstruction Surveys for Roosting Bats and Implement Protective Measures*, would ensure that  
27 improvements in the Yolo Bypass avoid effects on roosting special-status bats.
- 28 ● *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and  
29 inundation would result in the conversion of approximately 56,810 acres of foraging habitat into  
30 wetlands that could still be used by bats for foraging. Approximately 1,425 acres of roosting  
31 habitat for special-status bats would permanently affected. This habitat is of low value,  
32 consisting of a small, isolated patch surrounded by cultivated lands, and the species has a  
33 relatively low likelihood of being present in these areas. The roosting habitat that would be  
34 removed consists of relatively small and isolated patches along canals and irrigation ditches  
35 surrounded by cultivated lands in the Union Island and Roberts Island areas, and several small  
36 patches along the San Joaquin River. Mitigation Measure BIO-166, *Conduct Preconstruction*  
37 *Surveys for Roosting Bats and Implement Protective Measures*, described below, requires that  
38 tidal natural communities restoration avoid effects on roosting special-status bats.
- 39 ● *CM5 Seasonally Inundated Floodplain Restoration*: Levee construction associated with floodplain  
40 restoration would result in the conversion of an estimated 3,690 acres of foraging habitat into  
41 wetlands that could still be used by bats for foraging. CM5 would also result in the permanent  
42 removal of 57 acres and temporary removal of 45 acres of roosting habitat for special-status  
43 bats in the study area.
- 44 ● *CM11 Natural Communities Enhancement and Management*: Implementation of Alternative 9  
45 would result in an overall benefit to special-status bats within the study area through protection

1 and restoration of their foraging and roosting habitats. The majority of affected acres would  
2 convert agricultural land to natural communities with higher potential foraging and roosting  
3 value, such as riparian, tidal and nontidal wetlands, and periodically inundated lands. Restored  
4 foraging habitats primarily would replace agricultural lands. Restored habitats are expected to  
5 be of higher function because the production of flying insect prey species is expected to be  
6 greater in restored wetlands and uplands on which application of pesticides would be reduced  
7 relative to affected agricultural habitats. Noise and visual disturbances during implementation  
8 of riparian habitat management actions could result in temporary disturbances that, if bat roost  
9 sites are present, could cause temporary abandonment of roosts. This effect would be  
10 minimized with implementation of Mitigation Measure BIO-166, *Conduct Preconstruction*  
11 *Surveys for Roosting Bats and Implement Protective Measures.*

- 12 ● Operations and maintenance: Ongoing facilities operation and maintenance is expected to have  
13 little if any adverse effect on special-status bats. Postconstruction operation and maintenance of  
14 the above-ground water conveyance facilities and restoration infrastructure could result in  
15 ongoing but periodic disturbances that could affect special-status bat use of the surrounding  
16 habitat in the Yolo Bypass, the Cache Slough area, and the north and south Delta (CZ 1, CZ 2, CZ  
17 4, CZ 5, CZ 6, CZ 7, and CZ 8). Maintenance activities would include vegetation management,  
18 levee and structure repair, and regrading of roads and permanent work areas. These effects,  
19 however, would be minimized with implementation of the mitigation measures described  
20 below.
- 21 ● Injury and direct mortality: In addition, to habitat loss and conversion, construction activities,  
22 such as grading, the movement of construction vehicles or heavy equipment, and the installation  
23 of water conveyance facilities components and new transmission lines, may result in the direct  
24 mortality, injury, or harassment of roosting special-status bats. Construction activities related to  
25 conservation components could have similar affects. Preconstruction surveys would be  
26 conducted and if roosting or maternity sites are detected, seasonal restrictions would be placed  
27 while bats are present, as described below in the mitigation measures.

28 The following paragraphs summarize the combined effects discussed above and describe other  
29 BDCP conservation actions that offset or avoid these effects. NEPA effects and CEQA conclusions  
30 are also included.

### 31 ***Near-Term Timeframe***

32 Because water conveyance facilities construction is being evaluated at the project level, the near-  
33 term BDCP strategy has been analyzed to determine whether it would provide sufficient habitat  
34 protection or restoration in an appropriate timeframe to ensure that the construction effects would  
35 not be adverse under NEPA. Because the majority of affected acres would convert agricultural land  
36 to natural communities with higher potential foraging and roosting value, such as riparian, tidal and  
37 nontidal wetlands, and periodically inundated lands this analysis focuses only on losses to roosting  
38 habitat for CM1, CM2, and CM4 in the near-term.

39 Alternative 9 would permanently or temporarily affect 1,049 acres of roosting habitat for special-  
40 status bats in the near-term as a result of implementing CM1 (358 acres roosting habitat), CM2  
41 (256 acres roosting habitat), and CM4 (435 acres roosting habitat). Effects from CM5 would all occur  
42 in the late long-term. Most of the roosting habitat losses would occur in an valley/foothill riparian.

1 Typical NEPA project-level mitigation ratios for those natural communities that would be affected  
2 for roosting habitat would be 1:1 for restoration and protection of the valley/foothill riparian  
3 natural community. Using these ratios would indicate that 1,049 acres of riparian habitat should  
4 be restored and 1,049 acres of riparian habitat should be protected.

5 Implementation of BDCP actions in the near-term would result in an overall benefit to special-status  
6 bats within the study area through protection and restoration of their foraging and roosting habitats  
7 (Objective L1.1). BDCP actions in the near-term would restore 800 acres of riparian roosting and  
8 foraging habitat (Objective VFRNC1.1) and 21,288 acres of foraging habitat in natural communities  
9 and developed lands (Objective L1.1, Objective GNC1.2, Objective VPNC1.2, Objective L1.2, and  
10 Objective L2.11). In addition, the BDCP would protect 750 acres of riparian roosting and foraging  
11 habitat (Objective VFRNC1.2) and 41,445 acres of foraging habitat (Objective L1.1, Objective  
12 ASWNC1.1, Objective VPNC1.1, Objective MWNC1.1, Objective CLNC1.1, Objective GGS3.1, and  
13 Objective GNC1.1.). Restored foraging habitats would replace primarily cultivated lands. Restored  
14 habitats are expected to be of higher function because the production of flying insect prey species is  
15 expected to be greater in restored wetlands and uplands on which application of pesticides would  
16 be reduced relative to affected agricultural habitats. Conservation components in the near-term  
17 would sufficiently offset the adverse effects resulting from near-term effects from Alternative 9. In  
18 addition, activities associated with natural communities enhancement and protection and with  
19 ongoing facilities operations and maintenance could affect special-status bat use of surrounding  
20 habitat and could result in harassment, injury or mortality of bats. Mitigation Measure BIO-166,  
21 described below, requires preconstruction surveys to reduce these effects.

22 The BDCP also contains commitments to implement *AMM1 Worker Awareness Training*, *AMM2*  
23 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*  
24 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*  
25 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*  
26 *Material*, and *AMM10 Restoration of Temporarily Affected Natural Communities*. These AMMs include  
27 elements that avoid or minimize the risk of construction activity affecting habitat and species  
28 adjacent to work areas and storage sites. The AMMs are described in detail in BDCP Appendix 3.C,  
29 *Avoidance and Minimization Measures*.

### 30 **Late Long-Term Timeframe**

31 Alternative 9 as a whole would affect 2,140 acres of roosting habitat (Table 12-9-61). Because the  
32 majority of affected acres would convert agricultural land to natural communities with higher  
33 potential foraging and roosting value, such as riparian, tidal and nontidal wetlands, and periodically  
34 inundated lands this analysis focuses only on losses to roosting habitat for CM1, CM2, CM4, and CM5  
35 in the late long-term.

36 Implementation of BDCP actions in the late long-term would result in an overall benefit to special-  
37 status bats within the study area through protection and restoration of approximately 142,200 acres  
38 of their foraging and roosting habitats (Objective L1.1). Achieving this objective is intended to  
39 protect the highest quality natural communities and covered species habitat in the Plan Area to  
40 optimize the ecological value of the reserve system for conserving covered species and native  
41 biodiversity. The target for total protected and restored acreage is based on the sum of all natural  
42 community acreage targets. Achieving this objective is intended to protect and restore natural  
43 communities, species-specific habitat elements, and species diversity on a landscape-scale.,  
44 Achieving this objective is also intended to conserve representative natural and seminatural

1 landscapes in order to maintain the ecological integrity of large habitat blocks, including desired  
2 ecosystem function, and biological diversity.

3 BDCP actions in the late long-term would restore and protect 5,750 acres of riparian roosting and  
4 foraging habitat (Objective VFRNC1.1 and Objective VFRNC1.2), and 136,450 acres of foraging  
5 habitat (Objective L1.1, Objective GNC1.2, Objective VPNC1.2, Objective L1.2, Objective L2.11,  
6 Objective L1.1, Objective ASWNC1.1, Objective VPNC1.1, Objective MWNC1.1, Objective CLNC1.1,  
7 Objective GGS3.1, and Objective GNC1.1,) in natural communities and developed lands. Restored  
8 foraging habitats would replace primarily cultivated lands. Restored habitats are expected to be of  
9 higher function because the production of flying insect prey species is expected to be greater in  
10 restored wetlands and uplands on which application of pesticides would be reduced relative to  
11 affected agricultural habitats.

12  
13 Should any of the special-status bat species be detected roosting in the study area, construction of  
14 water conveyance facilities and restoration activities would have an adverse effect on roosting  
15 special-status bats. Noise and visual disturbances and the potential for injury or mortality of  
16 individuals associated within implementation of the restoration activities on active roosts would be  
17 minimized with implementation of Mitigation BIO-166, *Conduct Preconstruction Surveys for Roosting*  
18 *Bats and Implement Protective Measures*. Conservation components would sufficiently offset the  
19 adverse effects resulting from late long-term effects from CM1, CM2, CM4, and CM5.

20 **NEPA Effects:** In the near-term the losses of roosting habitat for special-status bats associated with  
21 implementing Alternative 9 are not expected to result in substantial adverse effects on special-status  
22 bats, either directly or through habitat modifications, and would not result in a substantial reduction  
23 in numbers or a restriction in the range of special-status bats because the BDCP has committed to  
24 protecting the acreage required to meet the typical mitigation ratios described above. In the late  
25 long-term, the losses of roosting habitat for special-status bats associated with Alternative 9, in the  
26 absence of other conservation actions, would represent an adverse effect as a result of habitat  
27 modification and potential direct mortality of a special-status species. However, with habitat  
28 protection and restoration associated with the conservation components, guided by landscape-scale  
29 goals and objectives and by AMM1-AMM6, and AMM10, and with implementation of Mitigation  
30 Measure BIO-166, the effects of Alternative 9 as a whole on special-status bats would not be adverse

31 **CEQA Conclusion:**

32 **Near-Term Timeframe**

33 Because water conveyance facilities construction is being evaluated at the project level, the near-  
34 term BDCP strategy has been analyzed to determine whether it would provide sufficient habitat  
35 protection or restoration in an appropriate timeframe to ensure that the construction effects would  
36 be less than significant for CEQA purposes. Because the majority of affected acres would convert  
37 agricultural land to natural communities with higher potential foraging and roosting value, such as  
38 riparian, tidal and nontidal wetlands, and periodically inundated lands this analysis focuses only on  
39 losses to roosting habitat for CM1, CM2, and CM4 in the near-term.

40 Alternative 9 would permanently or temporarily affect 1,049 acres of roosting habitat for special-  
41 status bats in the near-term as a result of implementing CM1 (358 acres roosting habitat), CM2 (256

1 acres roosting habitat), and CM4 (435 acres roosting habitat). Effects from CM5 would all occur in  
2 the late long-term. Most of the roosting habitat losses would occur in an valley/foothill riparian.

3 Typical CEQA project-level mitigation ratios for those natural communities that would be affected  
4 for roosting habitat would be 1:1 for restoration and protection of the valley/foothill riparian  
5 natural community. Using these ratios would indicate that 1,049 acres of riparian habitat should  
6 be restored and 1,049 acres of riparian habitat should be protected.

7 Implementation of BDCP actions in the near-term would result in an overall benefit to special-status  
8 bats within the study area through protection and restoration of their foraging and roosting habitats  
9 (Objective L1.1). BDCP actions in the near-term would restore 800 acres of riparian roosting and  
10 foraging habitat (Objective VFRNC1.1) and 21,288 acres of foraging habitat in natural communities  
11 and developed lands (Objective L1.1, Objective GNC1.2, Objective VPNC1.2, Objective L1.2, and  
12 Objective L2.11). In addition, the BDCP would protect 750 acres of riparian roosting and foraging  
13 habitat (Objective VFRNC1.2) and 41,445 acres of foraging habitat (Objective L1.1, Objective  
14 ASWNC1.1, Objective VPNC1.1, Objective MWNC1.1, Objective CLNC1.1, Objective GGS3.1, and  
15 Objective GNC1.1.). Restored foraging habitats would replace primarily cultivated lands. Restored  
16 habitats are expected to be of higher function because the production of flying insect prey species is  
17 expected to be greater in restored wetlands and uplands on which application of pesticides would  
18 be reduced relative to affected agricultural habitats. Conservation components in the near-term  
19 would sufficiently offset the adverse effects resulting from near-term effects from Alternative 9. In  
20 addition, activities associated with natural communities enhancement and protection and with  
21 ongoing facilities operations and maintenance could affect special-status bat use of surrounding  
22 habitat and could result in harassment, injury or mortality of bats. Mitigation Measure BIO-166,  
23 described below, requires preconstruction surveys to reduce these impacts to a less-than-significant  
24 level.

25 The permanent loss of roosting habitat from Alternative 9 would be mitigated through  
26 implementation of Mitigation Measure BIO-166, which would ensure there is no significant impact  
27 under CEQA on roosting special-status bats, either directly or through habitat modifications and no  
28 substantial reduction in numbers or a restriction in the range of special-status bats. The BDCP also  
29 contains commitments to implement AMM1–AMM6 and AMM10. These AMMs include elements that  
30 avoid or minimize the risk of construction activity affecting habitat and species adjacent to work  
31 areas and storage sites. The AMMs are described in detail in BDCP Appendix 3.C, *Avoidance and*  
32 *Minimization Measures*.

### 33 ***Late Long-Term Timeframe***

34 Alternative 9 as a whole would affect 2,140 acres of roosting habitat (Table 12-9-61). Because the  
35 majority of affected acres would convert agricultural land to natural communities with higher  
36 potential foraging and roosting value, such as riparian, tidal and nontidal wetlands, and periodically  
37 inundated lands this analysis focuses only on losses to roosting habitat for CM1, CM2, CM4, and CM5  
38 in the late long-term.

39 Implementation of BDCP actions in the late long-term would result in an overall benefit to special-  
40 status bats within the study area through protection and restoration of approximately 142,200 acres  
41 of their foraging and roosting habitats (Objective L1.1). Achieving this objective is intended to  
42 protect the highest quality natural communities and covered species habitat in the Plan Area to  
43 optimize the ecological value of the reserve system for conserving covered species and native

1 biodiversity. The target for total protected and restored acreage is based on the sum of all natural  
2 community acreage targets. Achieving this objective is intended to protect and restore natural  
3 communities, species-specific habitat elements, and species diversity on a landscape-scale.,  
4 Achieving this objective is also intended to conserve representative natural and seminatural  
5 landscapes in order to maintain the ecological integrity of large habitat blocks, including desired  
6 ecosystem function, and biological diversity.

7 BDCP actions in the late long-term would restore and protect 5,750 acres of riparian roosting and  
8 foraging habitat (Objective VFRNC1.1 and Objective VFRNC1.2), and 136,450 acres of foraging  
9 habitat (Objective L1.1, Objective GNC1.2, Objective VPNC1.2, Objective L1.2, Objective L2.11,  
10 Objective L1.1, Objective ASWNC1.1, Objective VPNC1.1, Objective MWNC1.1, Objective CLNC1.1,  
11 Objective GGS3.1, and Objective GNC1.1,) in natural communities and developed lands. Restored  
12 foraging habitats would replace primarily cultivated lands. Restored habitats are expected to be of  
13 higher function because the production of flying insect prey species is expected to be greater in  
14 restored wetlands and uplands on which application of pesticides would be reduced relative to  
15 affected agricultural habitats. Should any of the special-status bat species roost in the study area,  
16 construction of water conveyance facilities and restoration activities could have an adverse effect on  
17 roosting special-status bats. Noise and visual disturbances and the potential for injury or mortality  
18 of individuals associated within implementation of construction activities would be minimized with  
19 implementation of Mitigation Measure BIO-166, *Conduct Preconstruction Surveys for Roosting Bats*  
20 *and Implement Protective Measures*. Conservation components would sufficiently offset the adverse  
21 effects resulting from late long-term effects from CM1, CM2, CM4, and CM5.

22 The permanent loss of roosting habitat from Alternative 9 would be mitigated through  
23 implementation of Mitigation Measure BIO-166, which would ensure that there would be no  
24 significant impact on roosting special-status bats, either directly or through habitat modifications,  
25 and that there would be no substantial reduction in numbers or a restriction in the range of special-  
26 status bats. Therefore, Alternative 9 would not result in a significant impact on special-status bats  
27 under CEQA.

28 **Mitigation Measure BIO-166: Conduct Preconstruction Surveys for Roosting Bats and**  
29 **Implement Protective Measures**

30 The following measure was designed to avoid and minimize adverse effects on special-status  
31 bats. However, baseline data are not available or are limited on how bats use the study area, and  
32 on individual numbers of bats and how they vary seasonally. Therefore, it is difficult to  
33 determine if there would be a substantial reduction in species numbers. Bat species with  
34 potential to occur in the study area employ varied roost strategies, from solitary roosting in  
35 foliage of trees to colonial roosting in trees and artificial structures, such as buildings and  
36 bridges. Daily and seasonal variations in habitat use are common. To obtain the highest  
37 likelihood of detection, preconstruction bat surveys will be conducted by DWR and will include  
38 these components.

- 39
- 40 ● Identification of potential roosting habitat within project area.
  - 41 ● Daytime search for bats and bat sign in and around identified habitat.
  - 42 ● Evening emergence surveys at potential day-roost sites, using night-vision goggles and/or  
active full-spectrum acoustic monitoring where species identification is sought.

- 1           ● Passive full-spectrum acoustic monitoring and analysis to detect bat use of the area from  
2           dusk to dawn over multiple nights.
- 3           ● Additional on-site night surveys as needed following passive acoustic detection of special  
4           status bats to determine nature of bat use of the structure in question (e.g., use of structure  
5           as night roost between foraging bouts).
- 6           ● Qualified biologists will have knowledge of the natural history of the species that could  
7           occur in the study area and experience using full-spectrum acoustic equipment. During  
8           surveys, biologists will avoid unnecessary disturbance of occupied roosts.

9           ***Preconstruction Bridges and Other Structure Surveys***

10          Before work begins on the bridge/structure, qualified biologists will conduct a daytime search for  
11          bat sign and evening emergence surveys to determine if the bridge/structure is being used as a  
12          roost. Biologists conducting daytime surveys would listen for audible bat calls and would use naked  
13          eye, binoculars, and a high-powered spotlight to inspect expansion joints, weep holes, and other  
14          bridge features that could house bats. Bridge surfaces and the ground around the bridge/structure  
15          would be surveyed for bat sign, such as guano, staining, and prey remains.

16          Evening emergence surveys will consist of at least one biologist stationed on each side of the  
17          bridge/structure watching for emerging bats from a half hour before sunset to 1–2 hours after  
18          sunset for a minimum of two nights within the season that construction would be taking place.  
19          Night-vision goggles and/or full-spectrum acoustic detectors shall be used during emergence  
20          surveys to assist in species identification. All emergence surveys would be conducted during  
21          favorable weather conditions (calm nights with temperatures conducive to bat activity and no  
22          precipitation predicted).

23          Additionally, passive monitoring with full-spectrum bat detectors will be used to assist in  
24          determining species present. A minimum of four nights of acoustic monitoring surveys will be  
25          conducted within the season that the construction would be taking place. If site security allows,  
26          detectors should be set to record bat calls for the duration of each night. To the extent possible, all  
27          monitoring will be conducted during favorable weather conditions (calm nights with temperatures  
28          conducive to bat activity and no precipitation predicted). The biologists will analyze the bat call data  
29          using appropriate software and prepare a report with the results of the surveys. If acoustic data  
30          suggest that bats may be using the bridge/structure as a night roost, biologists will conduct a night  
31          survey from 1–2 hours past sunset up to 6 hours past sunset to determine if the bridge is serving as  
32          a colonial night roost.

33          If suitable roost structures would be removed, additional surveys may be required to determine  
34          how the structure is used by bats, whether it is as a night roost, maternity roosts, migration  
35          stopover, or for hibernation.

36          ***Preconstruction Tree Surveys***

37          If tree removal or trimming is necessary, qualified biologists will examine trees to be removed or  
38          trimmed for suitable bat roosting habitat. High-value habitat features (large tree cavities, basal  
39          hollows, loose or peeling bark, larger snags, palm trees with intact thatch, etc.) will be identified and  
40          the area around these features searched for bats and bat sign (guano, culled insect parts, staining,  
41          etc.). Riparian woodland, orchards, and stands of mature broadleaf trees should be considered  
42          potential habitat for solitary foliage roosting bat species.

1 If bat sign is detected, biologists will conduct evening visual emergence survey of the source habitat  
2 feature, from a half hour before sunset to 1–2 hours after sunset for a minimum of two nights within  
3 the season that construction would be taking place. Methodology should follow that described above  
4 for the bridge emergence survey.

5 Additionally, if suitable tree roosting habitat is present, acoustic monitoring with a bat detector will  
6 be used to assist in determining species present. These surveys would be conducted in coordination  
7 with the acoustic monitoring conducted for the bridge/structure.

### 8 ***Protective Measures for Bats using Bridges/Structures and Trees***

9 Avoidance and minimization measures may be necessary if it is determined that bats are using the  
10 bridge/structure or trees as roost sites and/or sensitive bats species are detected during acoustic  
11 monitoring. Appropriate measures will be determined in coordination with CDFW and may include  
12 measures listed below.

- 13 ● Disturbance of the bridge will be avoided between April 15 and September 15 (the  
14 maternity period) to avoid impacts on reproductively active females and dependent young.
- 15 ● Installation of exclusion devices from March 1 through April 14 or September 15 through  
16 October 30 to preclude bats from occupying the bridge during construction. Exclusionary  
17 devices will only be installed by or under the supervision of an experienced bat biologist.
- 18 ● Tree removal will be avoided between April 15 and September 15 (the maternity period) to  
19 avoid impacts on pregnant females and active maternity roosts (whether colonial or  
20 solitary).
- 21 ● All tree removal will be conducted between September 15 and October 30, which  
22 corresponds to a time period when bats have not yet entered torpor or would be caring for  
23 non-volant young.
- 24 ● Trees will be removed in pieces, rather than felling the entire tree.
- 25 ● If a maternity roost is located, whether solitary or colonial, that roost will remain  
26 undisturbed until September 15 or until a qualified biologist has determined the roost is no  
27 longer active.
- 28 ● All tree removal will be conducted between September 15 and October 30, which  
29 corresponds to a time period when bats would not likely have entered winter hibernation  
30 and would not be caring for flightless young. If weather conditions remain conducive to  
31 regular bat activity beyond October 30<sup>th</sup>, later tree removal may be considered in  
32 consultation with CDFW.
- 33 ● Trees will be removed in pieces, rather than felling the entire tree.
- 34 ● If a maternity roost is located, whether solitary or colonial, that roost will remain  
35 undisturbed with a buffer as determined in consultation with CDFW until September 15 or  
36 until a qualified biologist has determined the roost is no longer active.
- 37 ● If a non-maternity roost is found, that roost will be avoided and an appropriate buffer  
38 established in consultation with CDFW. Every effort should be made to avoid the roost, as  
39 methods to evict bats from trees are largely untested. However, if the roost cannot be  
40 avoided, eviction will be attempted and procedures designed in consultation with CDFW to  
41 reduce the likelihood of mortality of evicted bats. In all cases:

- 1           ○ Eviction will not occur before September 15<sup>th</sup> and will match the timeframe for tree  
2           removal approved by CDFW.
- 3           ○ Qualified biologists will carry out or oversee the eviction tasks and monitor the tree  
4           trimming/removal.
- 5           ○ Eviction will take place late in the day or in the evening to reduce the likelihood of  
6           evicted bats falling prey to diurnal predators.
- 7           ○ Eviction will take place during weather and temperature conditions conducive to bat  
8           activity.
- 9           ○ Special-status bat roosts will not be disturbed.
- 10          Eviction procedures may include but are not limited to:
- 11          ○ Pre-eviction surveys to obtain data to inform the eviction approach and subsequent  
12          mitigation requirements. Relevant data may include the species, sex, reproductive status  
13          and/or number of bats using the roost, and roost conditions themselves such as  
14          temperature and dimensions. Surveys may include visual emergence, night vision,  
15          acoustic, and/or capture.
- 16          ○ Structural changes may be made to the roost, performed without harming bats, such  
17          that the conditions in the roost are undesirable to roosting bats and the bats leave on  
18          their own (e.g., open additional portals so that temperature, wind, light and  
19          precipitation regime in the roost change).
- 20          ○ Non-injurious harassment at the roost site to encourage bats to leave on their own, such  
21          as ultrasound deterrents or other sensory irritants.
- 22          ● Prior to removal/trimming, after other eviction efforts have been attempted, any confirmed  
23          roost tree would be shaken, repeatedly struck with a heavy implement such as an axe and  
24          several minutes should pass before felling trees or trimming limbs to allow bats time to  
25          arouse and leave the tree. The biologists should search downed vegetation for dead and  
26          injured bats. The presence of dead or injured bats will be reported to CDFW.

27          Compensatory mitigation for the loss of roosting habitat will also be determined through  
28          consultation with CDFW and may include the construction and installation of suitable  
29          replacement habitat onsite. Depending on the species and type of roost lost, various roost  
30          replacement habitats have met with some success (e.g., bat houses, “bat bark,” planting  
31          cottonwood trees, leaving palm thatch in place rather than trimming). The creation of natural  
32          habitat onsite is generally preferable to artificial.

33          Artificial roosts are often unsuccessful, and care must be taken to determine as closely as  
34          possible the conditions in the natural roost to be replaced. Even with such care, artificial habitat  
35          may fail. Several artificial roosts have been highly successful in replacing bridge roost habitat  
36          when incorporated into new bridge designs. “Bat bark” has been successfully used by Arizona  
37          Department of Game and Fish to create artificial crevice-roosting bat habitat mounted on pine  
38          trees (Mering and Chambers 2012: 765). Bat houses have at best an inconsistent track record  
39          but information is mounting on how to create successful houses. There is no single protocol or  
40          recipe for bat-house success. Careful study of the roost requirements of the species in question;  
41          the particular conditions at the lost roost site including temperature, orientation of the

1 openings, airflow, internal dimensions and structures (cavity vs. crevice, etc.) should increase  
2 the chances of designing a successful replacement.

3 Restoring riparian woodland with plantings shows signs of success in Colorado. Western red bat  
4 activity has been positively correlated with increased vegetation and tree growth, canopy  
5 complexity and restoration acreage at cottonwood-willow restoration sites along the Lower  
6 Colorado River (Broderick 2012: 39). These complex woodland areas would ultimately provide  
7 a wider range of bat species with preferred roost types, including both foliage-roosting and  
8 crevice-/cavity-roosting bats.

### 9 **Impact BIO-167: Indirect Effects of Plan Implementation on Special-Status Bats**

10 Construction activities associated with water conveyance facilities, conservation components and  
11 ongoing habitat enhancement, as well as operations and maintenance of above-ground water  
12 conveyance facilities, including the transmission facilities, could result in ongoing periodic  
13 postconstruction disturbances and noise with localized effects on special-status bats and their  
14 roosting habitat over the term of the BDCP.

15 Water conveyance facilities operations and maintenance activities would include vegetation and  
16 weed control, ground squirrel control, canal maintenance, infrastructure and road maintenance,  
17 levee maintenance, and maintenance and upgrade of electrical systems. While maintenance  
18 activities are not expected to remove special-status bat habitat, operation of equipment could  
19 disturb small areas of vegetation around maintained structures and could result in disturbances to  
20 roosting bats, if present. Mitigation Measure BIO-166, *Conduct Preconstruction Surveys for Roosting  
21 Bats and Implement Protective Measures*, is available to address these adverse effects.

22 Increased exposure to methylmercury associated with tidal natural communities restoration would  
23 potentially indirectly affect special-status bat species. *CM12 Methylmercury Management* describes  
24 the process by which tidal natural communities restoration may increase methyl mercury levels in  
25 wetlands in the study area. Mercury has been found in high concentrations in some bat species, such  
26 as the Indiana bat. Many bat species forage heavily on aquatic insects, which might result in rapid  
27 bioaccumulation (Evers et al. 2012). Measures described in *CM12 Methylmercury Management* are  
28 expected to reduce the effects of methylmercury on special-status bat species resulting from BDCP  
29 tidal natural communities restoration.

30 **NEPA Effects:** Implementation of the Mitigation Measure BIO-166 for special-status bats would  
31 avoid the potential for substantial adverse effects on roosting special-status bats, either indirectly or  
32 through habitat modifications. This mitigation measure would also avoid and minimize effects that  
33 could substantially reduce the number of special-status bats, or restrict species' range. Therefore,  
34 the indirect effects of Alternative 9 would not have an adverse effect on special-status bats.

35 **CEQA Conclusion:** Indirect effects from conservation components operations and maintenance as  
36 well as construction-related noise and visual disturbances could have a significant impact on  
37 special-status bat species, either indirectly or through habitat modifications. Mitigation Measure  
38 BIO-166, *Conduct Preconstruction Surveys for Roosting Bats and Implement Protective Measures*,  
39 would reduce this impact to a less-than-significant level and ensure Alternative 9 would not result in  
40 a substantial reduction in numbers or a restriction in the range of species.

1           **Mitigation Measure BIO-166: Conduct Preconstruction Surveys for Roosting Bats and**  
2           **Implement Protective Measures**

3           See Mitigation Measure BIO-166 under Impact BIO-166.

4           **Impact BIO-168: Periodic Effects of Inundation of Special-Status Bat Habitat as a Result of**  
5           **Implementation of Conservation Components**

6           Flooding of the Yolo Bypass from *CM2 Yolo Bypass Fisheries Enhancement* would periodically affect  
7           324 acres of roosting habitat and 21,265 acres of foraging habitat for special-status bats in the study  
8           area (Table 12-9-61).

9           *CM5 Seasonally Inundated Floodplain Restoration* would periodically inundate up to 411 acres of  
10          roosting habitat and 10,137 acres of foraging habitat for special-status bats (Table 12-9-61).

11          Potential roosting trees are likely to be retained within seasonally flooded areas, although high  
12          velocity flooding could uproot some trees. Seasonal flooding would not adversely affect foraging  
13          habitat for the species. The overall effect of seasonal inundation in existing riparian natural  
14          communities may instead be beneficial. Historically, flooding was the main natural disturbance  
15          regulating ecological processes in riparian areas, and flooding promotes the germination and  
16          establishment of many native riparian plants. In the late long-term, seasonal inundation in areas  
17          currently occupied by riparian vegetation may contribute to the establishment of high-value habitat  
18          for special-status bats that use riparian habitats.

19          **NEPA Effects:** Periodic effects on roosting and foraging habitat for special-status bats associated  
20          with implementing Alternative 9 are not expected to result in substantial adverse effects on special-  
21          status bats, either directly or through habitat modifications and would not result in a substantial  
22          reduction in numbers or a restriction in the range of special-status bats. Mitigation Measure BIO-  
23          166, *Conduct Preconstruction Surveys for Roosting Bats and Implement Protective Measures*, is  
24          available to address any effects of periodic inundation on special-status bats and roosting habitat.  
25          Therefore, Alternative 9 would not adversely affect the species.

26          **CEQA Conclusion:** Periodic inundation under CM2 and floodplain restoration under CM5 would  
27          periodically affect foraging and roosting habitat for special-status bats in the study area. Any impact  
28          of periodic inundation on special-status bats would be mitigated through implementation of  
29          Mitigation Measure BIO-166, *Conduct Preconstruction Surveys for Roosting Bats and Implement*  
30          *Protective Measures*, which would ensure there is no significant impact on roosting special-status  
31          bats, either directly or through habitat modifications and no substantial reduction in numbers or a  
32          restriction in the range of special-status bats.

33           **Mitigation Measure BIO-166: Conduct Preconstruction Surveys for Roosting Bats and**  
34           **Implement Protective Measures**

35           See Mitigation Measure BIO-166 under Impact BIO-166.

36           **Plant Species**

37           The effects of constructing the water conveyance facilities under Alternative 9 would be  
38           substantially different than under any of the other alternatives. However, effects of implementing  
39           habitat restoration would be the same as under Alternative 1A.

1       **Vernal Pool Plants**

2       Five covered plant species and 12 noncovered special-status plant species occur in vernal pools in  
3       the study area (Tables 12-2, 12-3, summarized in Table 12-9-62). The vernal pool habitat model  
4       used for the impact analysis was based on vegetation types and associations from various data sets  
5       which were used to create maps showing the distribution of vernal pool habitat in the study area  
6       according to three habitat types in which the species are known to occur, including vernal pool  
7       complex and degraded vernal pool complex, and alkali seasonal wetland habitat. Vernal pool  
8       complex habitat consists of vernal pools and uplands that display characteristic vernal pool and  
9       swale visual signatures that have not been significantly impacted by agricultural or development  
10      practices. Degraded vernal pool complex habitat consists of habitat that ranges from areas with  
11      vernal pool and swale visual signatures that display clear evidence of significant disturbance due to  
12      plowing, discing, or leveling to areas with clearly artificial basins such as shallow agricultural  
13      ditches, depressions in fallow fields, and areas of compacted soils in pastures. Because wetlands in  
14      the degraded vernal pool complex are inundated during the wet season and may have historically  
15      been located in or near areas with natural vernal pool complex, they may support individuals or  
16      small populations of species that are found in vernal pools and swales. However, they do not possess  
17      the full complement of ecosystem and community characteristics of natural vernal pools, swales and  
18      their associated uplands and they are generally ephemeral features that are eliminated during the  
19      course of normal agricultural practices. A small amount of alkali seasonal wetland habitat was  
20      included in the model because alkaline vernal pools are also present in some areas mapped as alkali  
21      seasonal wetland.

22      Because each of the vernal pool species addressed in this EIR/EIS have specific microhabitat  
23      affinities, and because vernal pool habitat within the study area is highly heterogeneous with  
24      respect to habitat parameters such as soil type and pool depth, the vernal pool habitat model greatly  
25      overestimates the extent of habitat in the study area occupied by each species. However, the vernal  
26      pool habitat model is likely to encompass all or most of the potential area within which special-  
27      status vernal pool plant species would occur. Therefore, it is not likely to underestimate the extent  
28      of occupied habitat or to underestimate the effects of Alternative 9.

29      Full implementation of Alternative 9 would include the following conservation actions over the term  
30      of the BDCP to benefit covered vernal pool plants (BDCP Chapter 3, Section 3.3, *Biological Goals and*  
31      *Objectives*).

- 32      • Protect two currently unprotected occurrences of alkali milk-vetch in the Altamont Hills or  
33      Jepson Prairie core recovery areas (Objective VPP1.1, associated with CM3).
- 34      • Maintain no net loss of Heckard's peppergrass in Conservation Zones 1, 8, or 11 within  
35      restoration sites or within the area of affected tidal range of restoration projects (Objective  
36      VPP1.2, associated with CM3 and CM9).

37      The restoration activities covered under Alternative 9 could have impacts on special-status vernal  
38      pool plants. No modeled habitat and no known occurrences of the 17 vernal pool plants are within  
39      the proposed footprint for the Alternative 9 water conveyance facilities. Modeled vernal pool habitat  
40      would be affected by tidal habitat restoration, although no known occurrences of 17 vernal pool  
41      plants are within the hypothetical footprint for restoration activities. Table 12-9-62 summarizes the  
42      acreage of modeled vernal pool habitat in the study area, the number of occurrences of each special-  
43      status vernal pool plant in the study area, and the potential effects.

1 **Table 12-9-62. Summary of Impacts on Vernal Pool Plants under Alternative 9**

	Acres in Study Area	Acres Affected	Occurrences in Study Area	Occurrences Affected	Impacts
<b>Modeled Habitat</b>					
Vernal pool complex	9,557	1			Habitat loss from tidal habitat restoration
Degraded vernal pool complex	2,576	370			Habitat loss from tidal habitat restoration
Alkali Seasonal Wetland	188	0			None
Total	12,321	372			
<b>Covered Species</b>					
Alkali milk-vetch			16	0	None
Dwarf downingia			12	0	None
Boggs Lake hedge-hyssop			1	0	None
Legenere			8	0	None
Heckard's peppergrass			4 <sup>a</sup>	0	None
<b>Noncovered Species</b>					
Ferris' milk-vetch			6	0	None
Vernal pool smallscale			2	0	None
Hogwallow starfish			0	0	None
Ferris' goldfields			4	0	None
Contra Costa goldfields			7	0	None
Cotula-leaf navarretia			5	0	None
Baker's navarretia			3	0	None
Colusa grass			1	0	None
Bearded popcorn-flower			5	0	None
Delta woolly marbles			3	0	None
Saline clover			9	0	None
Solano grass			1	0	None

<sup>a</sup> One additional occurrence is in alkali seasonal wetlands.

2

3 **Impact BIO-169: Effects on Habitat and Populations of Vernal Pool Plants**

4 Alternative 9 could affect habitat for special-status vernal pool plants. The individual effects of each  
5 relevant conservation measure are addressed below. A summary statement of the combined impacts  
6 and NEPA and CEQA conclusions follows the individual conservation measure discussions.

- 7
- 8 • *CM1 Water Facilities and Operations*: No modeled habitat and no known occurrences of the 17  
9 vernal pool plants are within the proposed footprint for the Alternative 9 water conveyance  
10 facilities. Therefore, under Alternative 9, construction and operation of the water conveyance  
11 facilities would not affect the five covered vernal pool plant or the 12 noncovered special-status  
plants.

- 1       ● *CM2 Yolo Bypass Fisheries Enhancement*: No modeled vernal pool habitat and no known  
2       occurrences of the 17 vernal pool plants are within the hypothetical footprint for construction  
3       or operation of the Yolo Bypass fisheries enhancements. Therefore, construction and operation  
4       of the Yolo Bypass fisheries enhancements would not affect the covered or noncovered vernal  
5       pool plants.
- 6       ● *CM3 Natural Communities Protection and Restoration*: The BDCP proposes to benefit covered  
7       vernal pool plants by protecting 600 acres of vernal pool complex in CZs 1, 8, and 11 (Objective  
8       VPNC1.1). The protected vernal pool habitat would be managed and enhanced to sustain  
9       populations of native vernal pool species. These benefits also would accrue to any noncovered  
10      vernal pool plants occurring in the protected vernal pool complex.
- 11      ● *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration would result in the  
12      inundation of 372 acres of vernal pool complex and would, therefore, potentially affect special-  
13      status vernal pool plants. However, no known occurrences of covered and noncovered vernal  
14      pool plants would be affected. Most of this modeled habitat (370 acres) consists of degraded  
15      vernal pool habitat that is unlikely to contain special-status plants. In addition, 257.8 acres of  
16      critical habitat for Contra Costa goldfields could be affected.
- 17      ● *CM5 Seasonally Inundated Floodplain Restoration*: No vernal pool habitat or occurrences of  
18      special-status vernal pool plants are present within areas proposed for floodplain restoration.  
19      Therefore, floodplain restoration and construction of new floodplain levees would have no  
20      impacts on covered and noncovered vernal pool plants.
- 21      ● *CM6 Channel Margin Enhancement*: No vernal pool habitat or occurrences of special-status  
22      vernal pool plants are present within areas proposed for channel margin habitat enhancement.  
23      Therefore, channel margin habitat enhancement would have no impacts on covered and  
24      noncovered vernal pool plants.
- 25      ● *CM7 Riparian Natural Community Restoration*: No vernal pool habitat or occurrences of special-  
26      status vernal pool plants are present within areas proposed for riparian habitat enhancement.  
27      Therefore, riparian habitat enhancement would have no impacts on covered and noncovered  
28      vernal pool plants.
- 29      ● *CM8 Grassland Natural Community Restoration*: Although the vernal pool complex habitat  
30      includes grassland matrix within which the vernal pools occur, grassland restoration activities  
31      would take place in non-grasslands (ruderal habitat, cultivated land) or degraded grasslands  
32      that are not included within vernal pool complex habitat. Therefore, grassland communities  
33      restoration would have no impacts on covered and noncovered vernal pool plants.
- 34      ● *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*: If, through unforeseen  
35      circumstances, BDCP activities result in the net loss of vernal pool habitat, CM9 would be  
36      implemented to compensate for that loss. Because vernal pool complex restoration would focus  
37      on habitat that had been cleared and leveled but maintained an intact duripan or claypan, the  
38      likelihood of affecting any special-status vernal pool plants would be low. However, vernal pool  
39      restoration could adversely affect remnant populations of special-status vernal pool plants or  
40      affect vernal pool habitat adjacent to the restoration areas.
- 41      ● *CM10 Nontidal Marsh Restoration*: Nontidal marsh restoration would take place through  
42      conversion of cultivated lands. Therefore, nontidal marsh restoration would avoid vernal pool  
43      habitat and would have no impacts on covered and noncovered vernal pool plants.

1 • *CM22 Avoidance and Minimization Measures*: Effects on covered vernal pool plants potentially  
2 resulting from implementation of CM4 would be avoided or minimized through *AMM11 Covered*  
3 *Plant Species*, *AMM2 Construction Best Management Practices and Monitoring*, *AMM12 Vernal*  
4 *Pool Crustaceans*, and *AMM37 Recreation*. AMM11 prohibits ground disturbance or hydrologic  
5 disturbance within 250 feet of existing vernal pools. In addition, AMM11 specifies that  
6 individual projects be designed to avoid critical habitat for listed plant and wildlife vernal pool  
7 species. AMM12 limits the direct removal of vernal pool crustacean habitat to no more than 10  
8 wetted acres and the indirect effect to no more than 20 wetted acres through the life of the Plan.  
9 AMM12 also requires that that tidal natural communities restoration or other ground-disturbing  
10 covered activities in Conservation Zones 1 and 11 will not result in the adverse modification of  
11 primary constituent elements of critical habitat for vernal pool fairy shrimp, conservancy fairy  
12 shrimp, and vernal pool tadpole shrimp. These protections would also apply to critical habitat  
13 for Contra Costa goldfields, where it overlaps with critical habitat for these vernal pool  
14 crustaceans. AMM37 requires that new recreation trails avoid populations of covered vernal  
15 pool plants.

16 In addition, the BDCP includes species-specific goals to benefit covered vernal pool plants. This  
17 includes protecting two occurrences of alkali milkvetch (Objective VPP1.1) and requiring no net loss  
18 of Heckard's peppergrass (Objective VPP1.2).

19 In summary, no adverse effects on covered special-status vernal pool plants would be expected from  
20 implementing Alternative 9. No known occurrences of 17 special-status vernal pool plants would be  
21 affected. Beneficial effects on special-status vernal pool plants could occur by protecting 600 acres  
22 of vernal pool complex in CZs 1, 8, and 11 and by protecting occurrences of alkali milk-vetch.

23 The GIS analysis estimated that up to 371 acres of vernal pool complex could be adversely affected  
24 by covered activities under Alternative 9. However, the actual effect on habitat for special-status  
25 vernal pool plants is expected to be much less than the estimated impact because the BDCP limits  
26 the total loss of wetted vernal pool habitat resulting from specific projects to 10 acres  
27 (approximately 67 acres of vernal pool complex) over the permit term (AMM12). At the proposed  
28 restoration ratios of 1:1 (prior to impact) and 1.5:1 (concurrent with impact), between 67 and 100.5  
29 acres of vernal pool complex restoration would be required to compensate for the loss of modeled  
30 habitat for special-status vernal pool plants (Objective VPNC1.2, associated with CM9). This would  
31 be consistent with typical NEPA and CEQA project-level mitigation ratios for vernal pool impacts.  
32 The limitation on the loss of wetted vernal pool habitat will constrain the implementation of tidal  
33 restoration projects that are adjacent to vernal pool complex, which could affect the feasibility of  
34 restoring 65,000 acres of tidal habitat (Objective TPANC1.1, associated with CM4).

35 **NEPA Effects:** Implementation of the BDCP under Alternative 9 would not have an adverse effect on  
36 threatened and endangered vernal pool plant species.

37 **CEQA Conclusion:** Because loss of modeled habitat for vernal pool plant species would be offset  
38 through restoration, and because impacts on occurrences of special-status vernal pool plants would  
39 be avoided, implementation of Alternative 9 would not result in a reduction in the range or numbers  
40 of 17 covered and noncovered special-status vernal pool plants in the study area. Therefore,  
41 impacts on special-status vernal pool plants be less than significant. No mitigation is required.

1       **Alkali Seasonal Wetland Plants**

2       Five covered species and three noncovered plants occur in alkali seasonal wetlands in the study area  
3       (Tables 12-2, 12-3, summarized in Table 12-9-63). Alkali seasonal wetland habitat was modeled  
4       separately for four covered plant species occurring in seasonal alkali wetlands.

5       The San Joaquin spearscale habitat model approximated the distribution of suitable San Joaquin  
6       spearscale habitat in the study area according to the species' preferred habitat types, intersected  
7       with soil series and slope position. Historical and current records of San Joaquin spearscale in the  
8       study area indicate that its current distribution is limited to alkaline soil areas with shallow basin or  
9       swale microtopography along the western border. The vegetation cover of the alkaline soils is  
10      typically a combination of alkaline soil-adapted species and annual grasses, including annual  
11      ryegrass and Mediterranean barley. Habitat types used for the model included alkali seasonal  
12      wetlands, vernal pool complex, and grasslands. Soil series used in the model consisted of either clays  
13      or clay loams with alkaline horizons. San Joaquin spearscale typically occurs in swales or in level  
14      terrain but occasionally occurs on the lower slopes adjacent to streams or swales or where seeps are  
15      present. Because some of the soil series with which San Joaquin spearscale is associated can occur  
16      on hillsides, slope was used to limit the extent of the model to the toe of the slope where these soils  
17      occur by excluding areas with slope greater than 1%. Land uses that are incompatible with the  
18      species' habitat requirements, such as modeled habitat polygons falling on leveled or developed  
19      lands, were removed from the model.

20      Modeled habitat for brittlescale was mapped as hydrologic features such as stream corridors and  
21      playa pools located on alluvium associated with the Montezuma Block along the western boundary  
22      of the study area or on alluvium associated with tertiary formations located along the southwest  
23      boundary of the study area. Stream corridors (intermittent and perennial) that intersected these  
24      geologic units were selected and truncated at the point at which they encountered the upper  
25      elevation of intertidal marsh. The corridors were buffered 50 feet (15.2 meters) on either side of  
26      their centerlines to capture the estimated maximum extent of alluvium deposits in proximity to the  
27      streams. Mapped habitat that was occupied by urban or intensive agricultural uses was removed  
28      from the model.

29      The habitat model for heartscale was based on the species distribution in the study area (Solano and  
30      Yolo Counties) and on the soil types and plant communities within which it occurs. Potential habitat  
31      was determined by intersecting the GIS coverage for three parameters: 1) Yolo and Solano County  
32      boundaries; 2) Solano, Pescadero, and Willows soils; and 3) grassland, alkali seasonal wetland, and  
33      vernal pool complex natural communities. The model excluded areas that have been developed or  
34      cultivated, i.e., where the topography, soils, and hydrology have been substantially altered.

35      Delta button-celery habitat was modeled as alkali seasonal wetland complex, vernal pool complex,  
36      other natural seasonal wetland, and grassland occurring on Brentwood, Grangerville, Marcuse,  
37      Solano, and Vernalis soil map units within the San Joaquin Basin (i.e., south of the mainstem San  
38      Joaquin River). For this species, land cover north of the Discovery Bay area where intensive  
39      agriculture was classified as annual grassland were manually deleted from the area of predicted  
40      habitat. Additionally, other areas of potential habitat that have been developed were also manually  
41      deleted.

42      Full implementation of Alternative 9 would include the following conservation actions over the term  
43      of the BDCP to benefit covered alkali seasonal wetland plants (BDCP Chapter 3, Section 3.3,  
44      *Biological Goals and Objectives*).

- 1       • Of the 150 acres of alkali seasonal wetland complex protected under Objective ASWNC1.1, 600  
2 acres of vernal pool complex protected under Objective VPNC1.1, and 8,000 acres of grassland  
3 natural community protected under Objective GNC1.1, protect at least 75 acres of suitable  
4 brittlescale habitat and 75 acres of suitable heartscale habitat in Conservation Zones 1, 8, or 11  
5 (Objective BRIT/HART/SJSC1.1, associated with CM3).
- 6       • Protect two currently unprotected occurrences of San Joaquin spearscale in Conservation Zones  
7 1, 8, or 11 (Objective BRIT/HART/SJSC1.2, associated with CM3).
- 8 No adverse effects on Delta button celery, crownscale, palmate-bracted bird's-beak or recurved  
9 larkspur would be expected. Table 12-9-63 summarizes the acreage of modeled alkali seasonal  
10 wetland habitat in the study area and the number of occurrences of each special-status alkali  
11 seasonal wetland plant in the study area.

12 **Table 12-9-63. Summary of Impacts on Seasonal Alkali Wetland Plants under Alternative 9**

	Acres in Study Area	Acres Affected	Occurrences in Study Area	Occurrences Affected	Impacts
<b>Habitat</b>					
San Joaquin spearscale modeled habitat	14,933	680			Habitat loss from tidal habitat restoration, Yolo Bypass fisheries enhancements, and levee construction
Brittlescale modeled habitat	451	4			Habitat loss from tidal habitat restoration
Heartscale modeled habitat	6,528	306			Habitat loss from tidal habitat restoration and Yolo Bypass fisheries enhancements
Delta button celery modeled habitat	3,330 <sup>a</sup>	0			None
Alkali seasonal wetlands	3,273	72			Habitat loss from tidal habitat restoration and Yolo Bypass fisheries enhancements
<b>Covered Species</b>					
San Joaquin spearscale			19	1	Population loss from tidal habitat restoration
Brittlescale			8	0	None
Heartscale			3	0	None
Delta button celery			1 <sup>b</sup>	0	None
Heckard's peppergrass			1 <sup>c</sup>	1	Population loss from tidal habitat restoration
<b>Noncovered Species</b>					
Crownscale			17	0	None
Palmate-bracted bird's-beak			1	0	None
Recurved larkspur			4	0	None

<sup>a</sup> A portion of this acreage consists of riparian habitat.  
<sup>b</sup> A second occurrence in study area is in riparian habitat.

---

<sup>c</sup> Four additional occurrences of Heckard's peppergrass are associated with vernal pools.

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1       **Impact BIO-170: Effects on Habitat and Populations of Alkali Seasonal Wetland Plants**

2       Alternative 9 would have adverse effects on modeled seasonal alkali wetland habitat for San Joaquin  
3       spearscale, brittlescale, and heartscale. It could also have adverse effects on occurrences of San  
4       Joaquin spearscale and Heckard's peppergrass.

5       The individual effects of each relevant conservation measure are addressed below. A summary  
6       statement of the combined impacts and NEPA and CEQA conclusions follows the individual  
7       conservation measure discussions.

- 8       • *CM1 Water Facilities and Operations*: No alkali seasonal wetland habitat or occurrences of  
9       special-status alkali seasonal wetland plants are present within areas proposed for construction  
10      of the water facilities or channel dredging. Therefore, construction and operation of the water  
11      conveyance facilities would have no impacts on covered and noncovered alkali seasonal wetland  
12      plant species.
- 13      • *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo Bypass fisheries  
14      improvements would permanently remove 56 acres of modeled habitat for San Joaquin  
15      spearscale. No known occurrences of San Joaquin spearscale would be affected. No modeled  
16      habitat and no known occurrences of the seven other alkali seasonal wetland plants are within  
17      the hypothetical footprint for construction or operation of the Yolo Bypass fisheries  
18      enhancements.
- 19      • *CM3 Natural Communities Protection and Restoration*: The BDCP proposes to benefit alkali  
20      seasonal wetland plants by protecting 150 acres of alkali seasonal wetland in Conservation  
21      Zones 1, 8, and/or 11. The protected alkali seasonal wetland habitat would be managed and  
22      enhanced to sustain populations of native plant species.
- 23      • *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration is expected to convert  
24      alkali seasonal wetlands on the margins of tidal wetlands to freshwater or brackish tidal marsh.  
25      Tidal habitat restoration would convert 680 acres of modeled habitat for San Joaquin spearscale  
26      to tidal marsh. Tidal habitat restoration would permanently remove 4 acres of modeled habitat  
27      for brittlescale in CZ 1 near Lindsey Slough and in CZ 11 near Nurse Slough; however, the BDCP  
28      would allow up to 50 acres of modeled habitat to be converted to tidal wetlands. Tidal habitat  
29      restoration would remove 306 acres of modeled habitat for heartscale in CZ 1 in the vicinity of  
30      Jepson Prairie and in CZ 11 adjacent to Suisun Marsh. The extent to which the modeled habitat is  
31      actually occupied by these species is not known; modeled habitat is assumed to encompass all  
32      potential habitat for a species and may therefore overestimate the area actually occupied. Tidal  
33      habitat restoration could adversely affect an occurrence of Heckard's peppergrass at Hass  
34      Slough and an occurrence of San Joaquin spearscale at Main Prairie, both in CZ 1. These  
35      occurrences are based on historic records, and the whether or not the populations still exist is  
36      not known. In each case, the loss of modeled habitat and occurrences for covered species would  
37      be adverse effects. Delta button celery, crownscale, palmate-bracted bird's-beak, and recurved  
38      larkspur would not be affected by tidal habitat restoration.
- 39      • *CM5 Seasonally Inundated Floodplain Restoration*: Floodplain restoration levee construction  
40      would result in the removal of 2 acres of modeled habitat for San Joaquin spearscale. No known  
41      occurrences of San Joaquin spearscale would be affected. No other alkali seasonal wetland  
42      habitat or occurrences of special-status alkali seasonal wetland plants are present within areas

1 proposed for floodplain restoration. Therefore, floodplain restoration and construction of new  
2 floodplain levees would have no impacts on covered and noncovered alkali seasonal wetland  
3 plants.

- 4 • *CM6 Channel Margin Enhancement*: No alkali seasonal wetland habitat or occurrences of special-  
5 status alkali seasonal wetland plants are present within areas proposed for channel margin  
6 habitat enhancement. Therefore, channel margin habitat enhancement would have no impacts  
7 on covered and noncovered alkali seasonal wetland plants.
- 8 • *CM7 Riparian Natural Community Restoration*: No alkali seasonal wetland habitat or occurrences  
9 of special-status alkali seasonal wetland plants are present within areas proposed for riparian  
10 habitat enhancement. Therefore, riparian habitat enhancement would have no impacts on  
11 covered and noncovered alkali seasonal wetland plants.
- 12 • *CM8 Grassland Natural Community Restoration*: Although the alkali seasonal wetland habitat  
13 includes the grassland matrix within which the wetlands occur, grassland restoration activities  
14 would take place in non-grasslands (ruderal habitat, cultivated land) or degraded grasslands  
15 that are not included within alkali seasonal wetland habitat. Therefore, grassland communities  
16 restoration would have no impacts on covered and noncovered alkali seasonal wetland plants.
- 17 • *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*: Although some vernal pools  
18 are alkaline, alkali seasonal wetlands in the study area consist of alkali grassland, alkali meadow,  
19 or iodine bush scrub. Therefore, vernal pool restoration would avoid alkali seasonal wetland  
20 habitat and would have no impacts on covered and noncovered alkali seasonal wetland plants.  
21 In addition, the BDCP would compensate for the loss of alkali seasonal wetlands from other CMs  
22 by restoring or creating 72 acres of alkali seasonal wetlands in Conservation Zones 1, 8, or 11 to  
23 achieve no net loss of this habitat.
- 24 • *CM10 Nontidal Marsh Restoration*: Nontidal marsh restoration would take place through  
25 conversion of cultivated lands. Therefore, nontidal marsh restoration would avoid alkali  
26 seasonal wetland habitat and would have no impacts on covered and noncovered alkali seasonal  
27 wetland plants.
- 28 • *CM22 Avoidance and Minimization Measures*: Effects on special-status alkali seasonal wetland  
29 plants potentially resulting from implementation of CM4 would be avoided or minimized through  
30 *AMM11 Covered Plant Species*, *AMM2 Construction Best Management Practices and Monitoring*,  
31 and *AMM37 Recreation*. Under AMM11, surveys for covered plant species would be performed  
32 during the planning phase of projects, and any impacts on populations of covered species would  
33 be avoided through project design or subsequently minimized through AMM2. In addition,  
34 AMM11 prohibits ground disturbance or hydrologic disturbance within 250 feet of existing  
35 vernal pools, which would protect those species with modeled habitat that includes vernal pool  
36 complex. Occurrences of covered species in vernal pools near tidal wetlands would not be  
37 affected by tidal habitat restoration where critical habitat for vernal pool species is present and  
38 would be avoided under AMM11. AMM37 requires that new recreation trails avoid populations  
39 of covered alkali seasonal wetland plants.

40 In summary, one historic occurrence of Heckard's peppergrass and one historic occurrence of San  
41 Joaquin spearscale could be affected by tidal restoration activities, if those occurrences still exist.  
42 AMM11 would be implemented to avoid an adverse effect on the Heckard's peppergrass and San  
43 Joaquin spearscale occurrences.

1 The primary effect of Alternative 9 on special-status alkali seasonal wetland plants would be the loss  
2 of potential (i.e., modeled) habitat for San Joaquin spearscale, brittlescale, heartscale, and Delta  
3 button-celery. Approximately 72 acres of this habitat loss would be alkali seasonal wetlands. The  
4 actual effect on modeled habitat for alkali seasonal wetland plants is expected to be somewhat less  
5 than the estimated impact because some of this habitat is composed of vernal pool complex, and the  
6 BDCP limits the total loss of wetted vernal pool habitat to 10 acres (approximately 67 acres of vernal  
7 pool complex) over the permit term (AMM12). Loss of modeled habitat would be compensated for  
8 by restoring or creating vernal pool complex, alkali seasonal wetlands, and grasslands, in proportion  
9 to the amount of each habitat removed. At the proposed restoration ratios of 1:1 (prior to impact)  
10 and 1.5:1 (concurrent with impact), between 67 and 100.5 acres of vernal pool complex restoration  
11 would be required to compensate for the loss of modeled habitat composed of vernal pool complex  
12 (Objective VPNC1.2, associated with CM9). Approximately 72 acres of alkali seasonal wetlands  
13 would be restored (Objective ASWC1.2, associated with CM9). Loss of modeled habitat composed of  
14 grasslands would be compensated for by restoring grassland habitat on a 1:1 basis (Objective  
15 GNC1.1, associated with CM8). These compensation levels would be consistent with typical NEPA  
16 and CEQA project-level mitigation ratios for impacts on vernal pools, alkali seasonal wetlands, and  
17 grasslands.

18 Alternative 9 would have a small beneficial effect on special-status alkali seasonal wetland plants by  
19 protecting 150 acres of alkali seasonal wetland habitat. The BDCP also includes the species-specific  
20 goals that 75 acres of the protected alkali seasonal wetland habitat would be modeled habitat for  
21 brittlescale and heartscale (Objective BRIT/HART/SJSC1.1) and that 2 occurrences of San Joaquin  
22 spearscale would be protected (Objective BRIT/HART/SJSC1.2). The benefits of habitat protection  
23 and management also would accrue to any noncovered alkali seasonal wetland plants occurring in  
24 the protected habitat.

25 **NEPA Effects:** Under Alternative 9, loss of modeled habitat for alkali seasonal wetland plant species  
26 would be offset through restoration of grassland, vernal pool, and alkali seasonal wetland habitat  
27 (CM8, CM9), and impacts on one occurrence of San Joaquin spearscale and one occurrence of  
28 Heckard's peppergrass would be avoided through AMM11. With avoidance and habitat restoration,  
29 these effects would not be adverse.

30 **CEQA Conclusion:** Because loss of modeled habitat for alkali seasonal wetland plant species would  
31 be offset through restoration, and because impacts on occurrences of covered alkali seasonal  
32 wetland plants would be avoided, impacts on alkali seasonal wetlands as a result of implementing  
33 Alternative 9, would not result in substantially reducing the number or restricting the range of five  
34 covered and three noncovered plant species, and this impact would be less than significant. No  
35 mitigation is required.

### 36 **Grassland Plants**

37 One covered plant and 11 noncovered special-status plants occur in grasslands in the study area  
38 (Tables 12-2, 12-3, summarized in Table 12-9-64). The only covered plant species occurring in  
39 grassland is Carquinez goldenbush. Carquinez goldenbush modeled habitat included hydrological  
40 features such as stream corridors on alluvium derived from the Montezuma Formation. Stream  
41 corridors (intermittent and perennial) that intersected these geologic units were selected and  
42 truncated at the point at which they encountered the upper elevation of intertidal marsh. The  
43 corridors were buffered 50 feet (15 meters) on either side in an effort to capture the estimated  
44 maximum extend of alluvium deposits in close proximity to the actual rivers/streams.

1 Full implementation of Alternative 9 would include the following conservation actions over the term  
2 of the BDCP to benefit covered grassland plants (BDCP Chapter 3, Section 3.3, *Biological Goals and*  
3 *Objectives*).

- 4 • Protect three unprotected occurrences of the Carquinez goldenbush in Conservation Zones 1  
5 and/or 11 (Objective CGB1.1, associated with CM3).
- 6 • Maintain and enhance occupied Carquinez goldenbush habitat to slow erosion and reverse  
7 degradation from livestock grazing (Objective CGB1.2, associated with CM11).

8 Of 78,047 acres of grasslands in the study area, Alternative 9 would adversely affect 2,706 acres  
9 under Alternative 9, including 4 acres that are modeled habitat for Carquinez goldenbush. For 10 of  
10 the plants, no known occurrences would be affected. One of five Parry's rough tarplant occurrences  
11 in the study area could be affected by Alternative 9. Table 12-9-64 summarizes the acreage of  
12 grassland habitat in the study area and the number of occurrences of each special-status grassland  
13 plant in the study area.

1 **Table 12-9-64. Summary of Impacts on Grassland Plants under Alternative 9**

	Acres in Study Area	Acres Affected	Occurrences in Study Area	Occurrences Affected	Impacts
<b>Habitat</b>					
Carquinez goldenbush modeled habitat	1,346	4			Habitat loss from tidal habitat restoration
Grassland	78,047	2,706			Habitat loss from construction of water conveyance facilities, tidal restoration, Yolo Bypass fisheries enhancements, floodplain restoration, and construction of conservation hatcheries facilities
<b>Covered Species</b>					
Carquinez goldenbush			10	1	Occurrence affected by tidal restoration
<b>Noncovered Species</b>					
Big tarplant			5	0	None
Round-leaved filaree			2	0	None
Pappose tarplant			7	0	None
Parry's rough tarplant			5	1	Periodic inundation of one occurrence as a result of Yolo Bypass operations
Small-flowered morning-glory			0	0	None
Diamond-petaled poppy			1	0	None
Stinkbells			1	0	None
Fragrant fritillary			4	0	None
Gairdner's yampah			0	0	None
Streamside daisy <sup>a</sup>			1	0	None
Caper-fruited tropidocarpum			8	0	None
<sup>a</sup> This species actually occurs in upland woodland, a habitat that has not been mapped or quantified in the BDCP.					

2

3 **Impact BIO-171: Effects on Habitat and Populations of Grassland Plant Species**

4 Alternative 9 could have adverse effects on modeled habitat for Carquinez goldenbush. It could also  
5 affect one occurrence of Carquinez goldenbush and one occurrence of Parry's rough tarplant.  
6 Although Alternative 9 would have no expected effects on known occurrences of the other special-  
7 status plant species that occur in grasslands, the loss of 3,389 acres of grassland would have the  
8 potential to adversely affected undocumented populations of special-status grassland species.

1 The individual effects of each relevant conservation measure are addressed below. A summary  
2 statement of the combined impacts and NEPA and CEQA conclusions follows the individual  
3 conservation measure discussions.

- 4 • *CM1 Water Facilities and Operations*: No modeled habitat for Carquinez goldenbush and no  
5 known occurrences of the 12 special-status grassland plants are within the proposed footprint  
6 for the Alternative 9 water conveyance facilities. About 427 acres of grassland habitat would be  
7 affected by construction of the water conveyance facilities. However, this grassland habitat  
8 consists of small patches of herbaceous ruderal vegetation along levees that do not provide  
9 habitat for special-status grassland species. Therefore, under Alternative 9, construction and  
10 operation of the water conveyance facilities would not affect the 12 special-status grassland  
11 plants.
- 12 • *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo Bypass fisheries  
13 enhancements would remove 627 acres of grassland habitat. Yolo Bypass operations would  
14 result in more frequent and longer inundation of 1,597 acres of grasslands in the Yolo Causeway  
15 (CZ 2) that include habitat for one occurrence of Parry's rough tarplant. Parry's rough tarplant is  
16 a summer-blooming plant that occurs in areas subject to occasional inundation during the wet  
17 season, such as swales and seasonal wetlands. Increasing the frequency or duration of  
18 inundation may decrease the distribution in some areas by making some conditions too wet but  
19 would also expand the distribution into areas that may currently be too dry. Overall, changing  
20 the frequency and duration of inundation in the area of this occurrence should not result in a  
21 substantial change in the range of numbers of Parry's rough tarplant. Construction and  
22 operation of the Yolo Bypass fisheries enhancements would not affect modeled habitat for  
23 Carquinez goldenbush or known occurrences of other special-status grassland plants.
- 24 • *CM3 Natural Communities Protection and Restoration*: The BDCP proposes to preserve 8,000  
25 acres of grassland habitat, some of which may contain modeled habitat for Carquinez  
26 goldenbush. Protection of grassland habitat may also protect undiscovered occurrences of  
27 special-status plant species.
- 28 • *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration would permanently  
29 remove 1,122 acres of grassland habitat. Four acres of modeled habitat for Carquinez  
30 goldenbush along the eastern side of Suisun Marsh could be lost as a result of habitat  
31 conversion, including part of one known occurrence. Tidal restoration would not affect  
32 other known occurrences of special-status grassland plants.
- 33 • *CM5 Seasonally Inundated Floodplain Restoration*: Construction of new floodplain levees would  
34 result in the loss of 85 acres of grassland habitat, and periodic inundation of the floodplain  
35 would affect 513 acres of grassland habitat. However, no modeled habitat for Carquinez  
36 goldenbush or known occurrences of special-status grassland plants are present within areas  
37 proposed for floodplain restoration, and the affected grassland habitat consists of herbaceous  
38 ruderal vegetation that does not support special-status grassland plants. Therefore, floodplain  
39 restoration and construction of new floodplain levees would have no impacts on covered and  
40 noncovered grassland plants.
- 41 • *CM6 Channel Margin Enhancement*: No known occurrences of special-status grassland plants are  
42 present within areas proposed for channel margin habitat enhancement. Areas mapped as  
43 grassland along levees that would be affected by channel margin habitat enhancement are small  
44 patches of ruderal vegetation along levees that do not provide habitat for special-status

1 grassland species and are not modeled habitat for Carquinez goldenbush. Therefore, channel  
2 margin habitat enhancement would have no impacts on covered and noncovered grassland  
3 plants.

- 4 • *CM7 Riparian Natural Community Restoration*: No modeled habitat for Carquinez goldenbush or  
5 known occurrences of special-status grassland plants are present within areas proposed for  
6 riparian habitat enhancement. About 401 acres of grassland habitat would be converted to  
7 riparian habitat. The affected grassland habitat consists of herbaceous ruderal vegetation that  
8 does not support special-status grassland plants. Therefore, riparian habitat enhancement  
9 would have no impacts on covered and noncovered grassland plants.
- 10 • *CM8 Grassland Natural Community Restoration*: Grassland restoration would restore 2,000 acres  
11 of grassland habitat. Restoration activities would take place in non-grasslands (ruderal habitat,  
12 cultivated land) or degraded grasslands. These areas do not currently provide habitat for  
13 special-status grassland plants. Therefore, grassland community restoration would have no  
14 impacts on covered and noncovered grassland plants.
- 15 • *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*: Vernal pool complex includes  
16 vernal pools as well as the surrounding grassland matrix. Because the habitat to be restored  
17 would consist of areas of former vernal pool complex that have been leveled for cultivation,  
18 special-status grassland plants would not be present. Therefore, vernal pool complex  
19 restoration would not affect special-status grassland plants.
- 20 • *CM10 Nontidal Marsh Restoration*: Nontidal marsh restoration would take place through  
21 conversion of cultivated lands. Therefore, nontidal marsh restoration would avoid grassland  
22 habitat and would have no impacts on covered and noncovered grassland plants.
- 23 • *CM18 Conservation Hatcheries*: Construction of the conservation hatcheries would remove 35  
24 acres of grassland habitat. The removed habitat would consist of ruderal herbaceous vegetation  
25 that would not be likely to provide habitat for special-status grassland plants. Therefore,  
26 construction of the conservation hatcheries would not be expected to affect special-status  
27 grassland plants.
- 28 • *CM22 Avoidance and Minimization Measures*: Effects on Carquinez goldenbush potentially  
29 resulting from implementation of CM4 and potential effects on undiscovered populations of  
30 special-status grassland plants would be avoided or minimized through *AMM11 Covered Plant*  
31 *Species*, *AMM2 Construction Best Management Practices and Monitoring*, and *AMM37 Recreation*.  
32 Under AMM11, surveys for covered plant species would be performed during the planning  
33 phase of projects, and any impacts on populations of covered species would be avoided through  
34 project design or subsequently minimized through AMM2. AMM37 requires that new recreation  
35 trails avoid populations of Carquinez goldenbush.

36 The primary effect of Alternative 9 on special-status grassland plants is the loss of potential (i.e.,  
37 modeled) habitat for Carquinez goldenbush, including part of one known occurrence. Adverse  
38 effects on the occurrence will be minimized through AMM11. Protecting three unprotected  
39 occurrences of Carquinez goldenbush (Objective CGB1.1, associated with CM3) and maintaining and  
40 enhancing occupied Carquinez goldenbush (Objective CGB1.2, associated with CM11) would  
41 compensate for any residual effects. One occurrence of Parry's rough tarplant would be affected by  
42 CM2, but the effect is not expected to be adverse. No known occurrences of the other special-status  
43 grassland plants would be affected.

1 Alternative 9 would have a potential beneficial effect on special-status grassland plants by  
2 protecting 8,000 acres of grassland habitat. To ensure that this habitat preservation would  
3 specifically benefit Carquinez goldenbush, the plan proposes to protect three Carquinez goldenbush  
4 occurrences in CZs 1 and 11 that are currently not protected and to maintain and enhance occupied  
5 Carquinez goldenbush habitat. The preservation of modeled or potential habitat, together with  
6 avoidance and minimization of impacts on species occurrences, would reduce any effects Alternative  
7 9 on covered grassland plants to a level that is no longer adverse.

8 **NEPA Effects:** The loss of modeled and occupied habitat for Carquinez goldenbush would be offset  
9 through CM3, CM8, and CM11. Therefore, implementation of Alternative 1B would result in no  
10 adverse effects on special-status grassland plants.

11 **CEQA Conclusion:** Because adverse effects on special-status grassland plant species would be  
12 avoided or compensated for, Alternative 9 would not result in substantially reducing the numbers or  
13 restricting the range of one covered or 11 noncovered special-status grassland plants, and this  
14 impact would be less than significant. No mitigation is required.

### 15 **Valley/Foothill Riparian Plants**

16 Two covered plants and two noncovered special-status plants occur in valley/foothill riparian  
17 habitat in the study area (Tables 12-2, 12-3, summarized in Table 12-9-65). The valley/foothill  
18 riparian habitat model for Delta button-celery and slough thistle was mapped as all of the study area  
19 along the flood plain of the San Joaquin River between the levees from the Mossdale Bridge to  
20 Vernalis. Whether or not this modeled habitat is actually occupied by Delta button-celery and slough  
21 thistle is unknown; all known occurrences of these species within the area of modeled habitat are  
22 believed to be extirpated.

23 Full implementation of Alternative 9 would include the following conservation actions over the term  
24 of the BDCP to benefit covered valley/foothill riparian plants (BDCP Chapter 3 Section 3.3, *Biological*  
25 *Goals and Objectives*).

- 26 • Protect and enhance two occurrences of delta button celery. If occurrences are not found in the  
27 Plan Area, establish self-sustaining occurrences of delta button celery for a total of two  
28 occurrences within the restored floodplain habitat on the mainstem of the San Joaquin River in  
29 Conservation Zone 7 between Mossdale and Vernalis. (Objective DBC1.1, associated with CM3  
30 and CM11)
- 31 • Protect and enhance two occurrences of slough thistle. If occurrences are not found in the Plan  
32 Area, establish self-sustaining occurrences of slough thistle for a total of two occurrences within  
33 the 10,000 acres of restored floodplain on the mainstem of the San Joaquin River in  
34 Conservation Zone 7 between Mossdale and Vernalis (Objective ST1.1: associated with CM3 and  
35 CM11).

36 Of 17,966 acres of valley/foothill riparian habitat in the study area, Alternative 9 would adversely  
37 affect 1,116 acres, including 15 acres that are modeled habitat for Delta button-celery and 11 acres  
38 that are modeled habitat for slough thistle. Table 12-9-65 summarizes the acreage of modeled  
39 habitat for Delta button-celery and slough thistle and the number of occurrences of each special-  
40 status grassland plant in the study area.

1 **Table 12-9-65. Summary of Impacts on Valley/Foothill Riparian Plants under Alternative 9**

	Acres in Study Area	Acres Affected	Occurrences in Study Area	Occurrences Affected	Impacts
<b>Habitat</b>					
Delta button celery modeled habitat	3,361 <sup>a</sup>	15			Habitat loss from floodplain restoration
Slough thistle modeled habitat	1,834	11			Habitat loss from floodplain restoration
Valley/foothill riparian habitat	17,966	1,116			Habitat loss from construction of water conveyance facilities, tidal restoration, Yolo Bypass fisheries enhancements, and floodplain restoration
<b>Covered Species</b>					
Delta button celery			1 <sup>b</sup>	1	Occurrence potentially affected by floodplain restoration
Slough thistle			2	2	Occurrences potentially affected by floodplain restoration
<b>Noncovered Species</b>					
Northern California black walnut			1	0	None
Wright's trichocoronis			1	0	None
<sup>a</sup> A portion of this acreage consists of alkali seasonal wetland					
<sup>b</sup> A second occurrence is in alkali seasonal wetland					

2

3 **Impact BIO-172: Effects on Habitat and Populations of Valley/Foothill Riparian Plants**

4 No extant occurrences of Delta button-celery, slough thistle, Northern California black walnut, or  
 5 Wright's trichocoronis are present in the study area. Therefore, no impacts on special-status  
 6 valley/foothill riparian plants are expected. Modeled habitat for Delta button-celery and slough  
 7 thistle, which may support undocumented occurrences of these species, would be affected by  
 8 restoration of seasonally inundated floodplain.

9 The individual effects of each relevant conservation measure are addressed below. A summary  
 10 statement of the combined impacts and NEPA and CEQA conclusions follows the individual  
 11 conservation measure discussions.

- 12 • *CM1 Water Facilities and Operations*: Construction of the water conveyance facilities would  
 13 remove 310 acres of valley-foothill riparian habitat under Alternative 9. However, no modeled  
 14 habitat and no known occurrences of the four special-status valley/foothill riparian plants are  
 15 within the proposed footprint for the Alternative 9 water conveyance facilities. Therefore, under

1 Alternative 9, construction and operation of the water conveyance facilities would not affect  
2 covered or noncovered special-status valley/foothill riparian plants.

- 3 ● *CM2 Yolo Bypass Fisheries Enhancement*: Construction and operation of the Yolo Bypass fisheries  
4 enhancements would adversely affect 176 acres of valley/foothill riparian habitat. However, no  
5 modeled habitat and no known occurrences of the four special-status valley/foothill riparian  
6 plants are within the hypothetical footprint for construction or operation of the Yolo Bypass  
7 fisheries enhancements. Therefore, construction and operation of the Yolo Bypass fisheries  
8 enhancements would not affect the covered or noncovered valley/foothill riparian plants.
- 9 ● *CM3 Natural Communities Protection and Restoration*: The BDCP proposes to protect 552 acres  
10 of existing valley/foothill riparian forest in CZ 7. This action would have no substantial effects on  
11 special-status valley/foothill plants because no extant occurrences of special-status  
12 valley/foothill plants are present in the study area.
- 13 ● *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration would inundate 552 acres  
14 of valley/foothill riparian habitat. However, no modeled habitat and no known occurrences of  
15 the four special-status valley/foothill riparian plants are within the hypothetical footprint for  
16 tidal restoration. Therefore, tidal restoration would not affect the covered or noncovered  
17 valley/foothill riparian plants.
- 18 ● *CM5 Seasonally Inundated Floodplain Restoration*: Floodplain restoration levee construction  
19 would remove about 78 acres of valley/foothill riparian habitat, including 15 acres of modeled  
20 habitat for Delta button-celery along the San Joaquin River in CZ 7. In addition, floodplain  
21 restoration would result in more frequent and longer inundation of 18 acres of modeled habitat  
22 for Delta button-celery in this area. The area affected contains one historic occurrence of Delta  
23 button celery. This occurrence is considered to be extirpated, because all habitat for Delta  
24 button-celery at his location has been converted to agriculture (California Department of Fish  
25 and Wildlife 2013). Therefore, Alternative 9 would not have an adverse effect on Delta button  
26 celery in CZ 7.

27 The BDCP proposes to benefit Delta button-celery at this location by restoring 5,000 acres of  
28 valley/foothill riparian habitat and re-introducing two occurrences of Delta button-celery.  
29 Although Delta button celery occurs in riparian habitat, it is not associated with woodland or  
30 scrub habitats; rather, it occurs in alkali seasonal wetlands in floodplains, which may or may not  
31 also contain adjacent woody riparian habitat. Restoring habitat for Delta button-celery may not  
32 be compatible with restoring woody riparian habitat. In addition, establishing new populations  
33 of Delta button-celery is an untried, unproven procedure and may not be feasible. Therefore, any  
34 beneficial effects on Delta button-celery would be speculative.

35 Floodplain restoration levee construction would remove 11 acres of modeled habitat for slough  
36 thistle and would result in more frequent and longer inundation of 6 acres of modeled habitat  
37 for slough thistle along the San Joaquin River in CZ 7. However, the BDCP would allow up to 50  
38 acres of modeled habitat to be converted to riparian habitat. Whether the affected modeled  
39 habitat is actually occupied by slough thistle is not known; however, of two historic occurrences  
40 of slough thistle present in the study area, only one is considered to be extirpated (California  
41 Department of Fish and Wildlife 2013). The BDCP would protect and enhance two occurrences  
42 of slough thistle. If occurrences are not found in the study area, then two, self-sustaining  
43 occurrences of slough thistle would be established using locally-sourced genetic material for a  
44 total of two occurrences within the restored floodplain habitat on the main stem of the San

1 Joaquin River in CZ 7 between Mossdale and Vernalis. Establishing new populations of slough  
2 thistle is an untried, unproven procedure and may not be feasible. Therefore, any beneficial  
3 effects on slough thistle would be speculative.

4 One historic occurrence of Wright's trichocoronis in the study area near Lathrop (CZ 7) could  
5 also be affected by floodplain restoration. The occurrence is presumed to be extant because the  
6 presence or absence of suitable habitat has not been verified by field surveys (California  
7 Department of Fish and Wildlife 2013). However, the species has not been observed at this  
8 location for nearly a century, and habitat for Wright's trichocoronis, which would have been  
9 similar to that for Delta button celery and slough thistle, no longer appears to be present in  
10 aerial photographs of the area. Therefore, Alternative 9 would not be expected to have an  
11 adverse effect on Wright's trichocoronis.

- 12 • *CM6 Channel Margin Habitat Enhancement*: No modeled habitat or occurrences of special-status  
13 valley/foothill riparian plants are present within areas proposed for channel margin habitat  
14 enhancement. Therefore, channel margin habitat enhancement would have no impacts on  
15 covered and noncovered valley/foothill riparian plants.
- 16 • *CM7 Riparian Natural Community Restoration*: No extant occurrences of special-status  
17 valley/foothill riparian plants are present within areas proposed for riparian habitat  
18 restoration. Therefore, riparian habitat restoration would have no impacts on covered and  
19 noncovered valley/foothill riparian plants.
- 20 • *CM8 Grassland Natural Community Restoration*: No occurrences of special-status valley/foothill  
21 riparian plants are present within areas proposed for grassland communities restoration.  
22 Therefore, grassland communities restoration would have no impacts on covered and  
23 noncovered valley/foothill riparian plants.
- 24 • *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*: No occurrences of special-  
25 status valley/foothill riparian plants are present within areas proposed for vernal pool and  
26 alkali seasonal wetland complex restoration. Therefore, vernal pool complex restoration would  
27 have no impacts on covered and noncovered valley/foothill riparian plants.
- 28 • *CM10 Nontidal Marsh Restoration*: Nontidal marsh restoration would take place through  
29 conversion of cultivated lands. Therefore, nontidal marsh restoration would avoid  
30 valley/foothill riparian habitat and would have no impacts on covered and noncovered  
31 valley/foothill riparian plants.
- 32 • *CM22 Avoidance and Minimization Measures*: Effects on Delta button-celery and slough thistle  
33 potentially resulting from implementation of CM5 would be avoided or minimized though  
34 *AMM11 Covered Plant Species* and *AMM2 Construction Best Management Practices and*  
35 *Monitoring*. Under AMM11, surveys for covered plant species would be performed during the  
36 planning phase of projects, and any impacts on populations of covered species would be avoided  
37 through project design or subsequently minimized though AMM2.

38 Because no extant occurrences of special-status valley/foothill riparian plants are known to occur in  
39 the study area, Alternative 9 is not expected to adversely affect any special-status valley/foothill  
40 riparian plants. Modeled habitat for both Delta button-celery and slough thistle would be affected.  
41 Under AMM11, surveys for covered plants would be performed during the planning phase for  
42 floodplain restoration. If Delta button-celery or slough thistle were found to be present in the

1 floodplain restoration area, then the project would be designed to avoid impacts on the populations.  
2 Therefore, Alternative 9 would not have an adverse effect on these species.

3 The BDCP proposes to benefit Delta button-celery and slough thistle by restoring 5,000 acres of  
4 valley/foothill riparian habitat and re-introducing two occurrences of both species. Establishing  
5 new populations of Delta-button-celery or slough thistle would be a beneficial effect. However,  
6 establishing new populations is an untried, unproven procedure and may not be feasible.

7 **NEPA Effects:** Implementation of the BDCP under Alternative 9 would not have an adverse effect on  
8 special-status valley/foothill riparian plant species.

9 **CEQA Conclusion:** Alternative 9 would not result in a reduction in the range and numbers of covered  
10 and noncovered valley/foothill riparian plants. This impact would be less than significant. No  
11 mitigation is required.

## 12 **Tidal Wetland Plants**

13 Seven covered plants and one noncovered special-status plant occur in tidal wetlands in the study  
14 area (Tables 12-2, 12-3, summarized in Table 12-9-66). Five tidal wetland habitat models were  
15 developed for the seven covered plant species occurring in tidal wetland habitat.

16 Modeled habitat for Mason's lilaepsis and Delta mudwort was mapped as areas within 10 feet (3  
17 meters) on either side of the landward boundary of tidal perennial aquatic land cover type, which  
18 was obtained from the BDCP GIS vegetation data layer.

19 The side-flowering skullcap model mapped the distribution of suitable habitat in the study area  
20 according to the species' habitat association with woody riparian habitat. The model selected Delta  
21 riparian vegetation types providing the habitat characteristics that side-flowering skullcap seems to  
22 require, namely, woody substrate in freshwater tidal areas. The model included vegetation subunits  
23 of the BDCP Valley Riparian natural community characterized by California dogwood, white alder,  
24 and arroyo willow.

25 The modeled habitat for soft bird's-beak consisted of pickleweed- and saltgrass-dominated  
26 vegetation units located west of the Antioch Bridge. Modeled habitat for these two plant species was  
27 mapped as areas within 10 feet (3 meters) on either side of the landward boundary of tidal  
28 perennial aquatic land cover types. The model used all Tidal Brackish Emergent Wetland polygons  
29 that were limited by specific vegetation units that are known to be closely associated with soft  
30 bird's-beak habitat.

31 Habitat for Delta tule pea and Suisun Marsh aster was modeled separately based on the salinity of  
32 the water. For the tidal freshwater emergent wetland BDCP land cover type, modeled habitat was  
33 mapped as the area within 10 feet (3 meters) of the landward side of the landward boundary,  
34 exclusively where this land cover type is adjacent to grassland, vernal pool complex, valley/foothill  
35 riparian, or cultivated land habitat cover types. For brackish water areas in and near Suisun Marsh,  
36 the model used all tidal brackish emergent wetland polygons within an elevation range of 7 to 10  
37 feet (2 to 3 meters) to capture elevations 1 foot (30 centimeters) below intertidal to 2 feet (60  
38 centimeters) above intertidal.

39 The modeled habitat for Suisun thistle in and near Suisun Marsh consists of all tidal brackish  
40 emergent wetland polygons with the appropriate vegetation. This included vegetation units  
41 dominated by saltscale, saltgrass, pickleweed, and broad-leaved peppergrass.

1 Full implementation of Alternative 9 would include the following conservation actions over the term  
2 of the BDCP to benefit covered tidal wetland plants (BDCP Chapter 3, Section 3.3, *Biological Goals*  
3 *and Objectives*).

- 4 • No net loss of Mason’s lilaepsis and delta mudwort occurrences within restoration sites, or  
5 within the area of affected tidal range of restoration projects (Objective DMW/ML1.1, associated  
6 with CM4 and CM11).
- 7 • No net loss of Delta tule pea and Suisun Marsh aster occurrences within restoration sites  
8 (Objective DTP/SMA1.1, associated with CM4 and CM11).
- 9 • Restore tidal inundation to wetlands in the Hill Slough Ecological Reserve and to the ponded  
10 area at Rush Ranch (Objective SBB/SuT1.1, associated with CM4).
- 11 • Complete seed banking of all existing Suisun Marsh populations and the representative genetic  
12 diversity using accepted seed banking protocols (Objective SBB/SuT1.2, associated with CM11).
- 13 • Establish a cultivated population of Suisun thistle from wild seed using accepted seed collection  
14 protocols (Objective SBB/SuT1.3, associated with CM11).
- 15 • Establish two occurrences of Suisun thistle in Conservation Zone 11 (Objective SBB/SuT1.4,  
16 associated with CM11).

17 Of 17,357 acres of tidal wetlands in the study area, Alternative 9 would affect 193 acres, including  
18 areas that are modeled habitat for Mason’s lilaepsis, Delta mudwort, side-flowering skullcap, Delta  
19 tule pea, Suisun Marsh aster, soft bird’s-beak, and Suisun thistle. Known occurrences of all of these  
20 species would be affected. In addition, three occurrences of Bolander’s water-hemlock, a noncovered  
21 special-status plant, could be affected by tidal habitat restoration. Table 12-9-66 summarizes the  
22 acreage of modeled habitat for covered tidal wetland species and the number of occurrences of each  
23 special-status tidal wetland plants in the study area.

24 **Table 12-9-66. Summary of Impacts on Tidal Wetland Plants under Alternative 9**

	Acres in Study Area	Acres Affected	Occurrences in Study Area	Occurrences Affected	Impacts
<b>Habitat</b>					
Delta mudwort/ Mason’s lilaepsis modeled habitat	6,081	163			Habitat loss from construction of water conveyance facilities, tidal habitat restoration, Yolo Bypass fisheries enhancements, and floodplain restoration
Side-flowering skullcap modeled habitat	2,497	173			Habitat loss from construction of water conveyance facilities, conveyance facilities, tidal habitat restoration, Yolo Bypass fisheries enhancements, and floodplain restoration
Soft bird’s-beak modeled habitat	1,228	73			Habitat loss from tidal habitat restoration
Delta tule pea/ Suisun Marsh aster modeled habitat	5,853	26			Habitat loss from construction of water conveyance facilities, tidal habitat restoration, Yolo Bypass fisheries enhancements, and floodplain restoration

	Acres in Study Area	Acres Affected	Occurrences in Study Area	Occurrences Affected	Impacts
Suisun thistle modeled habitat	1,281	73			Habitat loss from tidal habitat restoration
Tidal brackish emergent wetland	8,501	0			None
Tidal freshwater emergent wetland	8,856	193			Habitat loss from construction of water conveyance facilities, tidal habitat restoration, Yolo Bypass fisheries enhancements, and floodplain restoration
<b>Covered Species</b>					
Delta mudwort			58	10	Occurrences affected by construction of water conveyance facilities and tidal habitat restoration
Delta tule pea			106	30	Occurrences affected by construction of water conveyance facilities and tidal habitat restoration
Mason's lilaepsis			181	27	Occurrences affected by construction of water conveyance facilities and tidal habitat restoration
Side-flowering skullcap			12	1	Occurrences affected by construction of water conveyance facilities
Soft bird's-beak			13	7	Occurrences affected by tidal habitat restoration
Suisun Marsh aster			164	27	Occurrences affected by construction of water conveyance facilities and tidal habitat restoration
Suisun thistle			4	0	None
<b>Noncovered Species</b>					
Bolander's water hemlock			8	3	Occurrences affected by construction of water conveyance facilities and tidal habitat restoration

1

2 **Impact BIO-173: Effects on Habitat and Populations of Tidal Wetland Plants**

3 Alternative 9 would have adverse effects on tidal marsh special-status plants through  
 4 implementation of CM1, CM2, CM4, and CM5. No adverse effects are expected from implementation  
 5 of CM3, CM6, CM7, CM8, and CM9.

6 The individual effects of each relevant conservation measure are addressed below. A summary  
 7 statement of the combined impacts and NEPA and CEQA conclusions follows the individual  
 8 conservation measure discussions.

- 1       ● *CM1 Water Facilities and Operations*: Construction of the Alternative 9 water conveyance  
2 facilities would remove 163 acres of modeled habitat for delta mudwort and Mason’s lilaepsis,  
3 173 acres of modeled habitat for side-flowering skullcap, and 26 acres of modeled habitat for  
4 Delta tulle pea and Suisun Marsh aster. The extent to which modeled habitat is actually occupied  
5 by these species is not known; however, 12 occurrences of Mason’s lilaepsis, eight occurrences  
6 of Delta mudwort, one occurrence of Suisun Marsh aster, two occurrences of side-flowering  
7 skullcap, and one occurrence of Bolander’s water-hemlock in the study area could be affected by  
8 construction impacts. No known occurrences of soft bird’s-beak or Suisun thistle would be  
9 affected by construction of the water conveyance facilities.
- 10       ● *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo Bypass fisheries  
11 enhancements would remove 5 acres of modeled habitat for Mason’s lilaepsis and delta  
12 mudwort. The extent to which modeled habitat is actually occupied by these species is not  
13 known; however, no known occurrences in the study area would be affected. Yolo Bypass  
14 operations would result in more frequent and longer inundation of 8 acres of modeled habitat  
15 Delta tulle peas and Suisun Marsh aster. Two occurrences of Suisun Marsh aster would be  
16 affected by Yolo Bypass operations. Habitat for these species is normally periodically inundated  
17 or saturated; therefore, a small increase in the frequency and duration of periodic inundation of  
18 the habitat would not be expected to have a substantial effect.
- 19       ● *CM3 Natural Communities Protection and Restoration*: The BDCP proposes restoring or creating  
20 20 linear miles of transitional tidal areas within other natural communities that would be  
21 created or restored, including 6,000 acres of tidal brackish emergent wetland and 24,000 acres  
22 of tidal freshwater emergent wetland. In addition, the habitat and ecosystem functions of these  
23 areas would be maintained and enhanced. The BDCP does not specifically propose to protect  
24 any occurrences of tidal wetland plants nor does it propose active restoration of affected habitat  
25 or occurrences. Instead, the BDCP assumes that the 20 linear miles of restored transitional tidal  
26 areas will be passively colonized by the covered tidal wetland plants.
- 27       ● *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration would permanently  
28 remove 6 acres of modeled habitat for Mason’s lilaepsis and Delta mudwort. Habitat loss would  
29 occur through conversion of the species habitat (at and immediately above the tidal zone in  
30 marshes and along rivers and streams) to inundated tidal habitat. The extent to which modeled  
31 habitat is actually occupied by the species is not known; however, 14 of 176 known occurrences  
32 of Mason’s lilaepsis and three of 57 known occurrences of delta mudwort in the study area  
33 could be affected by tidal habitat restoration.
- 34       Tidal habitat restoration would remove 4 acres of modeled habitat for side-flowering skullcap.  
35 Whether the affected modeled habitat is actually occupied by side-flowering skullcap is not  
36 known; however, none of the 12 known occurrences in the study area would be affected.
- 37       Tidal habitat restoration would remove 2 acres of modeled habitat for Delta tulle pea and Suisun  
38 Marsh aster. However, the BDCP would allow up to 50 acres of modeled habitat to be removed.  
39 Habitat loss would result from conversion of the species habitat (at and immediately above the  
40 tidal zone in marshes and along rivers and streams) to inundated tidal habitat. The extent to  
41 which modeled habitat is actually occupied by the species is not known; however, 26 of 112  
42 known occurrences of Delta tulle pea and 24 of 145 occurrences of Suisun Marsh aster in the  
43 study area would be affected.

1 Tidal habitat restoration could affect 73 acres of modeled habitat for soft bird's-beak and Suisun  
2 thistle, including 1.3 acres of critical habitat. The extent to which modeled habitat is actually  
3 occupied by the species is not known; however, seven of 12 known occurrences of soft bird's-  
4 beak in the study area could be affected. None of the four known occurrences of Suisun thistle in  
5 the study area would be affected.

6 Tidal habitat restoration could affect three of eight known occurrences of Bolander's water-  
7 hemlock, a noncovered special-status species in the study area. Because Bolander's water-  
8 hemlock occurs in tidal marsh, it may benefit from tidal marsh restoration. However, site  
9 preparation, earthwork, and other site activities could adversely affect Bolander's water-  
10 hemlock through direct habitat removal.

- 11 • *CM5 Seasonally Inundated Floodplain Restoration*: Floodplain restoration levee construction  
12 would remove 3 acres of modeled habitat for Mason's lilaepsis and delta mudwort and 2 acres  
13 of modeled habitat for side-flowering skullcap. No known occurrences of these species in the  
14 study area would be affected by floodplain restoration.

15 Floodplain restoration would result in more frequent and longer inundation of 2 acres of  
16 modeled habitat for Mason's lilaepsis and delta mudwort, 18 acres of modeled habitat for side-  
17 flowering skullcap, and 1 acre of modeled habitat for Delta tule peas and Suisun Marsh aster. No  
18 known occurrences of these species in the study area would be affected by periodic inundation  
19 of restored floodplain habitat. Habitat for these species is normally periodically inundated or  
20 saturated; therefore, a small increase in the frequency and duration of periodic inundation of the  
21 habitat would not be expected to have a substantial effect.

- 22 • *CM6 Channel Margin Enhancement*: Effects of channel margin enhancement were not analyzed  
23 separately from the effects of tidal habitat restoration. Channel margin enhancement would  
24 have adverse effects on tidal wetland plants through direct removal and habitat modification.  
25 However, it would have beneficial effects on these species by improving the habitat functions for  
26 these species as a result of riprap removal and creation of floodplain benches. Side-flowering  
27 skullcap would benefit from installation of large woody material, which it appears to colonize.
- 28 • *CM7 Riparian Natural Community Restoration*: Riparian habitat restoration is not expected to  
29 adversely affect special-status tidal wetland plants. Preparatory work that involves habitat  
30 disturbance would occur during implementation of CM4 and CM5. Riparian plantings carried out  
31 for CM7 would be placed in floodplain areas, not in tidal wetlands.
- 32 • *CM8 Grassland Natural Community Restoration*: No tidal wetlands or occurrences of special-  
33 status tidal wetland plants are present within areas proposed for grassland communities  
34 restoration. Therefore, grassland communities restoration would have no impacts on covered  
35 and noncovered tidal wetland plants.
- 36 • *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*: No tidal wetlands or  
37 occurrences of special-status tidal wetland plants are present within areas proposed for vernal  
38 pool complex restoration. Therefore, vernal pool complex restoration would have no impacts on  
39 covered and noncovered tidal wetland plants.
- 40 • *CM10 Nontidal Marsh Restoration*: Nontidal marsh restoration would take place through  
41 conversion of cultivated lands. Therefore, nontidal marsh restoration would avoid tidal wetland  
42 habitat and would have no impacts on covered and noncovered tidal wetland plants.

- 1 • *CM22 Avoidance and Minimization Measures*: Effects on covered tidal wetland plants potentially  
2 resulting from implementation of CM1, CM2, CM4, and CM5 would be avoided or minimized  
3 though *AMM11 Covered Plant Species*, *AMM2 Construction Best Management Practices and*  
4 *Monitoring*, *AMM12 Vernal Pool Crustaceans*, *AMM30 Transmission Line Design and Alignment*  
5 *Guidelines*, and *AMM37 Recreation*. Under AMM11, surveys for covered plant species would be  
6 performed during the planning phase of projects, and any impacts on populations of covered  
7 species would be avoided through project design or subsequently minimized through AMM2. In  
8 addition, AMM11 contains specific guidance to avoid adverse modification of any of the primary  
9 constituent elements for Suisun thistle or soft bird's-beak critical habitat. AMM30, which  
10 specifies that the alignment of proposed transmission lines will be designed to avoid sensitive  
11 terrestrial and aquatic habitats when siting poles and towers, to the maximum extent feasible,  
12 would avoid some impacts on Mason's lilaepsis. AMM37 requires that new recreation trails  
13 avoid populations of covered tidal wetland plants.

14 In summary, the GIS analysis indicates that Alternative 9 would result in the loss of modeled habitat  
15 for all of the covered species and result in adverse effects on known occurrences of most of the  
16 special-status plants occurring in tidal wetlands. However, the BDCP predicts that habitat  
17 restoration activities would greatly expand the amount of habitat available to each of these species,  
18 offsetting any potential loss of habitat or occurrences resulting from covered activities.

19 Delta mudwort could lose 163 acres of modeled habitat (2.7%), including all or part of ten  
20 occurrences. The BDCP predicts that tidal habitat restoration activities proposed under CM4  
21 (Objectives TBEWNC1.1 and TFEWNC1.1) would increase the extent of habitat available for  
22 colonization by Delta mudwort, which could offset this habitat loss. Channel margin enhancement  
23 (CM6) and riparian natural community restoration (CM7) will also consider the potential for  
24 creating habitat for Delta mudwort; creation of suitable habitat under these measures could also  
25 help offset this habitat loss. Although active restoration of this species is not proposed, the BDCP  
26 predicts that natural expansion of populations into the restored habitat would take place and result  
27 in no net loss of occurrences (Objective DMW/ML1.1, associated with CM11). Post-implementation  
28 monitoring of affected occurrences and occurrences in reserve lands would be done to confirm that  
29 no net loss of occurrences has been achieved (Monitoring Action CM11-21, associated with CM11).

30 Mason's lilaepsis could lose 163 acres of modeled habitat (2.7%), including all or part of 27  
31 occurrences. The BDCP predicts that tidal habitat restoration activities proposed under CM4  
32 (Objectives TBEWNC1.1 and TFEWNC1.1) would increase the extent of habitat available for  
33 colonization by Mason's lilaepsis, which could offset this habitat loss. Channel margin enhancement  
34 (CM6) and riparian natural community restoration (CM7) will also consider the potential for  
35 creating habitat for Mason's lilaepsis; creation of suitable habitat under these measures could also  
36 help offset this habitat loss. Although active restoration of this species is not proposed, the BDCP  
37 predicts that natural expansion of populations into the restored habitat would take place and result  
38 in no net loss of occurrences (Objective DMW/ML1.1, associated with CM11). Post-implementation  
39 monitoring of affected occurrences and occurrences in reserve lands would be done to confirm that  
40 no net loss of occurrences has been achieved (Monitoring Action CM11-21, associated with CM11).

41 Delta tule pea could lose 26 acre of modeled habitat (0.4%), including all or part of 30 occurrences.  
42 The BDCP predicts that tidal habitat restoration activities proposed under CM4 (Objectives  
43 TBEWNC1.1 and TFEWNC1.1) would increase the extent of habitat available for colonization by  
44 Delta tule pea, which could offset this habitat loss. Channel margin enhancement (CM6) and riparian  
45 natural community restoration (CM7) will also consider the potential for creating habitat for Delta

1 tulle pea; creation of suitable habitat under these measures could also help offset this habitat loss.  
2 Although active restoration of this species is not proposed, the BDCP predicts that natural expansion  
3 of populations into the restored habitat would take place and result in no net loss of occurrences  
4 (Objective DTP/SMA1.1, associated with CM11). Post-implementation monitoring of affected  
5 occurrences and occurrences in reserve lands would be done to confirm that no net loss of  
6 occurrences has been achieved (Monitoring Action CM11-22, associated with CM11).

7 Suisun Marsh aster could lose 26 acre of modeled habitat (0.4%), including all or part of 27  
8 occurrences. The BDCP predicts that tidal habitat restoration activities proposed under CM4  
9 (Objectives TBEWNC1.1 and TFEWNC1.1) would increase the extent of habitat available for  
10 colonization by Suisun Marsh aster, which could offset this habitat loss. Channel margin  
11 enhancement (CM6) and riparian natural community restoration (CM7) will also consider the  
12 potential for creating habitat for Suisun marsh aster; creation of suitable habitat under these  
13 measures could also help offset this habitat loss. Although active restoration of this species is not  
14 proposed, the BDCP predicts that natural expansion of populations into the restored habitat would  
15 occur and result in no net loss of occurrences (Objective DTP/SMA1.1, associated with CM11). Post-  
16 implementation monitoring of affected occurrences and occurrences in reserve lands would be done  
17 to confirm that no net loss of occurrences has been achieved (Monitoring Action CM11-22,  
18 associated with CM11).

19 All four of these species (Delta mudwort, Mason's lilaopsis, Delta tulle pea, and Suisun Marsh aster)  
20 are widespread in the study area with many occurrences. Habitat modification and loss are the  
21 primary stressors that are responsible for their decline and that currently limit their distribution  
22 and abundance. Therefore, restoring large areas of habitat and improving habitat functions for these  
23 species would provide a reasonable expectation that the distribution and abundance of these  
24 species would also improve. Because a relatively small amount of modeled habitat would be  
25 adversely affected (less than 1% of the total), it is likely that the initial adverse effects of covered  
26 activities on these species would be offset and that the overall effect of Alternative 9 on these  
27 species would not be adverse.

28 Side-flowering skullcap could lose 173 acres of modeled habitat (7%), including all or part of one  
29 occurrence. Under AMM11, this occurrence would be surveyed for, and because this is a tidal  
30 freshwater wetland species, avoidance of the habitat during project construction would be highly  
31 likely. The BDCP predicts that tidal habitat restoration activities proposed under CM4 (Objectives  
32 TBEWNC1.1 and TFEWNC1.1) would increase the extent of habitat available for colonization by  
33 side-flowering skullcap, which could offset this habitat loss. Channel margin enhancement (CM6)  
34 and riparian natural community restoration (CM7) will also consider the potential for creating  
35 habitat for side-flowering skullcap; creation of suitable habitat under these measures could also help  
36 offset this habitat loss. No active restoration of this species is proposed, and no post-implementation  
37 monitoring of affected occurrences and occurrences in reserve lands would be done. Because  
38 impacts on occurrences of side-flowering skullcap would be avoided, and because loss of modeled  
39 habitat for the species would be offset through restoration, the overall effect of Alternative on this  
40 species would not be adverse.

41 Soft bird's-beak could lose 73 acres of modeled habitat (6%), including all or part of seven  
42 occurrences. The BDCP predicts that tidal habitat restoration activities proposed under CM4  
43 (Objectives TBEWNC1.1 and TFEWNC1.1) would increase the extent of habitat available for  
44 colonization by soft bird's-beak, which could offset this habitat loss. Tidal restoration in the Hill  
45 Slough Ecological Reserve would be done to increase potential habitat there for soft bird's-beak

1 (Objective SBB/SuT1.1, associated with CM4). In addition, activities to control invasive plants and  
2 manage livestock in tidal marsh habitat under CM11 could enhance habitat for soft bird's-beak.  
3 Although no active restoration of this species is proposed, post-implementation monitoring of soft  
4 bird's-beak occurrences in proximity to tidal restoration sites would be done to confirm that  
5 occurrences are stable or increasing (Monitoring Action CM11-22, associated with CM11). Soft  
6 bird's-beak has a restricted distribution in the study area with highly localized occurrences, and  
7 habitat modification is the primary factor responsible for the species' decline and limiting the  
8 species' distribution and abundance. Improving habitat functions for this species would provide a  
9 reasonable expectation that the distribution and abundance of soft bird's-beak would also improve.  
10 Although a substantial amount of modeled habitat could be affected, the primary habitat for soft  
11 bird's-beak is high tidal brackish marsh, and the affected habitat is low tidal brackish marsh.  
12 Therefore, it is likely that the overall effect of Alternative 9 on this species would not be adverse.

13 Suisun thistle could lose 73 acres of modeled habitat (6%), although no occurrences would be  
14 affected. The BDCP predicts that tidal habitat restoration activities proposed under CM4 (Objectives  
15 TBEWNC1.1 and TFEWNC1.1) would increase the extent of habitat available for colonization by  
16 Suisun thistle, which could offset this habitat loss. Tidal restoration in the Hill Slough Ecological  
17 Reserve and at Rush Ranch would be done to increase potential habitat there for Suisun thistle  
18 (Objective SBB/SuT1.1, associated with CM4). In addition, activities to control invasive plants and  
19 manage livestock in tidal marsh habitat under CM11 could enhance habitat for Suisun thistle. In  
20 addition, two new occurrences of Suisun thistle would be established in CZ 11 (Objective  
21 SBB/SuT1.4, associated with CM11). Post-implementation monitoring of Suisun thistle occurrences  
22 in proximity to tidal restoration sites would be done to confirm that occurrences are stable or  
23 increasing (Monitoring Action CM11-22, associated with CM11). Habitat restoration, enhancement  
24 of habitat functions, and establishment of new occurrences would offset any potential loss of  
25 modeled habitat for Suisun Marsh thistle.

26 Three occurrences of Bolander's water-hemlock could be affected. Although the extent of potential  
27 habitat affected was not determined, it would be comparable to that for Delta tule pea and Suisun  
28 Marsh aster (5 acres). Tidal habitat restoration activities proposed under CM4 (Objectives  
29 TBEWNC1.1 and TFEWNC1.1) could increase the extent of habitat available for colonization by  
30 Bolander's water-hemlock, which could offset this habitat loss. Because only a few scattered  
31 occurrences of Bolander's water-hemlock are present in the study area, there is no reasonable  
32 expectation that habitat restoration without active species-specific restoration activities would  
33 result in the establishment of new occurrences to offset the losses. Also, because Bolander's water-  
34 hemlock is a noncovered species, the species protections and occurrence monitoring afforded to  
35 covered species under the BDCP would not apply to this species. Therefore, the effects of Alternative  
36 9 on Bolander's water hemlock could be adverse.

37 **NEPA Effects:** The loss of modeled and occupied habitat for special-status tidal wetland plants  
38 would be offset through tidal habitat restoration (CM4). Therefore, implementation of Alternative 9  
39 would result in no adverse effects on seven of eight special-status grassland plants in the study area.  
40 Alternative 9 would result in a reduction in the range and numbers of Bolander's water-hemlock,  
41 which would be an adverse effect. Adverse effects on Bolander's water-hemlock could be avoided or  
42 offset through implementation of Mitigation Measure BIO-170.

43 **CEQA Conclusion:** Because loss of occurrences and modeled habitat for covered tidal habitat plant  
44 species would be offset through habitat restoration, impacts on covered tidal wetland plants as a  
45 result of implementing Under Alternative 9 would not be significant. However, the loss of Bolander's

1 water-hemlock populations in CZ 11 would result in a reduction in the range and numbers of this  
2 species and would be a significant impact. Implementation of Mitigation Measure BIO-170 would  
3 reduce this impact to a less-than-significant level.

4 **Mitigation Measure BIO-170: Avoid, Minimize, or Compensate for Impacts on Noncovered**  
5 **Special-Status Plant Species**

6 DWR will evaluate all projects for their impacts on special-status plants, avoid or minimize  
7 impacts on species that occur on project sites, and compensate for impacts on species. All  
8 impacts on federally listed noncovered species, diamond-petaled California poppy, or caper-  
9 fruited tropidocarpum shall be avoided. Impacts on other special-status plant species shall be  
10 avoided to the extent feasible, and any unavoidable impacts shall be compensated for.

- 11 ● DWR shall conduct surveys for the special-status plant species within and adjacent to all  
12 project sites. Special-status plant surveys required for project-specific permit compliance  
13 will be conducted during the planning phase to allow design of the individual restoration  
14 projects to avoid adverse modification of habitat for specified covered plants. The purpose  
15 of these surveys will be to verify that the locations of special-status plants identified in  
16 previous record searches or surveys are extant, identify any new special-status plant  
17 occurrences, and cover any portions of the project area not previously surveyed. The extent  
18 of mitigation of direct loss of or indirect effects on special-status plants will be based on  
19 these survey results.
- 20 ● All surveys shall be conducted by qualified biologists using the using *Guidelines for*  
21 *Conducting and Reporting Botanical Inventories for Federally Listed, Proposed and Candidate*  
22 *Plants* (U.S. Fish and Wildlife Service 1996) and *Protocols for Surveying and Evaluating*  
23 *Impacts to Special Status Native Plant Populations and Natural Communities* (California  
24 Department of Fish and Game 2009) during the season that special-status plant species  
25 would be evident and identifiable, i.e., during their blooming season. Locations of special-  
26 status plants in proposed construction areas will be recorded using a GPS unit and flagged.
- 27 ● The construction monitoring plan for the protection of covered fish, wildlife, and plant  
28 species, prepared by DWR before implementing an approved project, will provide for  
29 construction activity monitoring in areas identified during the planning stages and  
30 species/habitat surveys as having noncovered special-status plant species.
- 31 ● Where surveys determine that a special-status plant species is present in or adjacent to a  
32 project site, direct and indirect impacts of the project on the species shall be avoided  
33 through the establishment of activity exclusion zones, within which no ground-disturbing  
34 activities shall take place, including construction of new facilities, construction staging, or  
35 other temporary work areas. Activity exclusion zones for special-status plant species shall  
36 be established around each occupied habitat site, the boundaries of which shall be clearly  
37 marked with standard orange plastic construction exclusion fencing or its equivalent. The  
38 establishment of activity exclusion zones shall not be required if no construction-related  
39 disturbances will occur within 250 feet of the occupied habitat site. The size of activity  
40 exclusion zones may be reduced through consultation with a qualified biologist and with  
41 concurrence from USFWS or CDFW based on project site-specific conditions.
- 42 ● Where avoidance of impacts on a special-status plant species is infeasible, DWR will  
43 compensate for loss of individuals or occupied habitat of a special-status plant species

through the acquisition, protection, and subsequent management in perpetuity of other existing occurrences at a 2:1 ratio (occurrences affected:occurrences preserved). DWR will provide detailed information to USFWS and CDFW on the location of the preserved occurrences, quality of the preserved habitat, feasibility of protecting and managing the areas in-perpetuity, responsible parties, and other pertinent information. If suitable occurrences of a special-status plant species are not available for preservation, then the project shall be redesigned to remove features that would result in impacts on that species.

**Inland Dune Plants**

**Impact BIO-174: Effects on Habitat and Populations of Inland Dune Plants**

Alternative 9 would have no adverse effects on inland dune plants (Table 12-9-67). No construction activities or habitat restoration would take place where the species occur. No specific actions to benefit inland dune species are proposed.

**Table 12-9-67. Summary of Impacts on Inland Dune Plants under Alternative 9**

	Acres in Study Area	Acres Affected	Occurrences in Study Area	Occurrences Affected	Impacts
<b>Modeled Habitat</b>					
Inland Dunes	19	0			None
<b>Noncovered Species</b>					
Hoover's cryptantha			1	0	None
Antioch Dunes buckwheat			1	0	None
Mt. Diablo buckwheat			1	0	None
Contra Costa wallflower			3	0	None
Antioch Dunes evening-primrose			9	0	None

**NEPA Effects:** Implementation of the BDCP under Alternative 9 would not affect special-status inland dune plant species.

**CEQA Conclusion:** Implementation of Alternative 9 would have no impacts on inland dune species. No mitigation is required.

**Nontidal Wetland Plants**

No covered plant species occur in nontidal wetlands in the study area; however, six noncovered special-status plant species occur in nontidal wetlands in the study area. Table 12-9-68 summarizes the acreage of nontidal wetland habitat in the study area and the number of occurrences of each special-status nontidal wetland plant in the study area.

1 **Table 12-9-68. Summary of Impacts on Nontidal Wetland Plants under Alternative 9**

	Acres in Study Area	Acres Affected	Occurrences in Study Area	Occurrences Affected	Impacts
<b>Habitat</b>					
Nontidal freshwater aquatic	5,567	269			Loss of habitat from construction of Yolo Bypass fisheries enhancements, tidal habitat restoration, and floodplain restoration
Nontidal freshwater perennial emergent wetland	1,509	151			Loss of habitat from construction of water conveyance facilities, tidal habitat restoration, Yolo Bypass fisheries enhancements, and floodplain restoration
<b>Noncovered Species</b>					
Watershield			3	0	None
Bristly sedge			18	1	Loss of habitat from construction of water conveyance facilities
Woolly rose-mallow <sup>a</sup>			121	14	Loss of habitat from construction of water conveyance facilities, tidal habitat restoration
Eel-grass pondweed			1	1	Loss of habitat from construction of water conveyance facilities
Sanford's arrowhead			23	2	Loss of habitat from construction of water conveyance facilities, tidal habitat restoration
Marsh skullcap <sup>a</sup>			5	1	Loss of habitat from construction of water conveyance facilities

<sup>a</sup> Also occurs in valley/foothill riparian habitat.

2

3 **Impact BIO-175: Effects on Habitat and Populations of Nontidal Wetland Plants**

4 Under Alternative 9, known occurrences eel-grass pondweed, bristly sedge, woolly rose-mallow,  
5 Sanford's arrowhead, and marsh skullcap would be within the proposed footprint for the water  
6 conveyance facilities or within the hypothetical footprint for restoration activities and would be  
7 adversely affected. Alternative 9 would have no adverse effects on watershield.

8 The individual effects of each relevant conservation measure are addressed below. A summary  
9 statement of the combined impacts and NEPA and CEQA conclusions follows the individual  
10 conservation measure discussions.

- 11 • *CM1 Water Facilities and Operations*: Under Alternative 9, the primary effect on noncovered  
12 plants would be the loss of occupied habitat as a result of in-stream island dredging and  
13 construction of operable barriers. One occurrence of bristly sedge in CZ 5 would be adversely  
14 affected by construction of a temporary access road. One occurrence of Sanford's arrowhead in  
15 CZ 5 would be adversely affected by installation of an operable barrier and associated  
16 transmission lines. Thirteen occurrences of woolly rose-mallow would be affected by channel  
17 dredging, construction of operable barriers, and other construction activities: five in CZ 6, one in

1 CZ 5, one in CZ 4, and six in CZ 8. One occurrence of eel-grass pondweed at the Webb Tract and  
2 one occurrence of marsh skullcap on the Middle River are present within areas in CZ 6 that  
3 would be affected by construction of water conveyance facilities. The locations of these two  
4 occurrences are not known with certainty (i.e., nonspecific occurrences), so the likelihood or  
5 extent of the impact cannot be determined.

- 6 • *CM2 Yolo Bypass Fisheries Enhancement*: No known occurrences of special-status nontidal  
7 wetland plants are present in the hypothetical footprint for construction or operation of the  
8 Yolo Bypass fisheries enhancements. Therefore, construction and operation of the Yolo Bypass  
9 Fisheries enhancements would not affect special-status nontidal marsh plants.
- 10 • *CM3 Natural Communities Protection and Restoration*: No specific natural communities  
11 protection is proposed for nontidal wetlands under the BDCP. Therefore, no occurrences of  
12 special-status nontidal plants are proposed for protection.
- 13 • *CM4 Tidal Natural Communities Restoration*: One known occurrence of Sanford's arrowhead is  
14 present within areas that could be affected by tidal habitat restoration in CZ 2. One known  
15 occurrence of woolly rose-mallow is present within areas that could be affected by tidal habitat  
16 restoration in CZ 7. No other known occurrences of special-status nontidal wetland plants are  
17 present within areas proposed for tidal habitat restoration. Therefore, tidal habitat restoration  
18 could have adverse effects on three special-status nontidal wetland plants.
- 19 • *CM5 Seasonally Inundated Floodplain Restoration*: No known occurrences of special-status  
20 nontidal wetland plants are present within areas proposed for floodplain restoration.
- 21 • *CM6 Channel Margin Enhancement*: No known occurrences of special-status nontidal wetland  
22 plants are present within areas proposed for channel margin habitat enhancement. Therefore,  
23 channel margin habitat enhancement would have no impacts on special-status nontidal wetland  
24 plants.
- 25 • *CM7 Riparian Natural Community Restoration*: No known occurrences of special-status nontidal  
26 wetland plants are present within areas proposed for riparian habitat restoration. Therefore,  
27 riparian habitat restoration would have no impacts on special-status nontidal wetland plants.
- 28 • *CM8 Grassland Natural Community Restoration*: No known occurrences of special-status nontidal  
29 wetland plants are present within areas proposed for grassland communities restoration.  
30 Therefore, grassland communities restoration would have no impacts on special-status nontidal  
31 wetland plants.
- 32 • *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*: No known occurrences of  
33 special-status nontidal wetland plants are present within areas proposed for vernal pool  
34 complex restoration. Therefore, vernal pool complex restoration would have no impacts on  
35 special-status nontidal wetland plants.
- 36 • *CM10 Nontidal Marsh Restoration*: Nontidal marsh restoration would take place through  
37 conversion of cultivated lands. Therefore, nontidal marsh restoration would avoid existing  
38 nontidal marsh and would have no adverse effects on special-status nontidal wetland plants.  
39 The BDCP may benefit nontidal wetland species by creating 400 acres of nontidal freshwater  
40 marsh, including components of nontidal perennial aquatic and nontidal freshwater perennial  
41 emergent wetland communities, and by maintaining and enhancing the habitat functions of  
42 protected and created nontidal wetland habitats for covered and other native species. However,  
43 no specific actions to benefit noncovered species are proposed.

1 Under Alternative 9, 1,500 acres of nontidal marsh would be restored (Objective NFEW/NPANC1.1,  
2 addressed under CM10). However, these wetlands would be restored primarily as habitat for giant  
3 garter snake. These habitat restoration activities would be unlikely to expand the amount of habitat  
4 available to bristly sedge, woolly rose-mallow, eel-grass pondweed, marsh skullcap, and Sanford's  
5 arrowhead, potential loss of habitat or occurrences resulting from covered activities would not be  
6 compensated for. Moreover, because special-status nontidal wetland plant species are not covered  
7 under the BDCP, the species protections afforded to covered species under CM22 do not apply to  
8 these species, and the effects of Alternative 9 on these species would be adverse.

9 **NEPA Effects:** Implementation of the BDCP under Alternative 9 could result in a reduction in the  
10 range and numbers of bristly sedge, woolly rose-mallow, eel-grass pondweed, marsh skullcap, and  
11 Sanford's arrowhead, five noncovered nontidal wetland species, which would be an adverse effect.  
12 Adverse effects on these species could be avoided or offset through implementation of Mitigation  
13 Measure BIO-170.

14 **CEQA Conclusion:** Under Alternative 9, construction of the water conveyance facilities and tidal  
15 habitat restoration would result in a reduction in the range and numbers of bristly sedge, woolly  
16 rose-mallow, eel-grass pondweed, marsh skullcap, and Sanford's arrowhead. These impacts would  
17 be significant. Implementation of Mitigation Measure BIO-170, *Avoid, Minimize, or Compensate for*  
18 *Impacts on Noncovered Special-Status Plant Species*, would reduce these impacts to a less-than-  
19 significant level.

20 **Mitigation Measure BIO-170: Avoid, Minimize, or Compensate for Impacts on Noncovered**  
21 **Special-Status Plant Species**

22 Please see Mitigation Measure BIO-170 under Impact BIO-173.

23 **General Terrestrial Biology Effects**

24 **Wetlands and Other Waters of the United States**

25 Alternative 9 actions would both permanently and temporarily remove or convert wetlands and  
26 open water that is potentially jurisdictional as regulated by USACE under Section 404 of the CWA.  
27 The following two impacts address the project-level effects of CM1 on these potential wetlands and  
28 waters, and the programmatic-level effects of other relevant conservation actions (CM2–CM10).  
29 Conservation Measures 11–22 would not directly result in loss or conversion of wetlands or other  
30 waters of the United States. The methods used to conduct these analyses are described in Section  
31 12.3.2.4 of this chapter.

32 **Impact BIO-176: Effects of Constructing Water Conveyance Facilities (CM1) on Wetlands and**  
33 **Other Waters of the United States**

34 Construction of the Alternative 9 water conveyance facilities would both temporarily and  
35 permanently remove potential wetlands and other waters of the United States as regulated by  
36 Section 404 of the CWA (Table 12-9-69). Based on the methodology used to conduct this analysis,  
37 these effects would occur at channel dredging sites, canal construction sites, operable barrier  
38 construction sites and channel widening sites throughout the study area, and at multiple temporary  
39 work areas associated with the construction activity. The permanent and temporary wetland effects  
40 (1,565 acres) would occur primarily in open tidally-influenced channels of the central and south  
41 Delta, including Middle River, Victoria Canal and Old River from channel dredging and canal

1 construction. Construction of various operable barriers in major rivers, canals and sloughs  
 2 throughout the central and south Delta would also contribute to the large acreage affected by water  
 3 conveyance construction. Most of the construction and dredging activities would not permanently  
 4 remove the waterways, but would permanently modify the channel bottoms and eliminate any  
 5 associated aquatic vegetation. An additional effect on waters of the United States is the dredging of  
 6 517 acres of tidal flow in Middle River and Victoria and North Canals.

7 **Table 12-9-69. Potential Wetlands and Other Waters of the United States Filled by Construction of**  
 8 **Alternative 9 Water Conveyance Facilities**

Wetland/Other Water Type <sup>a</sup>	Permanent	Temporary	Total
<b>Open Water</b>			
Nontidal Flow	41	10	51
Muted Tidal Flow	0	0	0
Tidal Flow <sup>b</sup>	670	362	1,032
Pond or Lake (nontidal)	5	<1	5
Clifton Court Forebay	13	0	13
<b>Wetland</b>			
Nontidal Wetland	17	21	38
Tidal Wetland	74	332	406
Seasonal Wetland	12	8	20
<b>Total Impact Acres</b>	<b>832</b>	<b>733</b>	<b>1,565</b>

<sup>a</sup> Wetland types are described in Section 12.3.2.4, *Methods Used to Assess Wetlands and Other Waters of the United States*.

<sup>b</sup> Alternative 9 also includes channel dredging impacts on 517 acres of tidal flow in Middle River and Victoria and North Canals

Source: California Department of Water Resources 2013b

9

10 **NEPA Effects:** The permanent and temporary loss of these potential jurisdictional wetlands as a  
 11 result of constructing Alternative 9 water conveyance facilities would be a substantial effect if not  
 12 compensated by wetland protection and/or restoration. This loss would represent a removal of  
 13 federally protected wetlands as defined by Section 404 of the CWA. However, Alternative 9 includes  
 14 conservation measures (CM4 and CM10) that would restore and protect large acreages of both tidal  
 15 and nontidal wetlands and open water in the study area. Through the course of the BDCP  
 16 restoration program, this alternative would restore 65,000 acres of tidal and 1,200 acres of nontidal  
 17 wetland or open water. Impacts to wetlands from CM1 construction would occur in the first 10 years  
 18 after BDCP approval. Approximately 19,550 acres of this wetland restoration would occur during  
 19 this time period, thereby offsetting the impacts of CM1 construction. These acreages greatly exceed  
 20 the no net loss (1:1 replacement ratio) requirement for Alternative 9 (1,569 acres). Therefore, there  
 21 would be an overall beneficial effect on potential jurisdictional wetlands and other waters of the  
 22 United States from Alternative 9 implementation.

23 **CEQA Conclusion:** The permanent and temporary loss of potential jurisdictional wetlands as a result  
 24 of constructing Alternative 9 water conveyance facilities would be a substantial effect if not  
 25 compensated for by wetland protection and/or restoration. This loss would represent either  
 26 temporary or permanent removal of federally protected wetlands or other waters of the United

1 States as defined by Section 404 of the CWA. However, Alternative 9 includes conservation measures  
2 (CM4 and CM10) that would restore and protect large acreages of both tidal and nontidal wetlands  
3 and open water. Through the course of the BDCP restoration program, this alternative would result  
4 in restoration of 65,000 acres of tidal and 1,200 acres of nontidal wetlands and open water. Impacts  
5 to wetlands from CM1 construction would occur in the first 10 years after BDCP approval.  
6 Approximately 19,550 acres of this wetland restoration would occur during this time period,  
7 thereby offsetting the impacts of CM1 construction. These acreages greatly exceed the no net loss  
8 (1:1 replacement ratio) requirement for Alternative 9 (1,565 acres). Therefore, there would be a  
9 beneficial impact on potential jurisdictional wetlands and other waters of the United States resulting  
10 from Alternative 9 implementation.

11 **Impact BIO-177: Effects of Implementing Other Conservation Measures (CM2–CM10) on**  
12 **Wetlands and Other Waters of the United States**

13 The habitat protection and restoration activities associated with Alternative 9's other conservation  
14 measures (CM2–CM10) would alter the acreages and functions and values of wetlands and Waters of  
15 the United States in the study area during the course of BDCP conservation action implementation.  
16 Because these conservation measures have not been defined to the level of site-specific footprints, it  
17 is not possible to delineate and quantify these effects in detail. Several of the conservation measures  
18 (CM2, CM4, and CM5) have been described with theoretical footprints for purposes of the effects  
19 analysis contained in BDCP Chapter 5, *Effects Analysis*. These theoretical footprints have been used  
20 to predict the acres of natural communities that would be affected through loss or conversion, which  
21 gives some indication of jurisdictional wetland effects. Any CM2–CM10 effects ascribed to tidal  
22 perennial aquatic, tidal brackish emergent, tidal freshwater emergent, other natural seasonal,  
23 nontidal freshwater perennial emergent, and nontidal perennial aquatic wetlands natural  
24 communities are likely to also be effects on wetlands and other Waters of the US. Effects ascribed to  
25 other natural communities and land cover types with small jurisdictional wetland components  
26 (valley/foothill riparian, alkali seasonal wetland complex, vernal pool complex, managed wetland,  
27 grassland and cultivated land) are not easily converted to effects on wetlands and other Waters of  
28 the US by the use of theoretical footprints. Because of this lack of detail, a programmatic assessment  
29 is provided for these other conservation measures.

30 **NEPA Effects:** The conversion of existing wetland natural communities to other types of wetland  
31 natural communities through implementation of CM2–CM10 for Alternative 9 would be in the range  
32 of 5,500 to 6,000 acres, assuming that 100% of the predominantly wetland natural communities  
33 listed in Table 12-9-69 and that 10% of all of the non-wetland natural communities listed in that  
34 table would qualify as wetlands or other Waters of the US under the CWA. Most of these wetlands  
35 would be converted to tidal and nontidal wetlands and open water through implementation of CM4,  
36 and CM10. The wetlands and open water created by these two restoration actions would be  
37 approximately 66,200 acres, far exceeding what is required under the no net loss policy used by the  
38 USACE in considering Section 404 permits, even if one were to assume that all conversions  
39 represented a functional wetland loss. Therefore, there would be a beneficial effect on potential  
40 jurisdictional wetlands and other Waters of the US from implementing CM2–CM10.

41 **CEQA Conclusion:** The permanent and temporary loss of potential jurisdictional wetlands as a result  
42 of implementing the other conservation measures (CM2–CM10) of Alternative 9 would be a  
43 substantial effect if not compensated for by wetland protection and/or restoration. This loss would  
44 represent a removal of federally protected wetlands or other Waters of the US as defined by Section

1 404 of the CWA. However, Alternative 9 includes conservation measures (CM4 and CM10) that  
2 would restore large acreages of both tidal and nontidal wetlands and open water in the study area.  
3 Over the life of the BDCP restoration program, this alternative would result in restoration of 66,200  
4 acres of tidal and nontidal wetlands and open water, of which 19,550 acres would be restored in the  
5 first 10 years. These acreages greatly exceed the no net loss (1:1 replacement ratio) requirement for  
6 Alternative 9 (5,500–6,000 acres). Therefore, there would be a beneficial impact on potential  
7 jurisdictional wetlands and other Waters of the US from implementing CM2–CM10 under  
8 Alternative 9.

### 9 **Shorebirds and Waterfowl**

10 Managed wetlands, tidal natural communities, and cultivated lands (including grain and hay crops,  
11 pasture, field crops, rice, and idle lands) provide freshwater nesting, feeding, and resting habitat for  
12 a large number of Pacific flyway waterfowl and shorebirds. The primary effects of concern for  
13 shorebirds and waterfowl are related to the conversion of managed wetland and cultivated lands to  
14 tidal marsh associated with habitat restoration. Ducks Unlimited (2013) conducted an analysis to  
15 determine the effects of BDCP conservation measures on waterfowl, as well as to determine whether  
16 BDCP actions would impede attainment of the goals established by the Central Valley Joint Venture  
17 (CVJV) Implementation Plan for the Delta, Yolo, and Suisun Marsh drainage basins. The CVJV efforts  
18 are guided by its 2006 Implementation Plan, which is founded on the principles of strategic habitat  
19 conservation (Central Valley Joint Venture 2006). Those principles emphasize the establishment of  
20 population abundance objectives and the use of species-habitat models to link population objectives  
21 to habitat needs. The CVJV has used species-habitat models to translate bird abundance objectives  
22 into habitat objectives, while explicitly identifying the biological assumptions that underpin these  
23 models and the data used to populate them. As a result, the CVJV's biological planning provides a  
24 framework for evaluating the effects of the BDCP on waterfowl.

25 The Ducks Unlimited waterfowl analysis focused primarily on dabbling ducks. Less than 5% of all  
26 geese in the Central Valley occur in the Yolo, Delta, and Suisun Marsh drainage basins. Moreover,  
27 geese in the Central Valley rely mostly on agricultural habitats to meet their food energy needs. The  
28 BDCP's effect on agricultural habitats is limited to the Delta Basin where about 2500 acres of corn  
29 now available to geese would be converted to other habitats (Ducks Unlimited 2013: Table 5). Food  
30 supplies for geese would still be well in excess of demand even with the loss of these agricultural  
31 habitats (Central Valley Joint Venture 2006, Ducks Unlimited 2013). The duck population objectives  
32 used in the analysis were taken directly from the CVJV Plan. Dabbling duck species make up 92% of  
33 this objective, while diving duck species make up the remaining 8%. Thus, the results were mostly  
34 driven by dabbling duck needs and largely interpreted in the context of dabbling duck foraging  
35 ecology. The 55,000 acres of Tidal Natural Communities Restoration (CM4) would be expected to  
36 benefit diving ducks by providing deep water foraging habitat. Refer to the Ducks Unlimited Report  
37 (Ducks Unlimited 2013) for details of the analysis and methods with respect to the TRUMET model  
38 used to quantify effects on food biomass and food quality.

39 An analysis was conducted to determine the effects of the BDCP covered activities on wintering and  
40 breeding shorebird habitat (ICF International 2013). This analysis evaluated the relative increase  
41 and decrease in natural communities known to provide important foraging, roosting, and breeding  
42 habitat. Similar to the waterfowl analysis, the results were broken up into the three Central Valley  
43 Joint Venture Basins that overlap with the BDCP study area: Yolo, Delta, and Suisun. Natural  
44 community losses and gains were then translated into species-specific outcomes, comparing the

1 relative habitat value of each BDCP natural community for each Central Valley shorebird species  
2 (Table 1, ICF International 2013). The shorebird species ranking system displayed in Table 1 (ICF  
3 International 2013) was modified from a table in Stralberg et. al (2011). The table was created using  
4 survey data and experts' species-specific habitat rankings. The survey data included fall, winter, and  
5 spring density data. This resulted in an overall, cross-season representation of habitat requirements.

6 **Impact BIO-178: Loss or Conversion of Habitat for Waterfowl and Shorebirds as a Result of**  
7 **Water Conveyance Facilities Construction**

8 Development of the water conveyance facilities (CM1) would result in the permanent removal of  
9 approximately 3 acres of managed wetland, 6 acres of tidal wetlands, 13 acres of nontidal wetlands,  
10 and 2,541 acres of suitable cultivated lands (including grain and hay crops, pasture, field crops, rice,  
11 and idle lands). In addition, 83 acres of managed wetland, 6 acres of tidal wetlands, 10 acres of  
12 nontidal wetlands, and 899 acres of cultivated lands would be temporarily impacted.

13 These losses of habitat would occur within the first 10 years of Alternative 9 implementation in the  
14 Delta Basin. The BDCP has committed to the near-term protection of 15,400 acres of non-rice  
15 cultivated lands, 200 acres of rice, and 700 acres of rice or "rice equivalent" natural communities  
16 including nontidal wetlands in the near-term. In addition, 4,100 acres of managed wetlands would  
17 be created, protected, and enhanced, 8850 acres of freshwater tidal wetlands would be restored, and  
18 2,000 acres of tidal brackish emergent wetland would be restored (Table 3-4, Chapter 3, *Description*  
19 *of Alternatives*).

20 Construction activities could have an adverse effect on nesting shorebirds or waterfowl if they were  
21 present in or adjacent to work areas and could result in destruction of nests or disturbance of  
22 nesting and foraging behaviors. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird*  
23 *Surveys and Avoid Disturbance of Nesting Birds*, would be available to minimize adverse effects on  
24 nesting birds.

25 **NEPA Effects:** Habitat loss from construction of the Alternative 9 water conveyance facilities would  
26 not result in an adverse effect on shorebirds and waterfowl because of the acres of natural  
27 communities and cultivated lands that would be restored and protected in the near-term timeframe.  
28 If waterfowl were present in or adjacent to work areas, construction activities could result in  
29 destruction of nests or disturbance of nesting and foraging behaviors, which would be an adverse  
30 affect on nesting shorebirds and waterfowl. Mitigation Measure BIO-75, *Conduct Preconstruction*  
31 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to minimize adverse  
32 effects on nesting birds.

33 **CEQA Conclusion:** Habitat loss from construction of the Alternative 9 water conveyance facilities  
34 would have a less-than-significant impact on shorebirds and waterfowl because of the acres of  
35 natural communities and cultivated lands that would be restored and protected in the near-term  
36 timeframe. If waterfowl were present in or adjacent to work areas, construction activities could  
37 result in destruction of nests or disturbance of nesting and foraging behaviors, which would be a  
38 significant impact. Implementation of Mitigation Measure BIO-75, *Conduct Preconstruction Nesting*  
39 *Bird Surveys and Avoid Disturbance of Nesting Birds*, would reduce this impact on nesting birds to a  
40 less-than-significant level.

1           **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**  
2           **Disturbance of Nesting Birds**

3           See Mitigation Measure BIO-75 under Impact BIO-75.

4           **Impact BIO-179: Loss or Conversion of Habitat for Wintering Waterfowl as a Result of**  
5           **Implementation of Conservation Components**

6           **Suisun Marsh:** Managed seasonal wetlands in Suisun Marsh would be reduced by an estimated  
7           8,818 acres as a result of Alternative 9 implementation. This would represent a 25% decrease in  
8           managed seasonal wetlands compared with long-term conditions without Alternative 9 (Ducks  
9           Unlimited 2013, Table 5). There is considerable uncertainty about the biomass and nutritional  
10          quality of waterfowl foods produced in Suisun Marsh's managed wetlands, which makes it difficult  
11          to identify the amount of mitigation needed. To address this uncertainty, three levels of food  
12          biomass and three levels of nutritional quality were modeled for these existing habitats (Ducks  
13          Unlimited 2013, Table 7). Three mitigation scenarios based on these energetic assumptions of  
14          biomass and food quality were then run to determine a minimum acreage of managed seasonal  
15          wetlands to be protected and enhanced to compensate for the loss of productivity resulting from  
16          habitat conversion to tidal wetlands.

- 17          ● Scenario 1) Assume that existing managed seasonal wetlands provide low food biomass and low  
18          food quality. Under this assumption, the managed seasonal wetlands in Suisun Marsh produce  
19          50% of the seed biomass of seasonal wetlands elsewhere in the Central Valley, and these seeds  
20          have 60% of the metabolizable energy of seeds produced outside of Suisun Marsh. Given the  
21          assumption that managed seasonal wetlands in Suisun could be enhanced to provide high food  
22          biomass and high food quality (equal to wetlands in the Central Valley), 5,000 acres of managed  
23          wetlands protected and managed for high biomass and high food quality would mitigate the  
24          conversion of 8,857 acres of managed seasonal wetland to tidal marsh.
- 25          ● Scenario 2) Assume that the managed seasonal wetlands lost provide medium food biomass and  
26          medium food quality. Under this assumption, the managed seasonal wetlands in Suisun Marsh  
27          produce 75% of the seed biomass of seasonal wetlands elsewhere in the Central Valley, and  
28          these seeds have 80% of the metabolizable energy of seeds produced outside of Suisun Marsh.  
29          Given the assumption that managed seasonal wetlands in Suisun Marsh could be enhanced to  
30          provide high food biomass and high food quality (equal to wetlands in the Central Valley),  
31          13,300 acres of managed wetlands protected and managed for high biomass and high food  
32          quality would mitigate the conversion of 8,857 acres of managed seasonal wetland to tidal  
33          marsh.
- 34          ● Scenario 3) Assume that existing managed seasonal wetlands provide low food biomass and low  
35          food quality. Given the assumption that managed seasonal wetlands in Suisun Marsh could only  
36          be enhanced to provide medium food biomass and medium food quality (produce 75% of the  
37          seed biomass of seasonal wetlands elsewhere in the Central Valley, with these seeds having 80%  
38          of the metabolizable energy of seeds produced outside of Suisun Marsh), 8,800 acres of  
39          managed wetlands protected and managed for medium biomass and medium food quality would  
40          mitigate the conversion of 8,857 acres of managed seasonal wetland to tidal marsh.

41          The BDCP has committed to protecting and enhancing a minimum of 5,000 acres of managed  
42          seasonal wetlands in Suisun Marsh to compensate for the loss of productivity from habitat  
43          conversion to tidal marsh. This minimum commitment of 5,000 acres would mitigate the reduced

1 productivity resulting from conversion of managed seasonal wetlands under the assumptions that  
2 1) existing managed seasonal wetlands on average in Suisun Marsh provide low biomass and low-  
3 quality food to wintering waterfowl and 2) protected seasonal wetlands can be managed to produce  
4 high biomass and high food quality. However, the food biomass and productivity in Suisun Marsh  
5 would need to be quantified in order to determine if the 5,000 acres was sufficient to avoid an  
6 adverse effect on wintering waterfowl in the Suisun Marsh, or if additional mitigation would be  
7 needed. Mitigation Measure BIO-179a, *Conduct Food Studies and Monitoring for Wintering Waterfowl*  
8 *in Suisun Marsh*, would be available to address this adverse effect.

9 **Yolo and Delta Basins:** The replacement of 1,400 acres of managed seasonal wetland with 19,000  
10 acres of palustrine tidal wetlands in the Delta watershed, and the replacement of 600 acres of  
11 managed seasonal wetlands with 2,000 acres of palustrine tidal wetlands in the Yolo watershed  
12 would not be expected to have an adverse effect on food productivity, under the assumption that  
13 these wetlands would provide adequate food sources. However, a monitoring component and a food  
14 study in these tidal habitats would be necessary in order to demonstrate that there would be a less  
15 than significant loss of food value in these habitats for wintering waterfowl. If it is determined from  
16 monitoring that there in fact would be a significant loss in food productivity resulting from habitat  
17 conversion to tidal wetlands, the protection and enhancement of managed wetlands in these  
18 watersheds would require mitigation for the change in food biomass and quality. Mitigation  
19 Measure *BIO-179b, Conduct Food Studies and Monitoring to Demonstrate Food Quality of Palustrine*  
20 *Tidal Wetlands in the Yolo and Delta Basins*, would be available to address this uncertainty.

21 **NEPA Effects:** There is considerable uncertainty about the biomass and nutritional quality of  
22 waterfowl foods produced in Suisun Marsh's managed wetlands, which makes it difficult to identify  
23 the level of effect that Alternative 9 habitat loss or conversion would have. The BDCP has committed  
24 to protecting and enhancing a minimum of 6,600 acres of managed seasonal wetlands in Suisun  
25 Marsh to compensate for the loss of productivity resulting from habitat conversion to tidal marsh. Of  
26 this 6,600 acres, at least 5,000 acres would be managed to benefit wintering waterfowl. This  
27 minimum commitment of 5,000 acres for wintering waterfowl would mitigate the reduced  
28 productivity from conversion of managed seasonal wetlands under the assumptions that 1) existing  
29 managed seasonal wetlands on average in Suisun Marsh provide low biomass and low-quality food  
30 to wintering waterfowl and 2) protected seasonal wetlands can be managed to produce high  
31 biomass and high-quality food. However, the food biomass and productivity in Suisun Marsh would  
32 need to be quantified to determine if the 5,000 acres would be sufficient for Alternative 9 to avoid an  
33 adverse effect on wintering waterfowl in the Suisun Marsh. Mitigation Measure BIO-179a, *Conduct*  
34 *Food Studies and Monitoring for Wintering Waterfowl in Suisun Marsh*, would be available to address  
35 this adverse effect.

36 The replacement of 1,400 acres of managed seasonal wetlands with 19,000 acres of palustrine tidal  
37 wetlands in the Delta watershed, and the replacement of 600 acres of managed seasonal wetlands  
38 with 2,000 acres of palustrine tidal wetlands in the Yolo watershed would not be expected to alter  
39 food productivity for wintering waterfowl. However, the conclusion that these new wetlands would  
40 provide adequate food sources is entirely dependent on assumptions about food production in  
41 palustrine tidal habitats. Mitigation Measure BIO-179b, *Conduct Food Studies and Monitoring to*  
42 *Demonstrate Food Quality of Palustrine Tidal Wetlands in the Yolo and Delta Basins*, would be  
43 available to address this uncertainty and avoid an adverse effect on wintering waterfowl.

44 **CEQA Conclusion:** There is considerable uncertainty about the biomass and nutritional quality of  
45 waterfowl foods produced in Suisun Marsh's managed wetlands, which makes it difficult to identify

1 the level of impact that Alternative 9 habitat loss or conversion would have. The BDCP has  
2 committed to protecting and enhancing a minimum of 6,600 acres of managed seasonal wetlands in  
3 Suisun Marsh to compensate for the loss of productivity resulting from habitat conversion to tidal  
4 marsh. Of this 6,600 acres, at least 5,000 acres would be managed to benefit wintering waterfowl.  
5 This minimum commitment of 5,000 acres for wintering waterfowl would mitigate the reduced  
6 productivity resulting from conversion of managed seasonal wetlands under the assumptions that  
7 1) existing managed seasonal wetlands on average in Suisun Marsh provide low biomass and low-  
8 quality food for wintering waterfowl and 2) protected seasonal wetlands can be managed to  
9 produce high biomass and high-quality food. However, the food biomass and productivity in Suisun  
10 Marsh would need to be quantified to determine if the 5,000 acres would be sufficient for  
11 Alternative 9 to avoid having a significant impact on wintering waterfowl in the Suisun Marsh, or if  
12 additional mitigation would be needed. Implementation of Mitigation Measure BIO-179a, *Conduct*  
13 *Food Studies and Monitoring for Wintering Waterfowl in Suisun Marsh*, would address this potential  
14 significant impact.

15 The replacement of 1,400 acres of managed seasonal wetlands with 19,000 acres of palustrine tidal  
16 wetlands in the Delta watershed, and the replacement of 600 acres of managed seasonal wetlands  
17 with 2,000 acres of palustrine tidal wetlands in the Yolo watershed would not be expected to alter  
18 food productivity. However, the conclusion that these tidal wetlands would provide adequate food  
19 sources for wintering waterfowl is entirely dependent on assumptions about food production in  
20 palustrine tidal habitats. Studies of food biomass and food quality in palustrine tidal habitats are  
21 needed to confirm that no mitigation for wintering waterfowl would be required in the Yolo and  
22 Delta Basins. Implementation of Mitigation Measure BIO-179b, *Conduct Food Studies and Monitoring*  
23 *to Demonstrate Food Quality of Palustrine Tidal Wetlands in the Yolo and Delta Basins*, would address  
24 this uncertainty and would reduce this impact on wintering waterfowl to a less-than-significant  
25 level.

26 **Mitigation Measure BIO-179a: Conduct Food Studies and Monitoring for Wintering**  
27 **Waterfowl in Suisun Marsh**

28 Poorly managed wetlands (considered low biomass and food quality) will be identified and  
29 managed by BDCP proponents to improve food quality and biomass. Studies will be required to  
30 quantify 1) food production of existing managed wetlands in Suisun Marsh and 2) energetic  
31 productivity of brackish and tidal marsh habitats. Protected wetlands will be monitored to  
32 measure changes in the energetic productivity of these sites. Based on the food studies and  
33 monitoring results, BDCP proponents will determine if the minimum commitment of 5,000 acres  
34 is sufficient to meet the goal of 1:1 compensation for loss of wintering waterfowl habitat with  
35 the protection and management of managed wetlands in perpetuity. If monitoring demonstrates  
36 that additional acreage is needed to meet this goal, additional acreage of protection or creation  
37 of managed wetlands and management will be required.

38 **Mitigation Measure BIO-179b: Conduct Food Studies and Monitoring to Demonstrate**  
39 **Food Quality of Palustrine Tidal Wetlands in the Yolo and Delta Basins**

40 In order to address the uncertainty of the impact of loss of managed wetlands in the Yolo and  
41 Delta Basins on wintering waterfowl, BDCP proponents will conduct food studies and  
42 monitoring to demonstrate the food quality of palustrine tidal habitats in these basins. If studies  
43 show that the assumption of no effect was inaccurate, and the food quality goal of 1:1

1 compensation for wintering waterfowl food value is not met, additional acreage of protection or  
2 creation of managed wetland and management will be required.

3 **Impact BIO-180: Loss or Conversion of Habitat for Breeding Waterfowl from Implementation**  
4 **of Conservation Components**

5 Alternative 9 would reduce managed wetlands in the Yolo and Delta basins by 437 acres and 1,155  
6 acres respectively. Under the assumption that 15% of these wetlands are managed as semi-  
7 permanent wetlands, Alternative 9 would reduce semipermanent wetlands in the Yolo and Delta  
8 drainage basins by 77 acres and 203 acres, respectively. While a reduction in these semipermanent  
9 habitats would represent a habitat loss for breeding waterfowl, with the restoration of 24,000 acres  
10 of palustrine tidal wetlands (Table 3-4, Chapter 3, *Description of Alternatives*) in the Yolo and Delta  
11 basins there would be a less than adverse effect on breeding waterfowl. These palustrine habitats  
12 would presumably contain water during the breeding period (i.e., March through July), and would  
13 be expected to compensate for the loss of 280 acres of managed semi-permanent wetlands in the  
14 Yolo and Delta watersheds attributed to the BDCP.

15 **Suisun Marsh:** Total managed wetlands in Suisun Marsh would decline from 41,012 acres to 30,640  
16 acres from the conversion of managed seasonal and semi-permanent wetlands to tidal habitats.  
17 Some of the remaining seasonal wetlands could be managed as semi-permanent wetlands to offset  
18 the loss of breeding habitat, but this could further reduce food supplies available to wintering  
19 waterfowl under the assumption that semi-permanent wetlands provide few food resources  
20 compared to seasonally managed habitats (Central Valley Joint Venture 2006).

21 The BDCP includes a commitment to protect and enhance 1,600 acres of permanently flooded  
22 managed wetlands in Suisun Marsh to provide habitat for breeding waterfowl. In addition, 5,000  
23 acres of semipermanent wetlands that would be protected and enhanced for wintering and  
24 migratory waterfowl (Table 3-4, Chapter 3; BDCP Chapter 3, *Conservation Strategy*, Objective  
25 MWNC1.1.).

26 Food studies and monitoring would be necessary to determine how increases in tidal marsh and  
27 salinity levels would affect the overall reproductive capacity of the marsh. These studies would be  
28 needed in order to quantify impacts on breeding waterfowl in Suisun Marsh and to determine not  
29 only the number of acres that would compensate for loss of breeding habitat at a ratio of 1:1 for  
30 habitat value, but how those acres should be managed. Mitigation Measure BIO-180, *Conduct Food*  
31 *and Monitoring Studies of Breeding Waterfowl in Suisun Marsh*, would be available to address the  
32 uncertainty of this effect.

33 In addition to providing semipermanent wetlands to breeding waterfowl, the Suisun Marsh contains  
34 several key upland areas that have significant nesting value. The largest block of upland habitat in  
35 the region is the core area on the Grizzly Island Wildlife Area. This area does not overlap with the  
36 hypothetical footprint for *CM4 Tidal Natural Communities Restoration*. However, this core area  
37 includes over 2,000 acres of upland grasslands that have some of the highest duck nesting densities  
38 in California (Central Valley Joint Venture 2006). A few small wetland areas are scattered within this  
39 core grassland mosaic that provide necessary freshwater brooding habitat. If restoration footprints  
40 were changed during the implementation process of BDCP to overlap with this area, the effects on  
41 breeding waterfowl would likely be greatly increased.

42 **NEPA Effects:** Alternative 9 would reduce managed wetlands in the Yolo and Delta basins by 437  
43 acres and 1,155 acres, respectively. Under the assumption that 15% of these wetlands are managed

1 as semi-permanent wetlands, Alternative 9 would reduce semi-permanent wetlands in the Yolo and  
2 Delta drainage basins by 77 acres and 203 acres, respectively. The reduction in these semi-  
3 permanent habitats would represent a habitat loss for breeding waterfowl. However, with the  
4 restoration of 24,000 acres of palustrine tidal wetlands in the Yolo and Delta basins, Alternative 9  
5 would not have an adverse effect on breeding waterfowl. These palustrine habitats would  
6 presumably contain water during the breeding period (March through July), and would be expected  
7 to compensate for the loss of 280 acres of managed semi-permanent wetlands in the Yolo and Delta  
8 watersheds attributed to Alternative 9 implementation. Total managed wetlands in Suisun Marsh  
9 would decline from 41,012 acres to 30,640 acres with the conversion of managed seasonal and  
10 semi-permanent wetlands to tidal habitats. Some of the remaining seasonal wetlands could be  
11 managed as semi-permanent wetlands to offset the loss of breeding habitat, but such management  
12 could further reduce food supplies available to wintering waterfowl under the assumption that  
13 semi-permanent wetlands provide few food resources compared with seasonally managed habitats.  
14 The protection and enhancement of 1,600 acres of permanently flooded managed wetlands would  
15 provide habitat for breeding waterfowl. However, food studies and monitoring would be necessary  
16 to determine how increases in tidal marsh and salinity levels would affect the overall reproductive  
17 capacity of the marsh. Therefore, the loss of breeding waterfowl habitat resulting from  
18 implementation of Alternative 9 could have an adverse effect. Mitigation Measure BIO-180, *Conduct*  
19 *Food and Monitoring Studies of Breeding Waterfowl in Suisun Marsh*, would be available to address  
20 the uncertainty of model assumptions and the potential adverse effect of habitat conversion on  
21 breeding waterfowl in Suisun Marsh.

22 **CEQA Conclusion:** Alternative 9 would reduce managed wetlands in the Yolo and Delta basins by  
23 437 acres and 1,155 acres, respectively. Under the assumption that 15% of these wetlands are  
24 managed as semi-permanent wetlands, Alternative 9 would reduce semi-permanent wetlands in the  
25 Yolo and Delta drainage basins by 77 acres and 203, acres respectively. The reduction in these semi-  
26 permanent habitats would represent a habitat loss for breeding waterfowl. However, with the  
27 restoration of 24,000 acres of palustrine tidal wetlands in the Yolo and Delta basins, Alternative 9  
28 would have a less-than-significant impact on breeding waterfowl. These palustrine habitats would  
29 presumably contain water during the breeding period (March through July), and would be expected  
30 to compensate for the loss of 280 acres of managed semi-permanent wetlands in the Yolo and Delta  
31 watersheds attributed to Alternative 9.

32 Total managed wetlands in Suisun Marsh would decline from 41,012 acres to 30,640 acres with the  
33 conversion of managed seasonal and semi-permanent wetlands to tidal habitats. Some of the  
34 remaining seasonal wetlands could be managed as semi-permanent wetlands to offset the loss of  
35 breeding habitat, but this management could further reduce food supplies available to wintering  
36 waterfowl under the assumption that semi-permanent wetlands provide few food resources  
37 compared with seasonally managed habitats. The protection and enhancement of 1,600 acres of  
38 permanently flooded managed wetlands would provide habitat for breeding waterfowl. However,  
39 food studies and monitoring would be necessary to determine how increases in tidal marsh and  
40 salinity levels would affect the overall reproductive capacity of the marsh. Therefore, the loss or  
41 conversion of habitat from implementation of Alternative 9 could have a significant impact on  
42 breeding waterfowl in Suisun Marsh. Implementation of Mitigation Measure BIO-180, *Conduct Food*  
43 *and Monitoring Studies of Breeding Waterfowl in Suisun Marsh*, would address the uncertainty of  
44 model assumptions and reduce the impact to a less-than-significant level.

1           **Mitigation Measure BIO-180: Conduct Food and Monitoring Studies of Breeding**  
2           **Waterfowl in Suisun Marsh**

3           To address the uncertainty of the impact of loss of managed wetlands in Suisun Marsh on  
4           breeding waterfowl, BDCP proponents will conduct food studies and monitoring to determine  
5           how increases in tidal marsh and salinity levels will affect the overall reproductive capacity of  
6           the marsh.

7           The required studies will examine how increases in tidal marsh and salinity levels will affect the  
8           overall reproductive capacity of the Marsh. Reproductive studies will address but will not be  
9           limited to the following questions:

- 10           ● How does the distribution of breeding waterfowl in Suisun Marsh differ in tidal versus  
11           managed habitats and across salinity gradients?
- 12           ● How does waterfowl nest success and nest density vary with respect to tidal versus  
13           managed habitats and across salinity gradients?
- 14           ● What are the patterns of habitat selection and movements by waterfowl broods in relation  
15           to tidal vs. managed habitats, and are there impacts on duckling survival?
- 16           ● What is the current relationship between waterfowl reproductive success and interactions  
17           with alternate prey and predators, and how is tidal restoration likely to alter these  
18           relationships?

19           **Impact BIO-181: Loss or Conversion of Habitat for Shorebirds from Implementation of**  
20           **Conservation Components**

21           Shorebird use of the study area varies by species and fluctuates both geographically and by habitat  
22           type throughout the year. Shallow flooded agricultural fields and wetlands support large numbers of  
23           wintering and migrating shorebirds (Shuford et al. 1998), particularly least and western sandpipers,  
24           dunlin, greater yellowlegs and long-billed dowitcher. Rice lands of the Sacramento Valley provide  
25           important breeding habitat for shorebirds such as American avocet and black-necked stilt (Shuford  
26           et al. 2004) and have been designated as a Western Hemisphere Shorebird Reserve Network Site of  
27           International Importance (Hickey et al. 2003). Managed wetlands provide suitable foraging and  
28           roosting habitat for shorebirds; black-necked stilts, avocets, and yellowlegs use this habitat type  
29           almost exclusively. Water depth in all of these habitat types is an important habitat variable as the  
30           majority of shorebird species require water depths of approximately 10-20cm for foraging (Isola et  
31           al. 2000, Hickey et al. 2003).

32           ***Managed Wetlands***

33           **Yolo Basin:** Primarily as a result of *CM4 Tidal Natural Communities Restoration* within the Yolo  
34           Basin, 1,185 acres of managed wetland habitat would be permanently converted; 1,066 acres of  
35           which are protected. In addition, 42 acres of managed wetland habitat would be temporarily lost by  
36           construction-related activities associated with tidal restoration (CM4) and Fisheries Enhancement  
37           activities (CM2) (Table 2, ICF International 2013). Increased inundation frequency, depth and  
38           duration associated with the ongoing operation of a modified Fremont Weir (CM2) could  
39           periodically affect managed wetlands ranging from an estimated 643 acres during a notch flow of  
40           1,000 cfs to an estimated 2,055 acres during a notch flow of 4,000 cfs Table 5.4-2, in BDCP Chapter  
41           5, *Effects Analysis*) in the Yolo Basin.

1 **Delta Basin:** Within the Delta Basin, 90 acres of managed wetland habitat would be permanently  
2 converted, as a result of tidal restoration (CM4). Thirteen of the 90 acres are protected (Table 3, ICF  
3 International 2013). Periodic flooding would not affect this natural community type in Delta Basin.

4 **Suisun Basin:** Within the Suisun Basin, 11,532 acres of managed wetland habitat would be  
5 permanently converted as a result of tidal restoration (CM4); 10,354 of which are protected. (Table  
6 4, ICF International 2013). Periodic flooding would not affect this natural community type in Suisun  
7 Basin.

8 According to Stralberg et al. 2011, the following species of shorebirds had a rank 1 designation for  
9 managed wetland habitat suitability (Table 1, ICF International 2013): black-necked stilt  
10 (*Himantopus mexicanus*), greater yellowlegs (*Tringa melanoleuca*), and long-billed dowitcher  
11 (*Limnodromus scolopaceus*). Dunlin (*Calidris alpina*), least sandpiper (*Calidris minutilla*),  
12 semipalmated plover (*Charadrius semipalmatus*), and western sandpiper (*Calidris mauri*), had a  
13 rank 2 for managed wetland habitat suitability. Black-bellied plover (*Pluvialis squatarola*) and  
14 whimbrel (*Numenius phaeopus*) both had rank 3 for managed wetland habitat suitability.

15 Managed wetlands would decrease in overall extent by 20% (Table 5, ICF International 2013). Most  
16 of this loss would occur in Suisun with some additional acreage loss in the Yolo Basin. The loss of  
17 managed wetland habitat for covered species and waterfowl would be compensated for with 8,200  
18 acres remaining managed wetland protection in Suisun Marsh. Of these 8,200 acres, the 5,000 acres  
19 of seasonal wetland protected, enhanced, and managed to provide overwintering waterfowl foraging  
20 habitat would be the habitat type most likely to benefit overwintering shorebirds. However, the  
21 1,600 acres of semi-permanent and permanent managed wetlands for breeding waterfowl and 1,500  
22 acres of managed wetlands for salt marsh harvest mouse would also be expected to have some  
23 benefit to wintering and breeding shorebirds.

#### 24 **Cultivated Lands**

25 **Yolo Basin:** Primarily as a result of tidal restoration (CM4) and Fisheries Enhancement activities  
26 (CM2) within the Yolo Basin, 8,309 acres of cultivated lands would be permanently converted; 1,272  
27 acres of which are protected. Also within the Yolo Basin, increased inundation frequency, depth and  
28 duration associated with the ongoing operation of a modified Fremont Weir (CM2) could affect an  
29 estimated 3,219 acres of cultivated lands during a notch flow of 1,000 cfs to an estimated 5,512  
30 acres during a notch flow of 6,000 cfs (Table 5.4-2, in BDCP Chapter 5, *Effects Analysis*)

31 **Delta Basin:** Within the Delta Basin, as a result of tidal restoration (CM4) and floodplain restoration  
32 (CM5), 25,633 acres of cultivated lands would be permanently converted. There would also be an  
33 additional 112 acres lost temporarily due to CM5 activities. Of the total permanently converted  
34 lands, 3,925 acres are protected (Table 3, ICF International 2013). Seasonal flooding (CM5) on the  
35 restored floodplain would periodically affect 738 acres of cultivated lands in Delta.

36 According to Stralberg et al. 2011, the following species of shorebirds had a rank 1 designation for  
37 cultivated lands habitat suitability (Table 1, ICF International 2013): killdeer (*Charadrius*  
38 *vociferous*), long-billed curlew, and whimbrel within pasture habitat and sandhill crane was ranked  
39 1 for grain and hay crops. Long-billed dowitcher and killdeer both had a rank 2 for idle crop habitat  
40 suitability and black-bellied plover was ranked 2 for pasture habitat. Red-necked phalarope  
41 (*Phalaropus lobatus*) and Wilson's phalarope (*Phalaropus tricolor*) were both ranked 2 for grain and  
42 hay crops. Long-billed dowitcher, dunlin, least sandpiper, and long-billed curlew were all ranked 3  
43 for rice habitat suitability and killdeer was ranked 3 for field crop habitat suitability.

1 Cultivated land loss would occur in all three basins, but the majority of acreage loss would occur in  
2 the Delta basin. Pasture crop types would decrease in overall extent by 15% over baseline (Table 5,  
3 ICF International 2013), but would increase in protection by 135%. More than half of all cultivated  
4 lands within the 48,000-acre BDCP cultivated lands reserve would be in pasture production  
5 (primarily alfalfa) and enhanced and managed to benefit Swainson's hawk. Idle crop types are not  
6 identified as a specific conservation target in the BDCP, are expected to occur within the reserve and  
7 are recognized in the BDCP as having "moderate" foraging habitat value for Swainson's hawk, white-  
8 tailed kite, and greater sandhill crane.

9 Grain and hay crop would be expected to decrease by 13% (Table 5, ICF International 2013) while  
10 protection, enhancement and management would be expected to increase by 28% (Table 6, ICF  
11 International 2013). These crop types would be managed for a tricolored blackbirds, Swainson's  
12 hawk, white-tailed kite, greater sandhill crane, and burrowing owls.

13 Rice would decrease in overall extent by 2% (Table 5, ICF International 2013) but increase in total  
14 protection by 57%. Rice lands would be protected, enhanced, and managed for the benefit for giant  
15 garter snake.

#### 16 **Tidal Wetlands**

17 **Yolo Basin:** As a result of tidal restoration (CM4) and Fisheries Enhancement activities (CM2)  
18 within the Yolo Basin, 194 acres of tidal wetland habitat would be permanently converted; 180 acres  
19 of which are protected. In addition, 12 acres of tidal wetland habitat would be temporarily lost by  
20 construction-related activities associated with Fisheries Enhancement activities (CM2) (Table 2, ICF  
21 International 2013). Periodic flooding in Yolo Bypass would affect 3,957 acres of tidal wetlands in  
22 Yolo Basin.

23 **Delta Basin:** Within the Delta Basin, 54 acres of tidal wetlands would be permanently converted as  
24 a result of tidal restoration (CM4) (Table 3, ICF International 2013). Of the total permanently  
25 converted lands, 26 acres are protected. Periodic flooding in Yolo Bypass would affect 26 acres of  
26 tidal wetlands in Delta Basin.

27 **Suisun Basin:** Within the Suisun Basin, 219 acres of tidal wetland habitat would be permanently  
28 converted as a result of tidal restoration (CM4); 215 of which are protected. (Table 4, ICF  
29 International 2013). Periodic flooding would not affect this natural community type in Suisun Basin.

30 According to Stralberg et al. 2011, the following species of shorebirds had a rank 1 designation for  
31 tidal mudflat habitat suitability (Table 6, ICF International 2013): black-bellied plover, dunlin, least  
32 sandpiper, marbled godwit (*Limosa fedoa*), semipalmated plover, short-billed dowitcher  
33 (*Limnodromus griseus*), western sandpiper, and willet (*Tringa semipalmata*). Long-billed curlew  
34 (*Numenius americanus*) and whimbrel both had a rank 2 for tidal mudflat habitat suitability.  
35 American avocet (*Recurvirostra americana*) was ranked 3 for tidal mudflat habitat suitability. For  
36 tidal brackish emergent wetland/tidal freshwater emergent wetland, willet was ranked 2 and long-  
37 billed curlew and whimbrel were both ranked 3 for habitat suitability.

38 Tidal mudflat habitat would be estimated to increase in extent by 1,780 acres. This extremely large  
39 increase in tidal mudflat habitat would occur almost exclusively in Suisun Marsh as the result of  
40 tidal restoration and the conversion of existing mid- and high-marsh types to low marsh and tidal  
41 mudflats in response to sea level rise. BDCP Appendix 3.B, *BDCP Tidal Habitat Evolution Assessment*,  
42 details the methods and assumptions modeled to come about this result. Tidal mudflat habitats

1 would be expected to require management, however, sediment augmentation has been discussed as  
2 an experimental method that could be employed in places like Suisun to combat the loss of intertidal  
3 marshes in the face of sea level rise and reduced sediment supplies.

4 Tidal emergent wetland habitat would increase in extent by 152% (Table 5, ICF International 2013).  
5 Of the 30,000 acres of emergent wetland restoration, 6,000 acres would be in the Suisun Basin and  
6 the rest would be distributed between the Yolo and Delta Basins. Enhancement and management on  
7 these lands would be likely to be focused on nonnative, invasive species management. Any  
8 additional actions in Suisun would be focused on salt marsh harvest mouse, Suisun shrew, California  
9 clapper rail, black rail, Suisun thistle, and soft bird's-beak. In freshwater marshes, enhancement and  
10 management would be likely to focus on black rail, western pond turtle, and, in some cases, giant  
11 garter snake.

### 12 ***Nontidal Wetlands***

13 **Yolo Basin:** As a result of tidal restoration (CM4) and Fisheries Enhancement activities (CM2)  
14 within the Yolo Basin, 313 acres of nontidal wetland habitat would be permanently converted; 119  
15 acres of which are protected. In addition, 11 acres of nontidal wetland habitat would be temporarily  
16 lost by construction-related activities associated with Fisheries Enhancement activities (CM2)  
17 (Table 2, ICF International 2013). Periodic flooding in Yolo Bypass associated with ongoing Fremont  
18 Weir operation (CM2) would affect 305 acres of nontidal wetlands in Yolo Basin, specifically  
19 nontidal perennial aquatic habitat.

20 **Delta Basin:** Within the Delta Basin, 99 acres of nontidal wetlands would be permanently converted  
21 as a result of tidal restoration (CM4) and floodplain restoration (CM5) (Table 3, ICF International  
22 2013). There would also be 8 acres of nontidal perennial aquatic habitat temporarily lost from CM5  
23 activities. Of the total permanently converted lands, 29 acres are protected. Periodic flooding from  
24 CM5 would affect 4 acres of nontidal perennial aquatic habitat in Delta Basin.

25 **Suisun Basin:** Within the Suisun Basin, 1 acre of nontidal wetland habitat, specifically vernal pool  
26 complex, would be permanently converted as a result of tidal restoration (CM4); and is not  
27 protected. (Table 4, ICF International 2013). Periodic flooding would not affect this natural  
28 community type in Suisun Basin.

29 According to Stralberg et al. 2011, the following species of shorebirds had a rank 1 designation for  
30 nontidal wetland habitat suitability (Table 6, ICF International 2013): red-necked phalarope and  
31 Wilson's phalarope for nontidal freshwater perennial emergent wetland and American avocet for  
32 alkali seasonal wetland complex. Greater yellowlegs had a rank 2 for vernal pool complex habitat  
33 suitability. Red-necked phalarope and western sandpiper were both ranked 3 for alkali seasonal  
34 wetland habitat suitability and greater yellowlegs was ranked 3 for nontidal freshwater perennial  
35 emergent wetland habitat suitability.

36 Nontidal freshwater emergent wetland would increase in extent by 88% as a result of BDCP  
37 implementation (Table 5, ICF International 2013). These lands would be managed to benefit giant  
38 garter snake and located within the Delta Basin (likely in the vicinity of White Slough) and the Yolo  
39 Basin (in the Cache Slough area).

40 Impacts on wetted acres of vernal pool complex and alkali seasonal wetland complex would be  
41 avoided and thus loss of this community is not expected. However, up to 10 acres of wetted acre loss  
42 could be permitted under the Plan. Protection of vernal pool complex natural community would

1 increase by 13% and by 6% for alkali seasonal wetlands (Table 6, ICF International 2013).  
2 Protection of these two community types would enhance and manage habitat for vernal pool  
3 crustaceans and alkali-related plant species.

4 The protection and restoration of natural communities would also include management and  
5 enhancement actions under *CM11 Natural Communities Enhancement and Management*. The  
6 following management activities to benefit shorebirds would be considered for implementation  
7 under CM11 in areas where they would not conflict with covered species management.

8 ● Managed Wetlands

- 9 ○ Managed wetlands can be potentially manipulated to provide the optimum water depths for  
10 foraging shorebirds and islands for nesting (Hickey et al. 2003).
- 11 ○ During fall and spring, stagger the timing and location of draining and flooding to optimize  
12 the extent of shallow-water habitat; varying depths within the wetland unit helps to create  
13 temporal variation in foraging opportunities. During warm, dry springs when wetland units  
14 dry quickly, wetland units can be re-supplied with water to extend habitat availability for  
15 shorebirds.
- 16 ○ Provide open, shallow water habitat adjacent to minimally vegetated, shallowly sloped  
17 edges for nesting shorebirds between April and July.
- 18 ○ Provide islands with little to no vegetation to increase the likelihood of shorebird roosting  
19 and nesting.
- 20 ○ Create low slopes on islands and levees; gradual angles (10-12:1) are better than steep  
21 angles.
- 22 ○ Limit levee maintenance during the nesting season (April through July). However, mowing  
23 the center of levees is fine.
- 24 ○ Potentially add material to levees or to islands to encourage nesting for some species.

25 ● Cultivated Lands

- 26 ○ Maintaining a mosaic of dry and flooded crop types, and varying water depths will promote  
27 a diverse community of waterbirds, including shorebirds, during fall migration and winter  
28 (Shuford et al. 2013).
- 29 ○ To provide wintering habitat for multiple waterbird guilds, including shorebirds, use a  
30 combination of flooding practices that include one-time water application and maintenance  
31 flooding while also providing unflooded habitat (Strum et al. *in review*).
- 32 ○ The post-harvest flooding of winter wheat and potato fields in early fall (July- September)  
33 can provide substantial benefits to shorebirds at a time of very limited shallow-water  
34 habitat on the landscape (Shuford et al. 2013).
- 35 ○ Stagger the drawdown of flooded rice and other winter-flooded agricultural fields to  
36 prolong the availability of flooded habitat (Iglecia et al. 2012). Be aware of soil type because  
37 this practice may not be as effective on soils that drain quickly.
- 38 ○ Remove as much stubble as possible in rice and other agricultural fields after harvest to  
39 increase the potential shorebird habitat on intentionally flooded or unflooded fields that  
40 may passively gather rain water (Iglecia et al. 2012).

- 1           ○ Shallowly flood available agricultural fields during July, August, and September to provide  
2           early fall migration habitat for shorebirds. Fields should be free of vegetation prior to  
3           flooding, have minimal micro-topography (e.g. no large clods), and should remain flooded  
4           for up to three week periods (after three weeks, vegetation encroachment reduces habitat  
5           value for shorebirds) (ICF International 2013).
- 6           ○ Manage levee habitats to have minimal vegetation but do not spray herbicide directly or  
7           drive on levees during the nesting season (April- July, Iglecia et al. 2012).
- 8           ○ Maintain a minimum top-width of 30 inches for levees, based on increased avocet use of  
9           wider levees (Iglecia et al. 2012).
- 10          ○ When possible, flood fields with nesting habitat (modified levees and islands) in late April to  
11          provide nesting habitat for American avocets (Iglecia et al. 2012).
- 12          ○ Finer grained substrate (clods smaller than a fist) in rice and other agricultural fields may be  
13          more appealing for nesting shorebirds (Iglecia et al. 2012).
- 14          ○ Maintain gently sloping levees and island sides (10-12:1; Iglecia et al. 2012).
- 15          ○ Islands should be disked along with the rest of the field after harvest to help inhibit  
16          vegetation growth (Iglecia et al. 2012).

17           **NEPA Effects:** Alternative 9 implementation would result in the conversion of managed wetland and  
18           cultivated lands to tidal natural communities, including tidal mudflat. The result would be  
19           substantial loss of the primary habitat of black-necked stilt, American avocet, greater yellowlegs,  
20           and long-billed dowitcher and a gain in the primary habitat of black-bellied plover, dunlin, least  
21           sandpiper, marbled godwit, semipalmated plover, short-billed dowitcher, western sandpiper, and  
22           willet. While substantial losses of cultivated lands would be incurred, protection, enhancement, and  
23           management of the remaining acres would likely have substantial benefits for select species of  
24           wintering and breeding shorebirds. This is because impacts on crop types would be distributed  
25           across all crop types, while protection would focus primarily on pasture lands, grain and hay, corn,  
26           and rice types. While the protection, enhancement, and management of these crop types are being  
27           driven by covered species, these management actions would also benefit shorebirds. The protection,  
28           enhancement, and management of remaining managed wetlands in Suisun Marsh, in compensation  
29           for the loss of substantial acreage, would have some incremental benefits for shorebirds, but would  
30           be unlikely to compensate for the overall loss. However, with the protection and restoration of acres  
31           in the Delta and Yolo watersheds, in addition to the implementation of the management actions  
32           outlined in *CM11 Natural Communities Enhancement and Management*, habitat conversion would not  
33           be expected to result in an adverse effect on shorebird populations in the study area.

34           **CEQA Conclusion:** Alternative 9 implementation would result in the conversion of managed wetland  
35           and cultivated lands to tidal natural communities, including tidal mudflat. The result would be  
36           significant loss of the primary habitat of black-necked stilt, American avocet, greater yellowlegs, and  
37           long-billed dowitcher and a gain in the primary habitat of black-bellied plover, dunlin, least  
38           sandpiper, marbled godwit, semipalmated plover, short-billed dowitcher, western sandpiper, and  
39           willet. While significant losses of cultivated lands would be incurred, protection, enhancement, and  
40           management of the remaining acres would likely have substantial benefits for select species of  
41           wintering and breeding shorebirds. This is because impacts on crop types would be distributed  
42           across all crop types, while protection would focus primarily on pasture lands, grain and hay, corn,  
43           and rice types. While the protection, enhancement, and management of these types are being driven

1 by covered species, these management actions would also benefit shorebirds. The protection,  
2 enhancement, and management of remaining managed wetlands in Suisun Marsh, in compensation  
3 for substantial acreage loss, would have some incremental benefits for shorebirds, but would be  
4 unlikely to compensate for the overall loss. However, with the protection and restoration of acres in  
5 the Delta and Yolo watersheds, in addition to the implementation of the management actions  
6 outlined in *CM11 Natural Communities Enhancement and Management*, habitat conversion would be  
7 expected to have a less-than-significant impact on shorebird populations in the study area.

## 8 **Impact BIO-182: Effects on Shorebirds and Waterfowl Associated with Electrical** 9 **Transmission Facilities**

10 New transmission lines installed in the study area would increase the risk for bird-power line  
11 strikes, which could result in injury or mortality of shorebirds and waterfowl. The existing network  
12 of power lines in the study currently poses a risk for shorebirds and waterfowl in the Delta. New  
13 transmission lines would increase this risk and have an adverse effect on shorebird and waterfowl  
14 species in the absence of other conservation actions. However, transmission lines constructed under  
15 Alternative 9 would be temporary and would be removed after the completion of CM1 construction  
16 activities (within the first 10 years of Plan implementation). In addition, implementation of *AMM20*  
17 *Greater Sandhill Crane* would reduce potential effects through the installation of flight-diverters on  
18 new transmission lines, and selected existing transmission lines in the study area.

19 **NEPA Effects:** New transmission lines would increase the risk for shorebird and waterfowl power  
20 line strikes. With the implementation of *AMM20 Greater Sandhill Crane*, the potential effect of the  
21 construction of new transmission lines on shorebird and waterfowl would not be adverse.

22 **CEQA Conclusion:** New transmission lines would increase the risk for shorebird and waterfowl  
23 power line strikes. The implementation of *AMM20 Greater Sandhill Crane* would reduce the potential  
24 impact of the construction of new transmission lines on shorebirds and waterfowl to a less-than-  
25 significant level.

## 26 **Impact BIO-183: Indirect Effects of Plan Implementation on Shorebirds and Waterfowl**

27 **Indirect construction- and operation-related effects:** Noise and visual disturbances associated  
28 with construction-related activities could result in temporary disturbances that affect shorebird and  
29 waterfowl use of modeled habitat. Indirect effects associated with construction include noise, dust,  
30 and visual disturbance caused by grading, filling, contouring, and other ground-disturbing  
31 operations. Construction-related noise and visual disturbances could disrupt nesting and foraging  
32 behaviors, and reduce the functions of suitable habitat which could result in an adverse effect on  
33 these species. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid*  
34 *Disturbance of Nesting Birds*, would be available to minimize adverse effects on active nests. The use  
35 of mechanical equipment during water conveyance construction could cause the accidental release  
36 of petroleum or other contaminants that could affect shorebirds and waterfowl or their prey in the  
37 surrounding habitat. AMM1–AMM7, including *AMM2 Construction Best Management Practices and*  
38 *Monitoring*, would minimize the likelihood of such spills from occurring. The inadvertent discharge  
39 of sediment or excessive dust adjacent to shorebirds and waterfowl in the study area could also have  
40 a negative effect on these species. AMM1–AMM7 would ensure that measures were in place to  
41 prevent runoff from the construction area and the negative effects of dust on wildlife adjacent to  
42 work areas.

1 **Methylmercury Exposure:** Covered activities have the potential to exacerbate bioaccumulation of  
2 mercury in avian species, including shorebird and waterfowl species. Marsh (tidal and nontidal) and  
3 floodplain restoration have the potential to increase exposure to methylmercury. Mercury is  
4 transformed into the more bioavailable form of methylmercury in aquatic systems, especially areas  
5 subjected to regular wetting and drying such as tidal marshes and flood plains (Alpers et al. 2008).  
6 Thus, BDCP restoration activities that create newly inundated areas could increase bioavailability of  
7 mercury (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Species sensitivity  
8 to methylmercury differs widely and there is a large amount of uncertainty with respect to species-  
9 specific effects. Increased methylmercury associated with natural community and floodplain  
10 restoration could indirectly affect shorebirds and waterfowl, via uptake in lower trophic levels (as  
11 described in the BDCP, Appendix 5.D, *Contaminants*).

12 In addition, the potential mobilization or creation of methylmercury within the Plan Area varies  
13 with site-specific conditions and would need to be assessed at the project level. *CM12 Methylmercury*  
14 *Management* includes provisions for project-specific Mercury Management Plans. Site-specific  
15 restoration plans that address the creation and mobilization of mercury, as well as monitoring and  
16 adaptive management as described in CM12 would be available to address the uncertainty of  
17 methylmercury levels in restored tidal marsh and potential impacts on shorebirds and waterfowl.

18 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in  
19 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,  
20 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,  
21 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz  
22 2009). The effect of selenium toxicity differs widely between species and also between age and sex  
23 classes within a species. In addition, the effect of selenium on a species can be confounded by  
24 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith  
25 2009).

26 The primary source of selenium bioaccumulation in birds is through their diet (Ackerman and  
27 Eagles-Smith 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the  
28 trophic level at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At  
29 Kesterson Reservoir in the San Joaquin Valley, selenium concentrations in invertebrates have been  
30 found to be two to six times the levels in rooted plants. Furthermore, bivalves sampled in the San  
31 Francisco Bay contained much higher selenium levels than crustaceans such as copepods (Stewart et  
32 al. 2004). Studies conducted at the Grasslands in Merced County recorded higher selenium levels in  
33 black-necked stilts which feed on aquatic invertebrates than in mallards and pintails, which are  
34 primarily herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which  
35 forage on bivalves) have much higher levels of selenium levels than shorebirds that prey on aquatic  
36 invertebrates (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high  
37 levels of selenium have a higher risk of selenium toxicity.

38 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations  
39 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to  
40 exacerbate bioaccumulation of selenium in avian species, including shorebird and waterfowl  
41 species. Marsh (tidal and nontidal) and floodplain restoration have the potential to mobilize  
42 selenium, and therefore increase avian exposure from ingestion of prey items with elevated  
43 selenium levels. Thus, BDCP restoration activities that create newly inundated areas could increase  
44 bioavailability of selenium (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration).  
45 Changes in selenium concentrations were analyzed in Chapter 8, *Water Quality*, and it was

1 determined that, relative to Existing Conditions and the No Action Alternative, CM1 would not result  
2 in substantial, long-term increases in selenium concentrations in water in the Delta under any  
3 alternative. However, it is difficult to determine whether the effects of potential increases in  
4 selenium bioavailability associated with restoration-related conservation measures (CM4–CM5)  
5 would lead to adverse effects on shorebirds and waterfowl species.

6 Because of the uncertainty that exists at this programmatic level of review, there could be a  
7 substantial effect on shorebirds and waterfowl from increases in selenium associated with  
8 restoration activities. This effect would be addressed through the implementation of *AMM27*  
9 *Selenium Management* (BDCP Appendix 3.C, *Avoidance and Minimization Measures*) which would  
10 provide specific tidal habitat restoration design elements to reduce the potential for  
11 bioaccumulation of selenium and its bioavailability in tidal habitats. Furthermore, the effectiveness  
12 of selenium management to reduce selenium concentrations and/or bioaccumulation would be  
13 evaluated separately for each restoration effort as part of design and implementation. This  
14 avoidance and minimization measure would be implemented as part of the tidal habitat restoration  
15 design schedule.

16 **NEPA Effects:** Noise and visual disturbances from the construction of Alternative 9 water  
17 conveyance facilities could reduce shorebird and waterfowl use of modeled habitat adjacent to work  
18 areas. Moreover, operation and maintenance of the water conveyance facilities, including the  
19 transmission facilities, could result in ongoing but periodic postconstruction disturbances that could  
20 affect shorebird and waterfowl use of the surrounding habitat. AMM1–AMM7 would minimize these  
21 effects, and Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid*  
22 *Disturbance of Nesting Birds*, would be available to address adverse effects on nesting individuals.  
23 Tidal habitat restoration could result in increased exposure of shorebirds and waterfowl to  
24 selenium. This effect would be addressed through the implementation of *AMM27 Selenium*  
25 *Management*, which would provide specific tidal habitat restoration design elements to reduce the  
26 potential for bioaccumulation of selenium and its bioavailability in tidal habitats. Therefore, the  
27 indirect effects associated with noise and visual disturbances, and increased exposure to selenium  
28 from Alternative 9 implementation would not have an adverse effect on shorebirds and waterfowl.  
29 Tidal habitat restoration is unlikely to have an adverse effect on shorebirds and waterfowl through  
30 increased exposure to methylmercury, as these species currently nest and forage in tidal marshes  
31 with elevated methylmercury levels. However, it is unknown what concentrations of methylmercury  
32 are harmful to species of waterfowl and shorebirds, and the potential for increased exposure would  
33 vary substantially within the study area. Site-specific restoration plans in addition to monitoring and  
34 adaptive management, described in *CM12 Methylmercury Management*, would address the  
35 uncertainty of methylmercury levels in restored tidal marsh. Once site-specific sampling and other  
36 information is developed, the site-specific planning phase of marsh restoration would be the  
37 appropriate place to assess the potential risk of shorebird and waterfowl exposure to  
38 methylmercury.

39 **CEQA Conclusion:** Noise, potential hazardous spills, and increased dust and sedimentation as a  
40 result of Alternative 9 water conveyance facilities construction and operation and maintenance  
41 would have a significant impact on shorebirds and waterfowl. AMM1–AMM7 would minimize these  
42 impacts, and implementation of Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird*  
43 *Surveys and Avoid Disturbance of Nesting Birds*, would reduce the impacts to a less-than-significant  
44 level. Tidal habitat restoration is unlikely to have a significant impact on shorebirds and waterfowl  
45 species through increased exposure to methylmercury, as these species currently nest and forage in

1 tidal marshes with elevated methylmercury levels. However, it is unknown what concentrations of  
2 methylmercury are harmful to species of waterfowl and shorebirds. Site-specific restoration plans  
3 that address the creation and mobilization of mercury, as well as the monitoring and adaptive  
4 management described in CM12, would be the appropriate place to assess the potential risk of  
5 shorebird and waterfowl exposure to methylmercury in the study area. Tidal habitat restoration  
6 could result in increased exposure of shorebirds and waterfowl to selenium. This effect would be  
7 addressed through the implementation of *AMM27 Selenium Management*, which would provide  
8 specific tidal habitat restoration design elements to reduce the potential for bioaccumulation of  
9 selenium and its bioavailability in tidal habitats. Therefore, the indirect effects of Alternative 9  
10 implementation would have a less-than-significant impact on shorebirds and waterfowl.

11 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**  
12 **Disturbance of Nesting Birds**

13 See Mitigation Measure BIO-75 under Impact BIO-75.

14 **Common Wildlife and Plants**

15 Common wildlife and plants are widespread, often abundant, species that are not covered under  
16 laws or regulations that address conservation or protection of individual species. Examples of  
17 common wildlife and plants occurring in the study area are provided within the discussion for each  
18 natural community type in Section 12.1.2.2, *Special-Status and Other Natural Communities*. Impacts  
19 on common wildlife and plants would occur through the same mechanisms discussed for natural  
20 communities and special-status wildlife and plants for each alternative.

21 **Impact BIO-184: Effects on Habitat and Populations of Common Wildlife and Plants**

22 Effects on habitat of common wildlife and plants, including habitat removal and conversion, are  
23 discussed in the analysis of Alternative 9 effects on natural communities. In general, effects on  
24 habitat of common wildlife and plants would not be adverse. Through the course of implementing  
25 the Plan over a 50-year time period, several natural communities and land cover types would be  
26 reduced in size, primarily from restoration of other natural communities. Grassland, managed  
27 wetland and cultivated lands would be reduced in acreage, so the common species that occupy these  
28 habitats would be affected. However, the losses in acreage and value of these habitats would be  
29 offset by protection, restoration, enhancement and management actions contained in the BDCP,  
30 including *CM3 Natural Communities Protection and Restoration*, *CM4 Tidal Natural Communities*  
31 *Restoration*, *CM5 Seasonally Inundated Floodplain Restoration*, *CM6 Channel Margin Enhancement*,  
32 *CM7 Riparian Natural Community Restoration*, *CM8 Grassland Natural Community Restoration*, *CM9*  
33 *Vernal Pool and Alkali Seasonal Wetland Complex Restoration*, *CM10 Nontidal Marsh Restoration*, and  
34 *CM11 Natural Communities Enhancement and Management*. In addition, the AMMs contained in  
35 Appendix 3.C of the BDCP would be in place to reduce or eliminate the potential to adversely affect  
36 both special-status and common wildlife and plants.

37 Direct effects on common wildlife and plants from constructing water conveyance facilities and  
38 implementing Alternative 9 conservation measures would include construction or inundation-  
39 related disturbances that result in injury or mortality of wildlife or plants and the immediate  
40 displacement of wildlife. Indirect effects include project-related disturbances to nearby wildlife and  
41 plants during construction (e.g., disruption of breeding and foraging behaviors from noise and  
42 human activity, habitat degradation from fugitive dust and runoff) and effects occurring later in time

1 (e.g., collisions of birds with transmission lines, habitat fragmentation, vegetation management).  
2 Indirect effects could result both from construction and from operations and maintenance (e.g.,  
3 ground disturbances could result in the spread and establishment of invasive plants).

4 **NEPA Effects:** The direct and indirect effects associated with implementing the conservation  
5 measures of Alternative 9 would not be adverse because the conservation measures and AMMs also  
6 expand and protect natural communities, avoid or minimize effects on special-status species,  
7 prevent the introduction and spread of invasive species, and enhance natural communities. These  
8 actions would result in avoiding and minimizing effects on common wildlife and plants as well.

9 **CEQA Conclusion:** Construction and operation of the water conveyance facilities and habitat  
10 restoration activities would have impacts on common wildlife and plants in the study area through  
11 habitat loss and through direct or indirect loss or injury of individuals. The loss of habitat would not  
12 be substantial, because habitat restoration would increase the amount and extent of habitat  
13 available for use by most common wildlife and plant species. Conservation measures to avoid or  
14 minimize effects on special-status species, to prevent the introduction and spread of invasive  
15 species, and to enhance natural communities also would result in avoiding and minimizing effects on  
16 common wildlife and plants. Consequently, implementation of the BDCP is not expected to cause any  
17 populations of common wildlife or plants to drop below self-sustaining levels, and this impact would  
18 be less than significant. No mitigation would be required.

## 19 **Wildlife Corridors**

20 ECAs are lands likely to be important to wildlife movement between large, mostly natural areas at  
21 the state wide level. The ECAs form a functional network of wildlands that are considered important  
22 to the continued support of California's diverse natural communities. Four general areas were  
23 identified within the Plan Area that contain ECAs (Figure 12-2). The BDCP also identified important  
24 landscape linkages in the Plan Area to guide reserve design, which can also be seen on Figure 12-2.

## 25 **Impact BIO-185: Effect of BDCP Conservation Measures on Wildlife Corridors**

26 Alternative 9 would have conveyance facility construction occurring within the Mandeville Island-  
27 Staten Island ECA. The conveyance facility construction would also occur along two linkages  
28 identified in the BDCP, the *Middle River* linkage (#6 in Figure 12-2) and the *White Slough to Stone*  
29 *Lakes* linkage (#11 in Figure 12-2).

30 The construction of an operable barrier and associated transmission lines would occur on the  
31 northwestern tip of Mandeville Island. These facilities would not create a substantial barrier to  
32 wildlife movement within and outside of this ECA. The construction of transmission lines may result  
33 in localized impacts on sandhill cranes and other avian species during periods of low visibility, but  
34 these transmission lines are relatively short and would not substantially affect flight patterns.

35 The Alternative 9 dredge spoils areas and an operable barrier identified along Middle River (linkage  
36 #6) would greatly conflict with the BDCP's plan for riparian conservation and establishing riparian  
37 connectivity along this stretch of Middle River. The dredge disposal areas could make a substantial  
38 section of Middle River unsuitable for BDCP riparian conservation actions.

39 The construction of a transmission line across BDCP the *White Slough to Stone Lakes* linkage would  
40 not substantially conflict with the BDCP's plans for giant garter snake conservation along this  
41 corridor.

1 Restoration activities would be implemented in the ECAs within Yolo Bypass (*CM2 Yolo Bypass*  
2 *Fisheries Enhancement*) and within the Grizzly Island-Lake Marie ECA (*CM4 Tidal Natural*  
3 *Communities Restoration*). These activities would generally improve the movement of wildlife within  
4 and outside of the study area. In addition, the preservation of restored lands (CM3) and the  
5 enhancement and management of these areas (CM11) would improve and maintain wildlife  
6 corridors within the study area.

7 **NEPA Effects:** Alternative 9 would conflict with the BDCP's planned riparian conservation along  
8 Middle River; however, compared to No Action this alternative would not result in adverse effects  
9 on wildlife corridors.

10 **CEQA Conclusion:**

11 The construction of an operable barrier and associated transmission lines would occur on the  
12 northwestern tip of Mandeville Island. These facilities would not create a substantial barrier to  
13 wildlife movement within and outside of the Mandevill Island-Staten Island ECA. The construction  
14 of transmission lines may result in localized impacts on sandhill cranes and other avian species  
15 during periods of low visibility, but these transmission lines are relatively short and would not  
16 substantially affect flight patterns.

17 The Alternative 9 dredge spoils areas and an operable barrier identified along Middle River (linkage  
18 #6) would greatly conflict with the BDCP's plan for riparian conservation and establishing riparian  
19 connectivity along this stretch of Middle River. The dredge disposal areas could make a substantial  
20 section of Middle River unsuitable for BDCP riparian conservation actions.

21 The construction of a transmission line across BDCP the *White Slough to Stone Lakes* linkage would  
22 not substantially conflict with the BDCP's plans for giant garter snake conservation along this  
23 corridor.

24 Restoration activities would be implemented in the ECAs within Yolo Bypass (*CM2 Yolo Bypass*  
25 *Fisheries Enhancement*) and within the Grizzly Island-Lake Marie ECA (*CM4 Tidal Natural*  
26 *Communities Restoration*). These activities would generally improve the movement of wildlife within  
27 and outside of the study area. In addition, the preservation of restored lands (CM3) and the  
28 enhancement and management of these areas (CM11) would improve and maintain wildlife  
29 corridors within the study area.

30 Alternative 9 would conflict with the BDCP's planned riparian conservation along Middle River;  
31 however, under the Existing Conditions, this alternative would overall result in less-than-significant  
32 impacts on wildlife corridors.

33 **Invasive Plant Species**

34 The invasive plant species that primarily affect each natural community in the study area, which  
35 include water hyacinth, perennial pepperweed, giant reed, and Brazilian waterweed, are discussed  
36 in Section 12.1.4. Invasive species compete with native species for resources and can alter natural  
37 communities by altering fire regimes, hydrology (e.g., sedimentation and erosion), light availability,  
38 nutrient cycling, and soil chemistry but also have the potential to harm human health and the  
39 economy by adversely affecting natural ecosystems, water delivery, flood protection systems,  
40 recreation, agricultural lands, and developed areas (Randall and Hoshovsky 2000). The construction  
41 and restoration activities covered under the BDCP could result in the introduction or spread of

1 invasive plant species by creating temporary ground disturbance that provides opportunities for  
2 colonization by invasive plants in the study area.

3 The primary mechanisms for the introduction of invasive plants as the result of implementation of  
4 Alternative 9 are listed here.

- 5 • Grading, excavation, grubbing, and placement of fill material.
- 6 • Breaching, modification, or removal of existing levees and construction of new levees.
- 7 • Modification, demolition, and removal of existing infrastructure (e.g., buildings, roads, fences,  
8 electric transmission and gas lines, irrigation infrastructure).
- 9 • Maintenance of infrastructure.
- 10 • Removal of existing vegetation and planting/seeding of vegetation.
- 11 • Maintaining vegetation and vegetation structure (e.g., grazing, mowing, burning, trimming).
- 12 • Dredging waterways.

13 Clearing operations and the movement of vehicles, equipment, and construction materials in the  
14 study area would facilitate the introduction and spread of invasive plants by bringing in or moving  
15 seeds and other propagules. These effects would result from four activities.

- 16 • Spreading chipped vegetative material from clearing operations over topsoil after earthwork  
17 operations are complete.
- 18 • Importing, distributing, storing, or disposing of fill, reusable tunnel material, borrow, spoil, or  
19 dredge material.
- 20 • Traffic from construction vehicles (e.g., water and cement trucks) and personal vehicles of  
21 construction staff.
- 22 • Transport of construction materials and equipment within the study area and to/from the study  
23 area.

24 Table 12-9-70 lists the acreages of temporary disturbance in each natural community in the study  
25 area that would result from implementation of Alternative 9 of the BDCP.

1 **Table 12-9-70. Summary of Temporary Disturbance in Natural Communities under Alternative 9**

Natural Community	Temporary Impacts (acres)
Tidal perennial aquatic	360
Tidal brackish emergent wetland	0
Tidal freshwater emergent wetland	123
Valley foothill riparian	367
Grassland	590
Inland dune scrub	0
Alkali seasonal wetland complex	0
Vernal pool complex	0
Other natural seasonal wetland	0
Nontidal freshwater perennial emergent wetland	25
Nontidal perennial aquatic	27
Managed wetlands	65
Agricultural lands	1,959
Total	3,516

2

3 **Impact BIO-186: Adverse Effects on Natural Communities Resulting from the Introduction**  
 4 **and Spread of Invasive Plant Species**

5 Under Alternative 9, the BDCP would have adverse effects on natural communities from the  
 6 introduction and spread of invasive plant species through implementation of CM1–CM10 and CM22  
 7 (AMM6). No adverse effects are expected from implementation of CM11–CM21.

- 8 • *CM1 Water Facilities and Operations*: Construction of the Alternative 9 water conveyance  
 9 facilities would result in the temporary disturbance of 3,507 acres that would provide  
 10 opportunities for colonization by invasive plant species.
- 11 • *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo Bypass fisheries  
 12 enhancements would result in the temporary disturbance of 758 acres that would provide  
 13 opportunities for colonization by invasive plant species. Vegetation maintenance activities for  
 14 the Fremont Weir and Yolo Bypass improvements may include the removal of giant reed;  
 15 however, the clearing of linear areas to facilitate water flow may also result increased  
 16 opportunities for invasion. Sediment removal, transportation, and application as a source  
 17 material for restoration or levee projects as part of Fremont Weir and Yolo Bypass maintenance  
 18 activities could also result in the spread of invasives if the sediment contains viable invasive  
 19 plant propagules.
- 20 • *CM3 Natural Communities Protection and Restoration*: The restoration activities in the natural  
 21 communities located in the eleven CZs would result in the temporary disturbance of restoration  
 22 areas that would provide opportunities for colonization by invasive plant species.
- 23 • *CM4 Tidal Natural Communities Restoration*: The activities associated with the restoration of  
 24 tidal perennial aquatic, tidal mudflat, tidal freshwater emergent wetland, and tidal brackish  
 25 emergent wetland in ROAs would result in the temporary disturbance of tidal areas that would  
 26 provide opportunities for colonization by invasive plant species. These adverse effects would be  
 27 reduced by designing restoration projects to minimize the establishment of nonnative

1 submerged aquatic vegetation, and early restoration projects would be monitored to assess the  
2 response of nonnative species to restoration designs and local environmental conditions. If  
3 indicated by monitoring results, the BDCP Implementation Office would implement invasive  
4 plant control measures in restored natural communities to help ensure the establishment of  
5 native marsh plain plant species. Additionally, the BDCP Implementation Office would actively  
6 remove submerged and floating aquatic vegetation in subtidal portions of tidal natural  
7 community restoration sites.

- 8 • *CM5 Seasonally Inundated Floodplain Restoration*: Floodplain restoration levee construction  
9 would result in the temporary disturbance of 1,285 acres along channels in the north, east, and  
10 south Delta (San Joaquin, Old, and Middle Rivers) that would provide opportunities for  
11 colonization by invasive plant species.
- 12 • *CM6 Channel Margin Enhancement*: The temporary effects of channel margin enhancement were  
13 not estimated because specific locations for this activity and their areal extent have not been  
14 developed. Channel margin enhancement (Sacramento River between Freeport and Walnut  
15 Grove, San Joaquin River between Vernalis and Mossdale, Steamboat and Sutter Sloughs, and  
16 salmonid migration channels in the interior Delta) would result in the temporary disturbance of  
17 channel areas that would provide opportunities for colonization by invasive plant species.
- 18 • *CM7 Riparian Natural Community Restoration*: The restoration of valley/foothill riparian habitat  
19 would result in the temporary disturbance of riparian areas that would provide opportunities  
20 for colonization by invasive plant species.
- 21 • *CM8 Grassland Natural Community Restoration*: The restoration of grassland habitat in CZs 1, 8  
22 and/or 11 would result in the temporary disturbance of degraded grassland or cultivated land  
23 that would provide opportunities for colonization by invasive plant species.
- 24 • *CM9 Vernal Pool and Alkali Season Wetland Complex Restoration*: The restoration of vernal pool  
25 and alkali seasonal wetland complexes in CZs 1,8, or 11 would result in the temporary  
26 disturbance of grassland areas that would provide opportunities for colonization by invasive  
27 plant species.
- 28 • *CM10 Nontidal Marsh Restoration*: Nontidal marsh restoration, which would take place through  
29 conversion of agricultural lands in CZs 2 and 4, would result in the temporary disturbance of  
30 fallow agricultural areas that would provide opportunities for colonization by invasive plant  
31 species. These adverse effects would be reduced by monitoring the development of marsh  
32 vegetation to determine if nonnative vegetation needs to be controlled to facilitate the  
33 establishment of native marsh vegetation or if restoration success could be improved with  
34 supplemental plantings of native species. If indicated by monitoring, nonnative vegetation  
35 control measures and supplemental plantings would be implemented.
- 36 • *CM22 Avoidance and Minimization Measures: AMM6 Spoils, Reusable Tunnel Material, and*  
37 *Dredged Material Disposal Plan* would have adverse effects if spoils, RTM, dredged material, or  
38 chipped vegetative materials containing viable invasive plant propagules are used as topsoil in  
39 uninfested areas.

40 The adverse effects that would result from the introduction and spread of invasive plants through  
41 colonization of temporarily disturbed areas would be minimized by implementation of CM11, AMM4  
42 AMM10 and AMM11.

1 *CM11 Natural Communities Enhancement and Management* would reduce these adverse effects by  
2 implementing invasive plant control within the BDCP reserve system to reduce competition on  
3 native species, thereby improving conditions for covered species, ecosystem function, and native  
4 biodiversity. The invasive plant control efforts would target new infestations that are relatively easy  
5 to control or the most ecologically damaging nonnative plants for which effective suppression  
6 techniques are available. In aquatic and emergent wetland communities, Brazilian waterweed,  
7 perennial pepperweed, barbgass, and rabbitsfoot grass would be controlled (and tidal mudflats  
8 would be maintained). In riparian areas, invasive plant control would focus on reducing or  
9 eliminating species such as Himalayan blackberry, giant reed, and perennial pepperweed. In  
10 grassland areas, techniques such as grazing and prescribed burning may be used to decrease the  
11 cover of invasive plant species.

12 Implementation of AMM4, AMM10, and AMM11 would also reduce the adverse effects that could  
13 result from construction activities. The AMMs provide methods to minimize ground disturbance,  
14 guidance for developing restoration and monitoring plans for temporary construction effects, and  
15 measures to minimize the introduction and spread of invasive plants. AMM4 would include the  
16 preparation and implementation of an erosion and sediment control plan that would control erosion  
17 and sedimentation and restore soils and vegetation in affected areas. The restoration and  
18 monitoring plans for implementation of AMM10 would involve methods for stockpiling, storing, and  
19 restoring topsoil, revegetating disturbed areas, monitoring and maintenance schedules, adaptive  
20 management strategies, reporting requirements, and success criteria. AMM10 would also include  
21 planting native species appropriate for the natural community being restored, with the exception of  
22 some borrow sites in cultivated lands that would be restored as grasslands.

23 AMM11 specifies that the BDCP Implementation Office would retain a qualified botanist or weed  
24 scientist prior to clearing operations to determine if affected areas contain invasive plants. If areas  
25 to be cleared do contain invasive plants, then chipped vegetation material from those areas would  
26 not be used for erosion control but would be disposed of to minimize the spread of invasive plant  
27 propagules (e.g., burning, composting). During construction of the water conveyance facilities and  
28 construction activities associated with the other conservation measures, construction vehicles and  
29 construction machinery would be cleaned prior to entering construction sites that are in or adjacent  
30 natural communities other than cultivated lands and prior to entering any BDCP restoration sites or  
31 conservation lands other than cultivated lands. Vehicles working in or travelling off paved roads  
32 through areas with infestations of invasive plant species would be cleaned before travelling to other  
33 parts of the study area. Cleaning stations would be established at the perimeter of BDCP covered  
34 activities along construction routes as well as at the entrance to reserve system lands. Biological  
35 monitoring would include locating and mapping locations of invasive plant species within the  
36 construction areas during the construction phase and the restoration phase. Infestations of invasive  
37 plant species would be targeted for control or eradication as part of the restoration and revegetation  
38 of temporarily disturbed construction areas.

39 **NEPA Effects:** The implementation of AMM4, AMM10, AMM11, and CM11 would reduce the  
40 potential for the introduction and spread of invasive plants and avoid or minimize the potential  
41 effects on natural communities and special-status species; therefore, these effects would not be  
42 adverse.

43 **CEQA Conclusion:** Under Alternative 9, impacts on natural communities from the introduction or  
44 spread of invasive plants as a result of implementing the BDCP would not result in the long-term

1 degradation of a sensitive natural community due to substantial alteration of site conditions and  
2 would, therefore, be less than significant. No mitigation would be required.

### 3 **Compatibility with Plans and Policies**

#### 4 **Impact BIO-187: Compatibility of the Proposed Water Conveyance Facilities and Other** 5 **Conservation Measures with Federal, State, or Local Laws, Plans, Policies, or Executive Orders** 6 **Addressing Terrestrial Biological Resources in the Study Area**

7 Constructing the water conveyance facilities (CM1) and implementing CM2–CM22 for Alternative 9  
8 have the potential for being incompatible with plans and policies related to managing and protecting  
9 terrestrial biological resources of the study area. A number of laws, plans, policies, programs, and  
10 executive orders that are relevant to actions in the study area provide guidance for terrestrial  
11 biological resource issues as overviewed in Section 12.2, *Regulatory Setting*. This overview of plan  
12 and policy compatibility evaluates whether Alternative 9 would be compatible or incompatible with  
13 such enactments, rather than whether impacts would be adverse or not adverse, or significant or  
14 less than significant. If the incompatibility relates to an applicable plan, policy, or executive order  
15 adopted to avoid or mitigate terrestrial biological resource effects, then an incompatibility might be  
16 indicative of a related significant or adverse effect under CEQA and NEPA, respectively. Such  
17 physical effects of Alternative 9 on terrestrial biological resources are addressed in the impacts on  
18 natural communities and species. The following is a summary of compatibility evaluations related to  
19 terrestrial biological resources for laws, plans, policies, and executive orders relevant to the BDCP.  
20 Federal and State Legislation

- 21 • The federal *Clean Water Act*, *Endangered Species Act*, *Fish and Wildlife Coordination Act*,  
22 *Migratory Bird Treaty Act*, *Rivers and Harbors Act* and *Marine Mammal Protection Act* all contain  
23 legal guidance that either directly or indirectly promotes or stipulates the protection and  
24 conservation of terrestrial biological resources in the process of undertaking activities that  
25 involve federal decision making. The biological goals and objectives contained in the BDCP that  
26 provide the major guidance for implementing the various conservation elements of Alternative  
27 9 are all designed to promote the long-term viability of the natural communities, special-status  
28 species, and common species that inhabit the study area. While some of the conservation  
29 measures of the alternative involve permanent and temporary loss of natural communities and  
30 associated habitats during facilities construction and expansion of certain natural communities,  
31 the long-term guidance in the Plan would provide for the long-term viability and expansion of  
32 the habitats and special-status species populations in the study area. Alternative 9 conservation  
33 actions would be compatible with the policies and directives for terrestrial biological resources  
34 contained in these federal laws.
- 35 • The *California Endangered Species Act*, *California Native Plant Protection Act*, *Porter-Cologne*  
36 *Water Quality Control Act*, and *Natural Communities Conservation Planning Act* are state laws  
37 that have relevance to the management and protection of terrestrial biological resources in the  
38 study area. Each of these laws promotes consideration of wildlife and native vegetation either  
39 through comprehensive planning or through regulation of activities that may have an adverse  
40 effect on the terrestrial and aquatic natural resources of the state. The BDCP, which is the basis  
41 for Alternative 9, contains biological goals and objectives that have been developed to promote  
42 the species protection and natural resource conservation that are directed by these state laws.  
43 Alternative 9 conservation actions would be compatible with the policies and directives  
44 contained in these laws.

- 1       • The *Johnston-Baker-Andal-Boatwright Delta Protection Act of 1992 (Delta Protection Act)* and the  
2       *Sacramento-San Joaquin Delta Reform Act*, which updated the Delta Protection Act, promote the  
3       maintenance and protection of natural resources and the protection of agricultural land uses in  
4       the Delta's primary zone through the goals and policies contained in the 2009 updated Land Use  
5       and Resources Management Plan (LURMP). While nothing in the LURMP is binding on state  
6       agencies that are BDCP proponents, the LURMP does promote restoration and enhancement of  
7       habitats for the terrestrial and aquatic species of the Delta on public land. The BDCP biological  
8       goals and objectives would be compatible with these LURMP goals (Delta Protection  
9       Commission 2010).
- 10       • The *Suisun Marsh Preservation Act of 1974* was designed to protect the Suisun Marsh for long-  
11       term use as wildlife habitat, with a goal of preserving and enhancing the quality and diversity of  
12       the Marsh's aquatic and wildlife habitats. The BDCP and its plans for protection and restoration  
13       of tidal marsh habitats in Suisun Marsh would be compatible with the intent of the Suisun Marsh  
14       Preservation Act.

15       ***Plans, Programs, and Policies***

- 16       • *The Delta Plan*, which was developed by the Delta Stewardship Council in compliance with the  
17       2009 Sacramento-San Joaquin Delta Reform Act, is mandated to achieve two co-equal goals:  
18       provide for a more reliable water supply for California and protect, restore, and enhance the  
19       Delta ecosystem. The co-equal goals are to be achieved in a manner that protects and enhances  
20       the unique cultural, recreational, natural resource, and agricultural values of the Delta as an  
21       evolving place. The BDCP is intended to become a component of the Delta Plan. The Delta  
22       Stewardship Council would determine whether the BDCP is compatible with the goals and  
23       objectives of the Delta Plan prior to its incorporation into the Plan. The compatibility of the  
24       BDCP with the Delta Plan is considered in detail in Section 13.2.2.2 of Chapter 13, *Land Use*.
- 25       • *California Wetlands Conservation Policy*, which was adopted by Executive Order in 1993,  
26       promotes a long-term gain in the quantity, quality and permanence of wetlands acreages and  
27       values in California. Alternative 9 conservation measures that provide for a significant  
28       expansion of wetland acreage and quality in the Delta and Suisun Marsh are compatible with the  
29       intent of the California Wetlands Conservation Policy.
- 30       • *The North American Waterfowl Management Plan (NAWMP)* and *Central Valley Joint Venture*  
31       (*CVJV*) strive to maintain and expand wetlands and uplands for waterfowl and shorebirds in the  
32       major basins of California's Central Valley. The NAWMP is a management plan jointly approved  
33       by the United States and Canada in 1986. It contains general guidance from the principal wildlife  
34       management agencies of the two countries for sustaining abundant waterfowl populations by  
35       conserving landscapes through self-directed partnerships (joint ventures) that are guided by  
36       sound science. The CVJV is the joint venture established for overseeing NAWMP implementation  
37       in the Central Valley. The CVJV is made up of 21 conservation organizations, state and federal  
38       government agencies, and one corporation that have formed a partnership to improve the  
39       habitat conditions for breeding and nonbreeding waterfowl, breeding and nonbreeding  
40       shorebirds, waterbirds, and riparian-dependent songbirds in the Central Valley. The CVJV's  
41       2006 Implementation Plan (Central Valley Joint Venture 2006) establishes conservation  
42       objectives and priorities for these bird groups within the basins of the Central Valley. The BDCP  
43       Plan Area includes all or portions of three Implementation Plan basins—the Delta, Yolo and  
44       Suisun basins. The 2006 Implementation Plan contains basin-specific objectives for wetland

1 restoration, protection of existing wetland habitats, wetland enhancement, adequate power and  
2 water supplies for wetland management, agricultural land enhancement, farmland easements  
3 that maintain waterfowl food resources on agricultural land, and farmland easements that  
4 buffer existing wetlands from urban and residential growth.

5 Implementation of the Alternative 9 conservation measures would result in significant  
6 reductions in cultivated land and managed wetland acreage in the Delta, Yolo and Suisun basins;  
7 however, significant increases in tidal and nontidal wetlands in these basins would be another  
8 result. Because of the large conversion of managed wetland in the Suisun basin, the BDCP has  
9 included a large managed wetland conservation and enhancement goal for this area. For the  
10 Suisun basin conversions to be compatible with the 2006 Implementation Plan goals, this  
11 EIR/EIS has added mitigation that would require food production studies and adaptive  
12 management to ensure that the Suisun basin would continue to provide the waterfowl and  
13 shorebird habitat envisioned in the Implementation Plan.

- 14 • *Stone Lakes National Wildlife Refuge Comprehensive Conservation Plan, Cosumnes River Preserve*  
15 *Management Plan, Brannan Island and Franks Tract State Recreation Areas General Plan, Yolo*  
16 *Bypass Wildlife Area Land Management Plan, Grizzly Island Wildlife Area Management Plan, and*  
17 *the Lower Sherman Island Wildlife Area Land Management Plan* are primarily designed to  
18 preserve and enhance the natural resource and recreation qualities of these areas.  
19 Implementing Alternative 9, especially construction of CM1 and CM2 facilities, and land  
20 modification associated with CM4 restoration activities, could create temporary disruptions to  
21 the terrestrial biological resource management activities in these management areas. The  
22 ultimate goals of aquatic and terrestrial habitat enhancement and restoration contained in the  
23 BDCP would be compatible with the long-term management goals of these areas. Proposed  
24 restoration areas in the Yolo Bypass, on Sherman Island, and in Suisun Marsh would be designed  
25 to be compatible with and to complement the current management direction for these areas and  
26 would be required to adapt restoration proposals to meet current policy established for  
27 managing these areas.
- 28 • *Suisun Marsh Preservation Agreement and Suisun Marsh Plan* are the most recent efforts by the  
29 state and federal agencies responsible for Suisun Marsh (the Marsh) to maintain its long-term  
30 viability as managed wetlands and wildlife habitat, consistent with the Suisun Marsh  
31 Preservation Act. The Suisun Marsh Preservation Agreement (SMPA) was signed in 1987 and  
32 modified in 2005 by DWR, CDFW, Reclamation and the Suisun Resource Conservation District to  
33 establish the mitigation approach in the Marsh for effects of operating the SWP and CVP. The  
34 primary concerns were the effects of CVP and SWP Delta diversions on salinity in the Marsh. The  
35 SMPA focused on ways to ensure adequate water quality and quantity for the managed wetlands  
36 and wildlife habitats in the Marsh to assure equal waterfowl values in the Marsh. The Suisun  
37 Marsh Plan (SMP), for which a Final EIS/EIR was released in 2010 by these agencies, provides  
38 for restoration of tidal marsh habitat and enhancement of managed wetland in the Marsh,  
39 maintenance of waterfowl hunting and recreational opportunities in the Marsh, maintenance  
40 and improvement of the Marsh levee system, and protection and enhancement of water quality  
41 for beneficial uses of the Marsh. An integral component of the SMP is balancing continued  
42 managed wetland operation with new tidal wetland restoration to provide improved and  
43 greater habitat for fish and wildlife species. The SMP is a programmatic, long-term plan and  
44 does not include specific projects, project proponents, or funding mechanisms. However, the  
45 SMP relies on tidal restoration to allow for managed wetland operations to continue. The BDCP  
46 would provide a funding mechanism and increased management potential relative to existing

1 and restored habitats, assisting the SMP in meeting its broader ecological goals, consistent with  
2 long-term operation of the SWP and CVP water conveyance facilities. The conservation actions  
3 contained in the BDCP, which are designed to ensure the long-term protection and recovery of  
4 special-status fish and wildlife species dependent on the Marsh, would be compatible with the  
5 water quality and habitat restoration goals of the SMPA and SMP.

- 6 • *California Aquatic Invasive Species Management Plan* does not address terrestrial invasive  
7 species. Implementation of the Plan's long-term control and management objectives affect  
8 terrestrial species that utilize study area aquatic habitats. These effects are positive in that Plan  
9 objectives are to control and remove invasive aquatic species that are detrimental to native  
10 aquatic and terrestrial species. Implementation of BDCP's conservation actions would be  
11 undertaken with the goal of avoiding any further spread of aquatic invasive species. Alternative  
12 9 would, therefore, be compatible with the objectives of the California Aquatic Invasive Species  
13 Management Plan.
- 14 • *Habitat Conservation Plans* and *Natural Community Conservation Plans* are the subject of a  
15 detailed analysis at the end of this chapter. The analysis considers the compatibility of the BDCP  
16 with all HCPs and NCCPs that share planning area with the BDCP Plan Area.

#### 17 **Executive Orders**

- 18 • *Executive Order 11990: Protection of Wetlands* requires all federal agencies to consider wetland  
19 protection in their policies and actions. The BDCP proposes to protect, enhance and expand the  
20 wetlands of the Plan Area, and, therefore, would be compatible with Executive Order 11990.
- 21 • *Executive Order 13112: Invasive Species* directs federal agencies to prevent and control the  
22 introduction and spread of invasive species in a cost-effective and environmentally sound  
23 manner. Alternative 9 construction and restoration actions have the potential to both introduce  
24 and spread invasive species in the study area. Implementation of mitigation measures described  
25 in this chapter would be capable of making Alternative 9 implementation compatible with  
26 Executive Order 13112.
- 27 • *Executive Order 113443: Facilitation of Hunting Heritage and Wildlife Conservation* directs  
28 federal agencies whose activities affect public land management, outdoor recreation, and  
29 wildlife management to facilitate the expansion and enhancement of hunting opportunities, and  
30 the management of game species and their habitat. Alternative 9 conservation measures that  
31 involve conversion of cultivated land and managed wetland to tidal and nontidal wetlands and  
32 other natural communities would conflict with the hunting expansion and enhancement aspects  
33 of this executive order. Refer to Chapter 15, *Recreation*, for a detailed analysis of the effects of  
34 alternatives on hunting opportunities. The habitat protection and expansion conservation  
35 measures of Alternative 9 would be compatible with the executive order's goal of facilitating the  
36 management of habitats for some game species.

37 **CEQA Conclusion:** The potential plan and policy incompatibilities of implementing Alternative 9  
38 identified in the analysis above indicate the potential for a physical consequence to the environment.  
39 The primary physical consequence of concern is the conversion of large acreages of cultivated land  
40 and managed wetland to natural wetland and riparian habitat in the Plan Area. The physical effects  
41 are discussed in the Shorebirds and Waterfowl analysis above and no additional CEQA conclusion is  
42 required related to the compatibility of the alternative with relevant plans and polices. The reader is  
43 referred to Section 13.2.3 of Chapter 13, *Land Use*, for a further discussion of the responsibilities of

- 1 state and federal agencies to comply with local regulations and the relationship between plan and
- 2 policy consistency and physical consequences to the environment.

### 1 12.3.3.17 Cumulative Effects on Terrestrial Biological Resources

#### 2 Assessment Methodology

3 The cumulative effects analysis for terrestrial biological resources addresses the potential for the  
4 BDCP alternatives to act in combination with other past, present, and reasonably foreseeable future  
5 projects, programs or conditions to create a cumulatively significant adverse impact. The analysis  
6 also considers whether any incremental effect of the alternative is cumulatively considerable.  
7 Chapter 4 Section 4.2, *Resource Chapter Organization*, provides the regulatory and statutory basis  
8 for the cumulative analyses found in this document.

9 The geographic scope of the analysis for natural communities is the terrestrial biology study area  
10 (the BDCP Plan Area and the two transmission corridors that extend beyond the Plan Area) and  
11 lands immediately adjacent to this study area where past, present or reasonably foreseeable  
12 activities might indirectly affect the natural communities in the study area. While the natural  
13 communities extend beyond these boundaries, the focus of the actions that might affect these  
14 resources is the Delta and other lands involved in BDCP conservation efforts. The geographic scope  
15 of the cumulative analysis for each of the covered and noncovered species varies, depending on the  
16 potential for other projects or programs to influence individuals that rely on the study area for some  
17 stage of their life history. For some wildlife species, such as migratory birds, this area includes their  
18 entire range within California. For other species whose individuals do not range beyond the study  
19 area and its immediate surroundings, the geographic range of the cumulative analysis has been  
20 limited to this smaller area. The geographic scope for cumulative effects from spread of invasive  
21 species is the study area.

22 The projects and programs that have been considered as part of the cumulative analysis have been  
23 drawn primarily from a list developed for this EIR/EIS and contained in Appendix 3D, *Defining*  
24 *Existing Conditions, No Action Alternative, No Project Alternative, and Cumulative Impact Conditions*.  
25 This list was compiled in part by reviewing the projects addressed in the cumulative impacts  
26 analysis for the Delta Land Use and Resource Management Plan (Delta Protection Commission  
27 2010). The list was augmented by reviewing the BDCP Alternatives Development Report (Appendix  
28 3A) and other recent environmental documents for Delta-area projects, and by coordinating with  
29 local, state, and federal agencies that are sponsoring activities in the Delta area or on other lands  
30 within the relevant range of individual species. The list of past, present and reasonably foreseeable  
31 future projects and programs has been evaluated to determine which of these activities may have  
32 effects on terrestrial habitats and terrestrial species that are known to occur within the study area.  
33 The list of projects and programs relevant to terrestrial biological resources is contained in Table  
34 12-8. Most of these projects and programs are also a part of the NAA that is addressed in Section  
35 12.3.3.1.

36 In addition, the effects of global climate change have been considered in addressing the cumulative  
37 effects of alternatives on terrestrial biological resources. Changes that might occur within the study  
38 area related to climate change are considered reasonably foreseeable and part of the cumulative  
39 condition that might combine with the effects of BDCP implementation. Climate change is also  
40 considered an element of the No Action Alternative (see Section 12.3.3.1). Chapter 29, *Climate*  
41 *Change*, provides background and assumptions associated with climate change in the Plan Area, and  
42 also addresses general effects on terrestrial habitat and species.

1 To assess whether implementation of the alternatives would contribute to an adverse cumulative  
2 effect on the terrestrial biological resources of the study area, a judgment must first be made  
3 regarding potential adverse effects of the alternatives. Where adverse effects are anticipated, a  
4 determination must be made as to whether these effects would contribute to a cumulative adverse  
5 effect on a terrestrial biological resource. If there is a contribution to a cumulative adverse effect, a  
6 final judgment must be made as to whether the effect of the alternative represents a considerable  
7 contribution to the cumulative effect.

## 8 **Cumulative Effects of No Action**

### 9 **Effects of Past, Present and Reasonably Foreseeable Projects and Programs**

10 The current conditions of study area biological resources are the byproduct of past and ongoing  
11 human activity and natural processes. The present geographic range and condition of natural  
12 communities, special-status and common plants and wildlife, and invasive species are described in  
13 Section 12.1, *Environmental Setting/Affected Environment*. A brief synopsis of general environmental  
14 conditions and their evolution in the study area is presented in Section 12.1.1, *Historical Trends in*  
15 *Biodiversity of the Plan Area*. This discussion provides a context of gradually declining acreages of  
16 natural habitat due to agricultural, urban development, flood control and water management  
17 activities.

18 The various projects and programs listed in Table 12-8 will have cumulative effects on the existing  
19 biological resources of the study area over the next 50 years. The most relevant elements of these  
20 projects and programs are their ability to modify land use patterns, modify land management  
21 practices, and change the patterns of hydrology and vegetation in the study area. Most of the local,  
22 state and federal land use and land management programs that are affecting or will affect the Delta  
23 are designed to preserve open space and agricultural lands, and to manage the resources of the area  
24 for multiple uses, including agriculture, recreation, fish and wildlife habitat, flood protection and  
25 water management. The restoration programs will increase primarily wetland and riparian natural  
26 communities by converting agricultural land or managed wetland. The special-status and common  
27 plants and wildlife that rely on wetland and riparian habitats for some stage of their life will benefit  
28 from these changes over time. Other species that rely on agricultural land and managed wetland, but  
29 do not benefit from wetland and riparian expansion, may decline in the study area. On the upland  
30 fringes of the Delta, plans exist for small expansions of urban development that would remove  
31 primarily agricultural land uses. The management of state- and federally owned wildlife areas,  
32 including Grizzly Island, Sherman Island and Yolo Bypass State Wildlife Areas and Stone Lakes NWR,  
33 will continue to focus on multiple uses, including wildlife habitat improvement, public access for  
34 wildlife viewing, wildlife-friendly agricultural production, and hunting opportunities. Natural  
35 habitat will be improved and expanded. The principal changes that are likely to result from the  
36 various habitat conservation plans that overlap with the study area would be expected to include  
37 the restoration and protection of the habitats that support the same special-status species being  
38 addressed in the BDCP (see *Effects of Other BDCP Conservation Measures on Overlapping*  
39 *Conservation Plans*, below). These changes would be expected to result in increases of wetland,  
40 grassland and riparian habitats, and a decrease in agricultural lands, and possibly managed  
41 wetlands in the study area.

42 Implementation of the water management strategies associated with the programs listed in Table  
43 12-8 would not significantly modify the principal natural communities in the study area. These  
44 management strategies are designed, in part, to improve aquatic habitat conditions in the Delta for

1 the benefit of special-status fish species. Periodic levee and channel maintenance activities  
2 associated with the flood management programs in Table 12-8 would result in localized  
3 disturbances to valley/foothill riparian, grassland, and tidal perennial aquatic natural communities,  
4 and to a lesser extent to tidal brackish and tidal freshwater emergent wetlands. To the extent that  
5 ongoing levee repair and replacement involves use of reinforcing rock and discouragement of  
6 replanting streamside vegetation, there could be a gradual decline in the extent and value of  
7 valley/foothill riparian habitat and grassland along minor and major waterways. Several of the  
8 water management and transportation projects listed in Table 12-8 require localized removal of  
9 natural communities and agricultural land for expanding infrastructure. Most of these activities are  
10 on the periphery or just outside of the study area, including the Contra Costa Water District fish  
11 screen and diversion structure modifications, the Delta Mendota Canal/California Aqueduct intertie  
12 project, the South Bay Aqueduct improvement project, and California High Speed Rail.

### 13 **Effects of Global Climate Change**

14 As discussed in Chapter 29, global climate change is expected to result in many physical changes to  
15 the BDCP Plan Area. From a terrestrial biology perspective, the most significant changes would  
16 include a gradual rise in sea level, increasing water and air temperatures, more frequent drought  
17 and extreme rainfall events, and changes in the hydrologic patterns of the rivers and the Delta  
18 channels that influence the terrestrial and aquatic habitats used by terrestrial plants and wildlife.  
19 The BDCP climate change analysis included in Chapter 29 considers sea level increases at various  
20 levels, including 18–55 inches during the Plan period (see Chapter 29, Section 29.5.1.2). Air  
21 temperatures are projected to rise by 2–5 degrees F by 2050 and water temperatures are projected  
22 to increase as some proportion (2–3 degrees F) of the air temperature rise (see Appendix 29C,  
23 Section 29C.2.1). The changed frequency of drought and extreme rainfall events has not been  
24 predicted, but these events are expected to be part of future California conditions with global  
25 climate change. Hydrologic conditions in the rivers and Delta channels are expected to be altered by  
26 changes in precipitation patterns, with a portion of precipitation shifting from snow to rainfall in the  
27 winter months. This would increase river flows in winter and early spring, and decrease flows in the  
28 remainder of the year as snowmelt runoff decreases. The changes in river flows would generate  
29 subsequent changes in west Delta and Suisun Marsh salinity levels.

30 The physical changes in conditions in the study area related to the climate change described above,  
31 especially the sea level rise, could change the distribution and value of study area habitats. The sea  
32 level rise is expected to gradually inundate existing habitats on the periphery of the Delta, in the  
33 lower Yolo Bypass, and the northern and southern edges of Suisun Marsh. This pattern of  
34 inundation, which assumes a 55-inch sea level rise, is shown in Figure 29-1. Tidal brackish and  
35 freshwater marsh could be gradually inundated and converted to more subtidal habitat. In areas  
36 where there is no upland barrier (e.g., levees, roads, residential development, agricultural fields),  
37 some portion of the tidal marsh may re-establish upslope with the higher water levels if there is  
38 sufficient sediment available to provide an appropriate substrate. However, decreases in sediment  
39 availability that have occurred in the Delta and Suisun Marsh over time and that may continue may  
40 not keep pace if the higher estimated rates of sea level rise occur (Barnard et al. 2013). The result  
41 could be a gradual loss of these tidal marshes. Where barriers exist upslope of existing marsh, the  
42 tidal marsh habitat could be gradually inundated and subtidal areas would remain. Subtidal habitat  
43 is less valuable to the special-status and common terrestrial plants and wildlife of the study area.  
44 Low-lying upland grassland and riparian areas that border the study area waterways could also be  
45 gradually converted to tidal marsh, but would be expected to re-establish upslope where open

1 ground exists and there are no physical barriers. Where these deeper water incursions bisect  
2 existing wildlife corridors, the ability of certain species to move and interact with adjacent  
3 populations would decrease. Population numbers of riparian, grassland, and tidal marsh species  
4 would be likely to decrease and population distribution would be altered. The habitats adjacent to  
5 study area waterways would also be exposed to more frequent inundation and desiccation as  
6 precipitation levels show greater fluctuation.

7 Land subsidence, sea level rise, gradual or catastrophic levee failure, or a combination of these  
8 conditions, should they occur, would result in flooding and inundation that could significantly  
9 damage existing facilities and infrastructure, uproot and kill vegetation to an unknown extent,  
10 permanently flood Delta islands, and drastically alter the salinity of Delta waterways and wetlands.  
11 Depending on the extent and duration of flooding, significant short- and long-term changes could  
12 occur in the availability of shallow tidal wetlands, riparian and grassland habitats and managed  
13 lands useful to certain special-status and common species (e.g., cultivated lands, managed wetland).  
14 Depending on the amount of human intervention to drain islands and rebuild levees, there may be a  
15 gradual succession of habitats less valuable to the plant and animal species currently relying on the  
16 Delta for growth and seed production, cover, breeding, nesting, resting, movement corridors and  
17 foraging. Refer to Appendix 3E, *Potential Seismic and Climate Change Risks to SWP/CVP Water*  
18 *Supplies*, for a further discussion of seismic and climate change effects that might occur in the study  
19 area under the no action condition. While similar risks would occur under implementation of the  
20 action alternatives, these risks may be reduced by BDCP-related levee improvements, along with  
21 implementation of those projects identified for the purposes of flood protection in Table 12-7.

22 The negative elements of global climate change described above would be a contributing factor to  
23 any cumulative effects of implementing the projects and programs that are part of the No Action  
24 scenario (Table 12-8). Any negative effects on terrestrial biological resources associated with the  
25 action alternatives (see below), when considered with all of the above effects of the No Action  
26 Alternative, could create adverse cumulative effects to these terrestrial biological resources.

## 27 **Cumulative Effects of the Action Alternatives**

28 Based on the analyses presented in earlier parts of this chapter, the alternatives would have little or  
29 no negative effect or would have a long-term beneficial effect on nearly all of the terrestrial  
30 biological resources of concern in the study area. This is consistent with the goal of HCP/NCCP  
31 programs, which is to improve the long-term viability of special-status species and their habitats.  
32 The positive effects of implementing the BDCP are similar in all of the project alternatives other than  
33 the No Action Alternative. There are relatively small variations in the acres affected by construction  
34 of the alternative water conveyance facilities (CM1), but the restoration, protection, enhancement  
35 and stressor reduction elements of the alternatives are the same for Alternatives 1A, 1B, 1C, 2A, 2B,  
36 2C, 3, 4, 6A, 6B, 6C, 8 and 9. These elements of the BDCP have the greatest potential to modify  
37 natural communities and affect special-status plants and wildlife. There are reductions in tidal  
38 marsh restoration (CM4) associated with Alternative 5, and expansion of channel margin habitat  
39 enhancement (CM6) and floodplain restoration (CM5) associated with Alternative 7 that create  
40 significant variances from the rest of the alternatives. Where relevant, these differences are  
41 addressed in the impact analysis that follows.

42 While construction and restoration activities in the near-term period of the alternatives would  
43 temporarily or permanently remove natural communities and modeled habitat for special-status  
44 plant and wildlife species, the near-, mid- and long-term conservation actions would replace,

1 enhance and in most cases expand habitat acres and value for these species. The positive effects the  
 2 alternatives would have on special-status species would also provide benefits to common terrestrial  
 3 wildlife and plants.

4 The potential adverse effects of implementing all of the action alternatives include potential  
 5 disturbance of nesting colonies of bank swallows, should they be present adjacent to construction  
 6 activity at the north end of the Yolo Bypass, and the potential that BDCP-related changes in river  
 7 stage upstream of the study area on the Sacramento and Feather Rivers could adversely affect bank  
 8 swallow colonies. Though the alternatives using the east (Alternatives 1B, 2B, and 6B) and west  
 9 (Alternatives 1C, 2C, and 6C) alignments would provide the same conservation benefits as the other  
 10 alternatives, the construction of the canal portions of the conveyance facilities would create  
 11 substantial barriers to wildlife movement within and through the study area. Also, the canal  
 12 associated with the east alignment alternatives (1B, 2B, and 6B) would adversely affect movement  
 13 and connectivity between subpopulations of giant garter snake in the vicinity of White Slough in the  
 14 eastern Delta.

15 Because these are the only potential adverse effects that could combine with the projects and  
 16 programs in Table 12-8 and with global climate change to create a cumulatively considerable effect,  
 17 the discussion that follows is limited to these issues.

18 **Table 12-8. Programs, Projects, and Policies Included In the Cumulative Impact Analysis for Terrestrial**  
 19 **Biological Resources**

Agency	Program/Project/Policy	Comments
Alameda County	East Alameda County Conservation Strategy	Approved in 2011. There is less than a 2% overlap with BDCP (4,643 acres) and this overlap only occurs in one conservation zone. The conservation strategy addresses the conservation needs of 19 species, including eight species that overlap with the BDCP. Currently no planned conservation activity in the overlap area, so the conservation strategy would not affect BDCP species in the Plan Area. The East Alameda strategy would have beneficial effects on eight of the BDCP covered species.
California Department of Fish and Wildlife	Calhoun Cut/Lindsey Slough Restoration	Increase intertidal marsh habitat and adjacent riparian habitat on 927 acres in Cache Slough ROA.
California Department of Fish and Wildlife	Ecosystem Restoration Program Conservation Strategy	Created in 2000. Ongoing program to preserve, restore, and enhance terrestrial natural communities and ecosystems in the San Francisco Bay and Sacramento-San Joaquin Delta. Protected and restored more than 150,000 acres of habitat, including 3,900 acres and 59 miles of riparian and riverine aquatic habitat (as of 2010) after 7 of the planned 30 years of the project. This conservation strategy creates beneficial impacts on the natural communities and special-status species included in this EIR/EIS.

Agency	Program/Project/Policy	Comments
California Department of Fish and Wildlife	Fremont Landing Conservation Bank	Established in 2006. Enhances 40 acres of riparian habitat and restores 60 acres of riparian woodlands and sloughs. This bank provides benefits to salmonid species in the Sacramento Valley and many riparian bird, reptile and mammal species that also occupy the Delta.
California Department of Fish and Wildlife	Grizzly Island Wildlife Area Land Management Plan	Estuarine marsh that contains about 15,300 acres of wildlife habitat. Will continue to be managed for wildlife, with an emphasis on waterfowl, threatened and endangered species, and the resident tule elk herd. CDFW actions at this wildlife area will maintain and enhance managed wetland as some of the private wetland is converted to tidal marsh.
California Department of Fish and Wildlife	Lower Sherman Island Wildlife Area Land Management Plan	Ongoing program. Directs habitat and species management on 3,100 acres of marsh and open water. The Plan's goals are to restore and improve marsh and upland habitats for threatened and endangered species, control invasive species and allow for hunting and fishing recreation activities. The Plan has a positive effect on species of concern in BDCP.
California Department of Fish and Wildlife	Private Lands Incentive Program	Includes 29,000 acres of habitat in Tulare Basin, Grasslands, Suisun Marsh, and Sacramento Valley. Encourages development and enhancement of habitat for shorebirds and waterfowl on private lands. This program has beneficial effects on waterfowl and shorebird species in the Plan Area, and encourages wildlife-friendly farming practices.
California Department of Fish and Wildlife	Restoring Ecosystem Integrity in the Northwest Delta	Originally funded in 2004. Ongoing program. Focused on habitat restoration. Currently concentrating acquisition efforts on 3 specific properties consisting of about 150 acres and baseline monitoring. The project centers on Calhoun Cut and Lindsay Slough in the Cache Slough ROA. The plan is designed to create a restored, protected corridor extending from Jepson Prairie to Prospect Island, doubling the overall acreage of marsh and riparian habitats, doubling the protected acres of vernal pool/perennial grasslands and increasing the abundance and local distribution of at risk and other native plant and animal species. It is consistent with BDCP goals for habitat restoration in the Cache Slough ROA.

Agency	Program/Project/Policy	Comments
California Department of Fish and Wildlife	Staten Island Wildlife-Friendly Farming Demonstration	Ongoing program. Objective is ecosystem restoration; 2,500–5,000 acres of corn will be flooded to increase habitat availability and to improve wildlife-friendly agriculture to foster recovery of at-risk species and to investigate effects of agriculture on water quality. This program is focused on improving agricultural land as seasonal habitat for greater and lesser sandhill cranes, a target species of the BDCP.
California Department of Fish and Wildlife	Yolo Bypass Wildlife Area Land Management Plan	Ongoing program. Provides for multiple use management of 16,000 acres of mixed agricultural, grassland and managed wetland habitats. This wildlife area is managed to support wintering waterfowl populations, shorebird migration, waterfowl hunting, and active wildlife observation, especially bird watching. This is accomplished by actively managing wetland habitats and providing for wildlife-friendly farming.
California Department of Water Resources	Central Valley Flood Protection Plan	Proposes significant expansion of flood protection features in the study area, including expansion of the Yolo Bypass. This flood protection improvement project would potentially conflict with BDCP's effort to improve giant garter snake habitat just outside of the current floodway, and to improve fish passage through Yolo Bypass waterways.
California Department of Water Resources	Delta Levees Flood Protection Program	Ongoing program. Includes modification to Delta levees within the Sacramento-San Joaquin Delta and portions of the Suisun Marsh, with a focus on western Delta island levees. The project works with 60 reclamation districts and strives to complete levee rehabilitation projects with no net loss of habitat in the Delta. The program has some potential to remove grassland, emergent marsh and riparian habitats in the short-term to strengthen levees. Habitat losses would have to be offset with protection or restoration actions.
California Department of Water Resources	FloodSAFE California	Promotes public safety through integrated flood management while protecting environmental resources; emphasizes action in the Delta. This program is very broad, but is designed to improve flood safety throughout the state while encouraging sound conservation actions that benefit California's native fish and wildlife and promote wildlife-friendly agricultural practices. The program should not reduce habitat values in the Delta.

Agency	Program/Project/Policy	Comments
California Department of Water Resources	Levee Repair-Levee Evaluation Program	Ongoing program. Upgrading levees along the Sacramento and San Joaquin Rivers and Delta; 1,600 miles of levees included in Central Valley. Most of the program efforts are geotechnical, bathymetric and geomorphic evaluations that have little to no effect on terrestrial wildlife in the study area.
California Department of Water Resources and MOA Partners	Lower Yolo Restoration Project	In Cache Slough ROA, reintroduce tidal action to half of 3,408-acre Yolo Ranch. This project would eliminate existing agricultural land used primarily for grazing, and create tidal marsh for the benefit of special-status Delta anadromous and resident fish species. It is expected to be part of BDCP's early implementation program. It will adversely affect some grassland species in favor of tidal marsh and riparian species.
California Department of Water Resources	Dutch Slough Tidal Marsh Restoration Project	Converts 240–840 acres from agricultural uses and grazing to wetland, riparian, and upland habitats. The project also includes development of a recreation center at one end of the property. The restoration will benefit tidal marsh and riparian habitats and species in the western Delta on lands with considerable topographic diversity and little to no land subsidence.
California High Speed Rail Authority	Sacramento to Merced Section of High Speed Rail System	One possible alignment for the section from Sacramento to Merced would include major infrastructure construction along the I-5 corridor between French Camp and Lathrop, which would pass through the portion of the study area around the I-5 and Hwy. 120 junction. The potential alignment from the Bay Area to Stockton would cross the study area from the west near Tracy and head east to Lathrop. These alignments are within or parallel existing rail corridors. The project has the potential to remove grassland and cultivated lands along existing rights of way in the study area.
California Partners in Flight	Riparian Habitat Joint Venture	Ongoing program. Promotes and supports riparian conservation and enhancement, contributes to flood control and maximizes habitat available to wildlife. Protects and restores riparian areas with intact adjacent upland habitats. The program has a positive influence on the value of riparian habitat.
Central Valley Joint Venture Program	Central Valley Joint Venture	Ongoing program. Strives to protect, restore, and enhance wetlands. Contributes to habitat conservation on a total of 714,000 acres in California. This program has the potential to convert agricultural land to managed wetland or natural wetlands.

Agency	Program/Project/Policy	Comments
Contra Costa County and East Contra Costa County Habitat Conservancy	East Contra Costa County HCP/NCCP	Approved in 2007. Encompasses about 175,000 acres and contains 30,000 acres of preserved land. Purpose is to purchase, restore, and permanently protect large, interconnected and biologically rich blocks of habitat. A 63,073 acre overlap with the BDCP boundary. This HCP/NCCP will result in restoration of native grassland, vernal pools and oak woodland on the southwestern edge of the BDCP Plan Area.
Contra Costa Water District	Contra Costa Canal Fish Screen Project	Completed in 2011. Designed to restore Delta ecosystems. Minor terrestrial impact at fish screen sites.
Contra Costa Water District, U.S. Bureau of Reclamation, and California Department of Water Resources	Contra Costa Water District Middle River Intake and Pump Station (Alternative Intake Project)	Completed in 2010. Resulted in permanent conversion of 6–8 acres of rural agricultural land. Features about 12,000 feet of pipe across Victoria Island and under Old River.
Delta Protection Commission	Land Use and Resource Management Plan	Outlines long-term land use requirements for the Sacramento-San Joaquin Delta. This plan directs the long-term protection of agricultural, recreational, and open space uses of the Delta and restricts urban and other types of development that would reduce the value of these uses. The Plan supports protection and restoration of riparian and aquatic habitats in the Delta, and improvement in water quality in Delta channels.
National Marine Fisheries Service, U.S. Bureau of Reclamation, and Department of Water Resources	Biological Opinion (BiOp) on the Long-Term Operations of the Central Valley Project and State Water Project	Ongoing program. Action area consists of the Oroville Reservoir, Feather River downstream of Oroville, Sacramento River downstream of Feather River, Sacramento-San Joaquin Delta, and adjacent habitats that are dependent on or influenced by waterways. Designed to conserve freshwater, estuarine, nearshore, and offshore aquatic habitats, for the benefit of federally protected fish species. Includes 8,000-acre tidal wetland restoration requirement, which will result in conversion of agricultural land and managed wetland in the Delta and Suisun Marsh.
Reclamation District 2093	Liberty Island Conservation Bank	Under implementation. Permits and approvals acquired in 2009. Project site is on northern tip of Liberty Island. Over 160 acres in the project site with about 50 acres proposed to be converted to open water channels, emergent marsh wetland, and riparian habitat. Focuses on Delta fish habitat but will restore 2.7 acres of riparian habitat.

Agency	Program/Project/Policy	Comments
Sacramento Area Flood Control Agency, Central Valley Flood Protection Board, and U.S. Army Corps of Engineers	Central Valley Flood Management Program	Ongoing program. Supports flood management planning in Sacramento and San Joaquin Valleys. To be updated every 5 years with first update to be completed in 2017. Combined total of about 2.2 million acres of land within the Central Valley. The program supports improvements in flood management structures, including levees and bypasses. Facilities improvements could result in local removal of vegetation in the study area as flood control facilities are improved and expanded.
San Joaquin Council of Governments	San Joaquin County Multi-Species Habitat Conservation and Open Space Plan	Ongoing program. Approved in 2011. Includes most of San Joaquin County. Assumes 100,000 acres of open land conversion and provides about 100,000 acres of preserves. About 35% of this plan overlaps with BDCP so competition for restoration sites and land acquisition would exist. There are 39 covered species in common and very similar land acquisition targets, such as riparian forests and grasslands. The Plan is likely to result in conversion of agricultural land to native vegetation, including riparian and grassland areas in the south and east Delta areas.
Semi Tropic Water District	Delta Wetlands	Flood storage and habitat conservation project on four Delta islands. This project could convert four large Delta islands into 11,000 acres of freshwater storage and 9,000 acres of managed agricultural lands, wetlands, riparian areas and other types of wildlife habitat. A significant amount of agricultural land would be removed from production.
Solano County	Solano County Multispecies Habitat Conservation Plan	Establishes habitat conservation goals for Solano County, including approximately 205,000 acres of the study area. This conservation plan focuses on protection and restoration of 13,000-15,000 acres of valley floor grassland and vernal pool habitat for a range of special-status species. Many of the target species are common with the BDCP, including fairy shrimp, Swainson's hawk, western burrowing owl, giant garter snake, California red-legged frog, and Mason's lilaeopsis.

Agency	Program/Project/Policy	Comments
U.S. Army Corps of Engineers	CALFED Levee Stability Program	Includes maintaining and improving levee stability in the Delta. Long-term strategy will include ecosystem restoration. Partially funds McCormack-Williamson Tract Restoration in Cosumnes-Mokelumne ROA; 1,500 acres of tidal and floodplain habitat restoration would expand habitats also targeted by BDCP.
U.S. Bureau of Reclamation	Delta Mendota Canal/California Aqueduct Intertie	Construction completed in April 2012. Includes construction of a pump and 500-foot pipeline between the two canals near the Jones Pumping Plant. No special-status plant community was affected. The majority of the habitat disturbed was nonnative annual grassland.
U.S. Bureau of Reclamation, U.S. Fish and Wildlife Service, National Marine Fisheries Service, Department of Water Resources and Department of Fish and Wildlife	San Joaquin River Restoration Program	Initiated in 2006. Ongoing program; 150 miles of the river is planned for restoration, with an emphasis on improving fish passage and riparian habitats within and adjacent to the river's floodplain. This program does not include lands within the BDCP Plan Area, but would provide habitat connections along the San Joaquin River upstream of the Plan Area.
U.S. Fish and Wildlife Service, U.S. Bureau of Reclamation and California Department of Fish and Wildlife	San Joaquin Basin Action Plan	Includes a habitat acquisition and wetland enhancement project on 23,500 acres in northern San Joaquin River basin, outside of the BDCP Plan Area. This program is focused on supplying adequate water to state and federal refuges and managed wetlands in the San Joaquin Valley for the benefit of migratory waterfowl and other species that are supported by these managed wetlands. These habitats are elements of the larger Central Valley flyway that includes wetlands in the BDCP Plan Area
U.S. Fish and Wildlife Service and Sacramento County	South Sacramento Habitat Conservation Plan	Establishes conservation goals for south Sacramento County, including approximately 43,000 acres of the study area. This plan targets habitat restoration and preservation for 16 species that are common to the BDCP. Habitat improvements are sought for grassland, wetland, agricultural land and riparian areas. There is overlap in the demand for land acquisition sites between the BDCP and the South Sacramento Plan. The Plan also provides for an urban expansion area within the BDCP Plan Area. Collaborative planning for the two HCPs could improve the opportunities to create a continuous band of preserved land from giant garter snake populations in the White Slough area to Stone Lakes NWR and Cosumnes River Preserve.

Agency	Program/Project/Policy	Comments
U.S. Fish and Wildlife Service	Recovery Plan for Sacramento-San Joaquin Delta Native Fishes	Released in 1995, the recovery plan includes developing additional shallow water habitat, riparian vegetation zones and tidal marsh to restore wetland habitats for the benefit of 8 native species throughout the Bay-Delta ecosystem. The objective of the plan is to establish self-sustaining populations of the species included in the plan. The goals for chinook salmon, green sturgeon, and splittail include providing for a limited harvest that can be sustained. The estuary is to be managed so that it is better habitat for aquatic life in general and for the fish species of concern in particular. This plan complements the goals of the BDCP, for both terrestrial and aquatic species in the Delta.
U.S. Fish and Wildlife Service	Stone Lakes National Wildlife Refuge Comprehensive Conservation Plan	Drafted in 2006. Ongoing program. Directs habitat and species management on approximately 17,600 acres of grassland, agricultural land, managed wetland and riparian habitat. The managed lands of the refuge are a major conservation feature on the eastern boundary of the BDCP Plan Area. Lands within the refuge are owned in fee title or cooperatively managed with landowners through easements. The goals of the refuge are to conserve, restore and manage wetland, grassland, and riparian habitat for the benefit of fish, wildlife and plants, and special-status species; conserve enhance, and restore high quality migrating, wintering and breeding habitat for migrating birds; provide visitors with wildlife-dependent recreation, education and interpretation opportunities; and identify and protect cultural resources. The refuge represents an excellent opportunity for cooperative habitat conservation between the USFWS and BDCP implementing entities.

Agency	Program/Project/Policy	Comments
U.S. Fish and Wildlife Service, U.S. Bureau of Reclamation and California Department of Water Resources	BiOp on the Long-Term Operations of the Central Valley Project and State Water Project (Delta smelt)	Ongoing program. The opinion directs reasonable and prudent actions associated with the ongoing operation of the CVP and SWR, as they relate to the long-term survival of delta smelt. It directs actions associated with reducing entrainment of adult, juvenile and larval smelt in the south Delta pumps; improving habitat for smelt within the Delta by regulating river outflow, restoring or creating at least 8,000 acres of intertidal and related subtidal habitat for delta smelt in the Delta and Suisun Marsh; and initiating a monitoring and reporting program. This program is a principal element in controlling west Delta and Suisun Marsh salinity levels that might affect terrestrial species and habitats.
Yolo County	Yolo Natural Heritage Program Plan	First administrative draft plan released in June 2013. Establishes habitat conservation goals for Yolo County (653,818 acres), including 111,383 acres of the BDCP study area. The principal areas of overlap are in the Yolo plan's Planning Units 17 and 18, northern and southern Yolo Bypass. This corresponds primarily with BDCP CZ 2. Thirty-two species are being considered for ESA and NCCPA coverage, including Swainson's hawk and giant garter snake. The Yolo plan proposes to restore or protect over 76,000 acres of valley oak woodland, valley foothill riparian, fresh emergent wetland, shrubland, agricultural land and grassland. This plan provides the potential to work toward common habitat protection, restoration and enhancement with the BDCP in the Yolo Bypass area (Yolo County Habitat/Natural Community Conservation Plan Joint Powers Authority 2013).
Zone 7 Water Agency and Department of Water Resources	South Bay Aqueduct Improvement and Enlargement Project	Estimated completion in 2012. More than 40 miles of pipelines, a 500 acre-foot reservoir and new pumping facilities will be built. The project is located outside of the BDCP Plan Area, but will remove grassland, riparian and related habitats in the hills west of the Plan Area.

1 **Impact BIO-188: Cumulative Indirect Effects of the Construction of Conservation Components**  
 2 **on Bank Swallow**

3 Noise and visual disturbances during restoration activities for Alternatives 1A–9 could result in  
 4 temporary disturbances that cause bank swallow to abandon active nest burrows adjacent to  
 5 construction areas, and construction-related disturbances could result in an adverse effect on  
 6 individuals. The noise and visual disturbance could result from implementing *CM2 Yolo Bypass*  
 7 *Fisheries Enhancement*, and *CM4 Tidal Natural Communities Restoration* including operation of  
 8 earthmoving equipment and human activities at work sites. Bank swallow colonies with occupied  
 9 burrows have been recorded in CZ 2 and CZ 5. Various activities related to *CM11 Natural*  
 10 *Communities Enhancement and Management* could also have indirect impacts on bank swallow.

11 A number of other projects and programs listed in Table 12-8 also have the potential to directly or  
 12 indirectly affect bank swallow in the study area and in areas upstream of the study area along the  
 13 Sacramento and Feather Rivers. They include:

- 14 • DWR Central Valley Flood Protection Plan (Yolo Bypass widening)
- 15 • DWR Delta Levees Flood Protection Program
- 16 • DWR FloodSAFE California
- 17 • Sacramento Area Flood Control Agency, Central Valley Flood Protection Board, U.S. Army Corps  
 18 of Engineers Central Valley Flood Management Program
- 19 • U.S. Army Corps of Engineers CALFED Levee Stability Program

20 All of the flood control and levee protection programs and plans listed above could involve  
 21 modification and armoring of levees within the range of known bank swallow colonies adjacent to  
 22 and north of the study area. Additional bank protection could further reduce the availability of bank  
 23 swallow nesting sites and could involve indirect disturbance of active nesting colonies. Alternatives  
 24 1–9, in combination with the other projects and programs listed above, could result in adverse  
 25 effects on bank swallow nesting colonies that are individually limited but cumulatively considerable.

26 **NEPA Effects:** The indirect disturbance to bank swallow nesting colonies caused by implementing  
 27 Alternatives 1A–9, in combination with the potential direct and indirect effects on these colonies  
 28 caused by other past, present, or reasonably foreseeable projects and programs would create an  
 29 adverse cumulative effect on this species adjacent to and north of the study area. The disturbances  
 30 could result in take of a state-listed threatened species. Although the potential effect of the  
 31 alternatives is restricted to few colonies, the state recognizes this species as both imperiled and  
 32 vulnerable because of its restricted range and low populations. Therefore, the effect of the  
 33 alternatives represents a cumulatively considerable contribution to an adverse cumulative effect.  
 34 Implementation of Mitigation Measure BIO-146, *Active Bank Swallow Colonies Shall Be Avoided and*  
 35 *Indirect Effects on Bank Swallow Will Be Minimized*, would be available to address this effect.

36 **CEQA Conclusion:** The indirect disturbance to bank swallow nesting colonies caused by  
 37 implementing Alternatives 1–9, in combination with the potential direct and indirect effects on  
 38 these colonies caused by other past, present or reasonably foreseeable projects and programs would  
 39 create a significant cumulative impact on this species adjacent to and north of the study area. The  
 40 disturbances could result in take of a state-listed threatened species. Although the potential effect of  
 41 the alternatives is restricted to a single colony, the state recognizes this species as both imperiled

1 and vulnerable because of its restricted range and low populations. Therefore, the impact of the  
 2 alternatives represents a cumulatively considerable contribution to a significant cumulative impact.  
 3 Implementation of Mitigation Measure BIO-146, *Active Bank Swallow Colonies Shall Be Avoided and*  
 4 *Indirect Effects on Bank Swallow Will Be Minimized*, would reduce this impact to a less-than-  
 5 significant level.

6 **Mitigation Measure BIO-146: Active Bank Swallow Colonies Shall Be Avoided and Indirect**  
 7 **Effects on Bank Swallow Will Be Minimized**

8 To the extent practicable, BDCP proponents will not construct conservation components during  
 9 the bank swallow nesting season (April 1 through August 31). If construction activities cannot  
 10 be avoided during nesting season, a qualified biologist will conduct preconstruction surveys to  
 11 determine if active bank swallow nesting colonies are present within 500 feet of work areas. If  
 12 no active nesting colonies are present, no further mitigation is required.

13 If active colonies are detected, BDCP proponents will establish a nondisturbance buffer  
 14 (determined in coordination with CDFW and the Bank Swallow Technical Advisory Committee)  
 15 around the colony during the breeding season. In addition, a qualified biologist will monitor any  
 16 active colony within 500 feet of construction to ensure that construction activities do not affect  
 17 nest success.

18 **Impact BIO-189: Cumulative Upstream Effects of Reservoir and Water Conveyance Facilities**  
 19 **Operations on Bank Swallow**

20 Bank swallows are a riparian species that have evolved to deal with a dynamic system that changes  
 21 with annual variation in variables such as rainfall, or late snowpack runoff. The primary threat to the  
 22 species is loss of nesting habitat from the placement of rock revetment for levee stabilization.  
 23 Because of this limited available habitat, and the reduction of natural river process, the species is  
 24 highly sensitive to 1) reductions in winter flows which are necessary to erode banks for habitat  
 25 creation, and 2) high flows during the breeding season. The potential impacts of changes in  
 26 upstream flows during the breeding season on bank swallows are the flooding of active burrows and  
 27 destruction of burrows from increased bank sloughing. Bank swallows arrive in California and  
 28 begin to excavate their burrows in March, and the peak egg-laying occurs between April and May  
 29 (Bank Swallow Technical Advisory Committee 2013). Therefore, increases in flows after the March  
 30 when the swallows have nested and laid eggs in the burrows could result in the loss of nests. On  
 31 the Sacramento River, breeding season flows between 14,000 and 30,000 cfs have been associated  
 32 with localized bank collapses which resulted in partial or complete colony failure (Stillwater  
 33 Sciences 2007).

34 The CALSIM II modeling results of mean monthly flow were analyzed for three flow gauge stations  
 35 on the Sacramento (Sacramento River at Keswick, Sacramento River upstream of Red Bluff,  
 36 Sacramento River at Verona) and two flow gauge stations on the Feather River (Feather River high-  
 37 flow channel Thermalito Dam, and Feather River at the Confluence with the Sacramento River).  
 38 Flows were estimated for wet years (W), above normal years (AN), below normal years (BN), dry  
 39 years (D), critical years (C) and an average (A; see Section 5.3.1 Methods for Analysis, Chapter 5  
 40 *Water Supply*, for a description of the model).

41 On the Sacramento River, at the Keswick and Red Bluff gauges, mean monthly flows under  
 42 Alternatives 1A–9 would increase between April and August in some water years which could lead  
 43 to inundation of active colonies. However, the flows under Existing Conditions and the predicted

1 flows in the late long-term without the project also show increases in flows during the breeding  
 2 season (April–August) in these water year types. Similar trends occur for the Feather River. In  
 3 addition, under Alternatives 1A–9 flows are predicted to be greater than 14,000 cfs during the  
 4 breeding season (April–August,) during certain water years which could lead to bank collapse.  
 5 However, flows of this height are recorded under Existing Conditions at this flow gauge and are also  
 6 predicted for the late long-term time without the project (the No Action Alternative).

7 **NEPA Effects:** High spring flows on the Sacramento and Feather Rivers may already be impacting  
 8 bank swallow colonies during the breeding season, and predicted flows under Alternatives 1A–9  
 9 would not be substantially greater than under the No Action Alternative. However, because of the  
 10 complexity of variables that dictate suitable habitat for the species, there is uncertainty regarding  
 11 the potential for and magnitude of impacts on bank swallow from changes in upstream operations.  
 12 Soil type, high winter flows, and low spring flows all contribute to successful nesting of bank  
 13 swallow, and even moderate changes in seasonal flows could have an adverse effect on breeding  
 14 success for the species. Mitigation Measure BIO-147, *Monitor Bank Swallow Colonies and Evaluate*  
 15 *Winter and Spring Flows Upstream of the Study Area*, would be available to address the uncertainty of  
 16 potential adverse effects of upstream operations on bank swallow. Because the state recognizes this  
 17 species as both imperiled and vulnerable due to its restricted range and low populations, any  
 18 negative effect of the alternatives would represent a cumulatively considerable contribution to an  
 19 adverse cumulative effect.

20 **CEQA Conclusion:** High spring flows on the Sacramento and Feather Rivers may already be  
 21 impacting bank swallow colonies during the breeding season, and predicted flows under  
 22 Alternatives 1A–9 would not be substantially greater than under the No Action Alternative.  
 23 However, because of the complexity of variables that dictate suitable habitat for the species, there is  
 24 uncertainty regarding the potential for and magnitude of upstream impacts on bank swallow from  
 25 changes in operations. There are many variables that dictate suitable habitat for the species that  
 26 cannot be clearly quantified, and seasonal changes in flow could increase or decrease suitable  
 27 habitat for bank swallow depending on soil type and location of current colonies. Mitigation  
 28 Measure BIO-147, *Monitor Bank Swallow Colonies and Evaluate Winter and Spring Flows Upstream of*  
 29 *the Study Area* would address this significant impact and further determine if additional mitigation  
 30 is required for bank swallow. Because the state recognizes this species as both imperiled and  
 31 vulnerable due to its restricted range and low populations, any adverse impact of the alternatives  
 32 would represent a cumulatively considerable contribution to a significant cumulative impact.

### 33 **Mitigation Measure BIO-147: Monitor Bank Swallow Colonies and Evaluate Winter and** 34 **Spring Flows Upstream of the Study Area**

35 To address the uncertainty of the impact of upstream spring flows on existing bank swallow  
 36 habitat, DWR will monitor existing colonies upstream of the study area and collect habitat  
 37 suitability data including soil type, number of active burrows per colony, and height of average  
 38 burrows. In addition, to determine the degree to which reduced winter flows are contributing to  
 39 habitat loss, DWR will quantify the winter flows required for river meander to create suitable  
 40 habitat through lateral channel migration and bank resurfacing. If impacts of upstream flows on  
 41 bank swallow are identified, further mitigation may be required after consultation with CDFW  
 42 and the Bank Swallow Technical Advisory Committee. Recommended mitigation for changes in  
 43 flow regimes associated with water conveyance includes conservation easements on currently  
 44 occupied habitat or revetment removal projects to create habitat for bank swallow (Bank  
 45 Swallow Technical Advisory Committee 2013).

1 **Impact BIO-190: Cumulative Effect of Constructing Conveyance Facilities on Giant Garter**  
 2 **Snake Movements and Connectivity between Subpopulations**

3 The construction of the conveyance facilities (CM1) under the alternatives using the eastern  
 4 (Alternatives 1B, 2B, and 6B) alignments would adversely affect movement and connectivity for the  
 5 Coldani Marsh/White Slough subpopulation of giant garter in the study area. The facilities would  
 6 eliminate Coldani Marsh/White Slough subpopulation connectivity with areas containing current or  
 7 previous occurrences of giant garter snake, specifically in the vicinity of Stone Lakes NWR to the  
 8 north and in the Delta to the southwest (Figure 12-15B). An unknown number of small agricultural  
 9 ditches and drains between Disappointment Slough and Stone Lakes would be lost, rerouted, or  
 10 directed into culverts and affect species' movements and connectivity. Siphons would be  
 11 constructed underneath sloughs (Disappointment Slough, White Slough, Sycamore Slough, Hog  
 12 Slough, and Beaver Slough) and Stone Lakes Drain, and a tunnel would be constructed under the  
 13 Lost Slough/Mokelumne River area that connects with Snodgrass Slough. These sloughs and drains  
 14 would still provide some aquatic habitat and opportunities for movement and connectivity between  
 15 giant garter snakes in the vicinity of Stone Lakes NWR and the Coldani Marsh/White Slough  
 16 subpopulation.

17 A number of other factors, projects, or programs also have the potential to directly or indirectly  
 18 affect giant garter snake movements and connectivity in the study area. They include:

- 19 • Urbanization which continues to be one of the greatest threats to the giant garter snake  
 20 throughout much of its extant range. Environmental impacts associated with urbanization are  
 21 loss of habitat, introduction of non-native species with a resulting loss of biodiversity,  
 22 fragmentation of habitat due to road construction, and degradation of habitat due to pollutants.  
 23 Within the current range of the giant garter snake, cities that are rapidly expanding and, in some  
 24 instances, intruding upon or otherwise impacting giant garter snake habitat include, but are not  
 25 limited to: Chico, Woodland, Yuba City/Marysville, Sacramento, Galt, Stockton, Gustine, Los  
 26 Banos, Merced, and Fresno. Urbanization increasingly threatens the viability of giant garter  
 27 snake populations as urban landscapes encroach on ever-diminishing habitat for this listed  
 28 species, including eliminating rice agriculture that serves as an alternative habitat for the giant  
 29 garter snake.
- 30 • A number of HCP's have been issued by USFWS for projects anticipated to impact the giant  
 31 garter snake, which include the San Joaquin County multi-species HCP, the East Contra Costa  
 32 County HCP, and the PG&E San Joaquin Valley HCP. In addition, eight other HCPs which include  
 33 areas within the range of the giant garter snake are currently being developed and include:  
 34 Butte County, South Sacramento, Solano County, Yolo County, Yuba/Sutter County, Placer  
 35 County, PG&E Statewide Operations and Maintenance, and PG&E Bay Area.
- 36 • Giant garter snakes found in rice fields or agricultural canals are threatened by conversion of  
 37 rice crops to non-agricultural land uses and other crops such as grape-producing vineyards, fruit  
 38 or nut producing orchards, or annual row crops (e.g., cotton). Unlike flood irrigated rice fields,  
 39 other agricultural cropping systems do not hold sufficient water for long enough time periods to  
 40 create artificial, temporary wetlands.
- 41 • The White Slough Wildlife Management Area (WSWA) is owned by the California Department of  
 42 Water Resources and managed by the California Department of Fish and Wildlife. WSWA  
 43 consists of 880 acres of man-made ditches, canals, and freshwater marshes with associated  
 44 grassland/upland habitats used for hunting and fishing. Between 1974 and 1978, 13 rectangular

1 borrow pits were excavated from one to five miles west of Interstate 5 to provide fill for freeway  
 2 construction. The pits are fed by groundwater and periodic runoff from precipitation, irrigation,  
 3 and high canal flows, creating a series of ponds characterized by vegetated sloping or vertical  
 4 banks and open water with adjacent uplands and high ground. As a management area, WSWA  
 5 comprises a discontinuous series of properties encompassing ponds 5-13, which occur along a  
 6 roughly 11-mile stretch between Thornton and Stockton. WSWA supports the preponderance of  
 7 the Coldani Marsh/ White Slough giant garter snake population, one of 13 giant garter snake  
 8 populations described in the USFWS 1999 Draft Recovery Plan for the Giant Garter Snake. In the  
 9 1970's, CDFW stocked large-mouth bass, channel catfish, and red-eared sunfish in at least two of  
 10 the ponds: each of these species probably prey on giant garter snakes and compete with them  
 11 for smaller prey (58 FR 54053).

- 12 ● DWR Central Valley Flood Protection Plan (Yolo Bypass widening) which proposes expansion of  
 13 flood protection features in the study, including expansion of the Yolo Bypass. This flood  
 14 protection improvement project would potentially conflict with BDCP's effort to improve giant  
 15 garter snake habitat just outside of the current floodway.
- 16 ● National Marine Fisheries Service, U.S. Bureau of Reclamation, and Department of Water  
 17 Resources: Biological Opinion (BiOp) on the Long-Term Operations of the Central Valley Project  
 18 and State Water Project which includes the Sacramento River downstream of Feather River,  
 19 Sacramento-San Joaquin Delta, and adjacent habitats that are dependent on or influenced by  
 20 waterways. The BiOp includes landscape designs to conserve freshwater, estuarine, nearshore,  
 21 and offshore aquatic habitats, for the benefit of federally protected fish species. Including 8,000-  
 22 acre tidal wetland restoration requirement, which would result in conversion of agricultural  
 23 land and managed wetland in the Delta and Suisun Marsh, which could negatively affect giant  
 24 garter snake connectivity and movement in the study area.
- 25 ● Sacramento Area Flood Control Agency, Central Valley Flood Protection Board, U.S. Army Corps  
 26 of Engineers Central Valley Flood Management Program is an ongoing program that supports  
 27 flood management planning in Sacramento and San Joaquin Valleys. The program supports  
 28 improvements in flood management structures, including levees and bypasses. Facilities  
 29 improvements could result in local removal of vegetation in the study area as flood control  
 30 facilities are improved and expanded which could include effects on giant garter snakes in the  
 31 study area.

32 Past development within the study area, including urbanization and the construction of irrigation  
 33 canals, levees, local roads, highways, agricultural development, and the development of wildlife  
 34 management areas, has already affected the ability for giant garter snake to move within and  
 35 through the study area.

36 **NEPA Effects:** The construction of the water conveyance facilities under Alternatives 1B, 2B, and 6B,  
 37 in combination with past, present or reasonably foreseeable projects would create an adverse  
 38 cumulative effect on giant garter snake movement and connectivity within and in the vicinity of the  
 39 study area. The alternatives' effects represent a cumulatively considerable contribution to an  
 40 adverse cumulative effect. There is no feasible mitigation to address this effect.

41 **CEQA Conclusion:** The construction of the water conveyance facilities under Alternatives 1B, 2B and  
 42 6B, in combination with past, present or reasonably foreseeable projects would create a significant  
 43 cumulative impact on giant garter snake movement and connectivity within and in the vicinity of the  
 44 study area. The alternatives' impact would represent a cumulatively considerable contribution to a

1 significant cumulative impact. This impact would be significant and unavoidable. There is no  
2 feasible mitigation to reduce this impact to a less-than-significant level.

### 3 **Impact BIO-191: Cumulative Effect of Constructing Conveyance Facilities on Wildlife** 4 **Corridors**

5 The construction of the conveyance facilities (CM1) under the alternatives using the eastern  
6 alignment (Alternatives 1B, 2B, and 6B) and western alignment (Alternatives 1C, 2C, and 6C) would  
7 adversely effect wildlife corridors within and through the study area. The intakes, forebays, and  
8 canal portions of these alternatives would create barriers to the movement of nonavian wildlife  
9 within and through the study area. Nonavian wildlife in large portions of the study area would be  
10 restricted to moving across the canals via roads and bridges that would likely act as deterrents to  
11 wildlife movement and would be a source of wildlife mortality. The canal for the eastern alignment  
12 would act as a major barrier to the movement of nonavian wildlife within the eastern portion of the  
13 Delta. The canals for the western alignment would create a substantial barrier to the east-west  
14 movement of nonavian wildlife from Clifton Court Forebay north to around the community of  
15 Knightsen, and to the north-south movement of wildlife from the town of Hood west to the  
16 Sacramento Deep Water Ship Channel. Avian species would also be subject to increased mortality  
17 where new transmission lines are installed; however, these lines would not serve as major barriers  
18 to avian species' ability to disperse within and through the study area.

19 One project listed in the Table 12-8, the California High Speed Rail, would also have the potential to  
20 adversely affect wildlife corridors in the study area and region. One of the proposed alignments for  
21 the Sacramento-to-Merced section of the California High Speed Rail would pass through the study  
22 area between French Camp and Lathrop, generally following the I-5 corridor and eventually heading  
23 east along State Route 120. A proposed option for the Bay Area-to-Central Valley alignment passes  
24 through the study area from just west of Tracy east to around Lathrop, a route that generally follows  
25 the existing Union Pacific Rail Road corridor. Both of these area already have barriers to species  
26 dispersal, but increased rail traffic and the speed of the trains could serve as deterrents and sources  
27 of mortality to wildlife trying to cross these areas.

28 Past development within the study area, including the construction of irrigation canals, levees, local  
29 roads, highways, and agricultural development, has already affected the ability for wildlife to move  
30 within and through the study area.

31 **NEPA Effects:** The construction of the water conveyance facilities under Alternatives 1B, 1C, 2B, 2C,  
32 6B, and 6C, in combination with past, present or reasonably foreseeable projects, would create an  
33 adverse cumulative effect on wildlife corridors within and in the vicinity of the study area. The  
34 alternatives' effects represent a cumulatively considerable contribution to an adverse cumulative  
35 effect. There is no feasible mitigation to address this effect.

36 **CEQA Conclusion:** The construction of the water conveyance facilities under Alternatives 1B, 1C, 2B,  
37 2C, 6B, and 6C, in combination with past, present or reasonably foreseeable projects, would create a  
38 significant cumulative impact on wildlife corridors within and in the vicinity of the study area. The  
39 alternatives' impact would represent a cumulatively considerable contribution to a significant  
40 cumulative impact. This impact would be significant and unavoidable. There is no feasible  
41 mitigation to reduce this impact to a less-than-significant level.

### 1 **12.3.3.18 Effects on Other Conservation Plans**

#### 2 **Impact BIO-192: Potential for Conflicts between Implementation of the BDCP and Other** 3 **Conservation Plans**

4 To comply with CEQA, potential conflicts with the provisions of an adopted HCP, NCCP, or other  
5 approved local, regional, or state habitat conservation plan must be analyzed. Within or near the  
6 study area, numerous HCPs, NCCPs, and other regional conservation plans have been permitted or  
7 are in process, including those listed below.

- 8 • Placer County Conservation Plan (TRA Environmental Services 2011)
- 9 • Yuba-Sutter HCP/NCCP (Yuba County et al. 2011)
- 10 • Natomas Basin HCP (City of Sacramento et al. 2003)
- 11 • Yolo Natural Heritage Program (YNHP) (Yolo County Habitat/Natural Community Conservation  
12 Plan Joint Powers Authority 2013)
- 13 • South Sacramento HCP (Sacramento County 2010)
- 14 • Solano County Multispecies HCP (Solano County MSHCP) (Solano County Water Agency 2009)
- 15 • East Contra Costa County HCP/NCCP (ECCCCHCP/NCCP) (East Contra Costa Habitat Conservation  
16 Plan Association 2006)
- 17 • San Joaquin County Multi-Species HCP and Open Space Plan (SJCMSHCP) (Jones & Stokes 2000)
- 18 • East Alameda County Conservation Strategy (EACCS) (East Alameda County Conservation  
19 Strategy Steering Committee 2010)

20 Of these, the first three plans have little (less than 1%) or no physical overlap with the study area  
21 boundary and, thus, no potential for conflict with BDCP actions (Figure 12-3). The Placer County  
22 Conservation Plan is found in western Placer County and does not overlap with BDCP. The Yuba-  
23 Sutter HCP/NCCP covers Yuba and Sutter Counties and overlaps with less than 200 acres of the  
24 study area at the northern end of the Yolo Bypass (Table 12-9). The Natomas Basin HCP is found in  
25 northwestern Sacramento and southern Sutter Counties. This plan is adjacent to the study area but  
26 does not overlap with it. Because of the lack of overlap and the location of these plans upstream of  
27 BDCP, they are not discussed further in this section.

28 The remaining six plans overlap with the study area to varying extents (Table 12-9). Each of these  
29 six plans includes a conservation strategy that implements land restoration, enhancement and/or  
30 acquisition within or near their respective boundaries. The following discussion addresses whether  
31 the implementation of BDCP covered activities and conservation actions have the potential to  
32 conflict with these plans and their conservation strategies.

1 **Table 12-9. Summary Table of Conservation Plans that Overlap with BDCP**

Conservation Plan	Plan Status	Plan Area (ac)	Boundary Overlap with BDCP (ac)	Overlap Relative to Other Plans	Overlap relative to BDCP
East Contra Costa County HCP/NCCP	Approved in 2007	174,116	63,073	36.2%	7.3%
San Joaquin County MSHCP and Open Space Plan	Approved in 2001	912,386	317,355	34.8%	37.0%
East Alameda County Conservation Strategy	Approved in 2011	271,486	4,643	1.7%	0.5%
Solano County MSHCP	In Process	581,874	198,149	34.1 %	22.9%
South Sacramento HCP	In Process	374,733	41,130	11.0%	4.8%
Yolo Natural Heritage Program	In Process	653,818	111,383	17.1%	12.9%
Yuba-Sutter HCP/NCCP	In Process	469,137	198	0.04%	0.02%

Sources: ICF International 2011; Cal-Atlas Geospatial Clearinghouse; TRA Environmental Services 2011; Solano County Water Agency 2009; Radmacher pers. comm.

2  
3 Table 12-10 lists the amount of conservation remaining in each of the three approved plans based  
4 on summary reports released in 2011. Because EACCS was just approved in 2011, no land has been  
5 acquired to date for its reserve system. The acreage provided in Table 12-10 is the estimated  
6 amount needed for the entire plan area under each plan, and is not limited to the overlap area.

7 **Table 12-10. Conservation Status of Approved Plans (acres)**

Plan	Target Reserve System Size	Current Reserve System Size	Amount Remaining to Acquire
East Contra Costa County HCP/NCCP*	30,300	4,589	25,711
San Joaquin County MSHCP **	100,841	8,942	91,899
East Alameda County Conservation Strategy***	N/A	0	N/A

Sources: ICF International 2011; San Joaquin Council of Governments 2010.

\* Reserve System Size based on Maximum Development Scenario

\*\* Based on estimated acreage of take according to mitigation ratios. Actual amount remaining likely to be much less.

\*\*\* Conservation Strategy is implemented project-by-project according to established mitigation ratios. Because the strategy is not dependent on a certain amount of development occurring, there is no target reserve system size.

8  
9 **Effects of Water Conveyance Facilities Construction on Other Conservation Plans**

10 The BDCP conservation measures that have the potential to affect overlapping conservation plans  
11 include the construction and operation of new water conveyance facilities associated with the SWP  
12 and CVP, and the implementation of restoration and acquisition actions and other conservation  
13 activities. The effects of restoration, acquisition, and other conservation activities are discussed in  
14 the next section. To quantify the potential effects of the construction of the water conveyance

1 facilities on overlapping plans, the permanent surface impacts of the construction of Alternatives 1A,  
 2 1B, 1C, 2A, 2B, 2C, 3, 4, 5, 6A, 6B, 6C, 7, 8, and 9 were identified.

3 Construction of the water conveyance facilities would result in permanent surface disturbance  
 4 within the BDCP Plan Area. Depending upon the alternative, a portion of these impacts would occur  
 5 outside of the plan area boundaries for the six overlapping plans (Figure 12-4). The remaining  
 6 impacts would be small relative to the size of the overlapping plan areas, varying from less than 1%  
 7 of total plan areas, to a maximum of 2.7% of the East Contra Costa County HCP/NCCP area under  
 8 Alternatives 1C, 2C, and 6C (4,755 acres of impacts within a 174,115-acre plan area). The impacts of  
 9 Alternative 1A construction would be less than 1% of each plan’s respective total acreage (Table 12-  
 10 11). However, construction of the water conveyance facilities would reduce the amount of available  
 11 cultivated land for acquisition by overlapping conservation plans by as little as 11 acres in the East  
 12 Alameda County Conservation Strategy (Alternative 9) and as much as 14,016 acres in the San  
 13 Joaquin County HCP (Alternatives 1B, 2B, 6B).

14 The construction of the water conveyance facilities would avoid all existing reserve lands of the East  
 15 Contra Costa County HCP/NCCP because these lands are outside of the study area (Figure 12-4).  
 16 Similarly, construction of the water conveyance facilities using the west alignment, Modified  
 17 Pipeline/Tunnel Alignment, or Pipeline/Tunnel Alignment would avoid all existing reserve lands of  
 18 the San Joaquin County HCP (Figure 12-4). Construction of the east canal has the potential to  
 19 temporarily affect existing preserve lands of the San Joaquin County HCP near Sycamore Slough and  
 20 Walnut Grove. See the section below on this plan for details of these potential impacts and  
 21 mitigation measures.

22 **Table 12-11. Impacts from BDCP Alternatives Relative to Total Area of Overlapping Conservation**  
 23 **Plans**

Plan	Plan Area (ac.)	Alternative	Permanent Surface Impacts (ac.)	Surface Impacts Relative to Plan (% of Plan Area)
East Alameda County Conservation Strategy	271,485	1A	228	0.08%
		1B	228	0.08%
		1C	23	0.01%
		2A	228	0.08%
		2B	228	0.08%
		2C	23	0.01%
		3	228	0.08%
		4 (North-South Line)	228	0.08%
		4 (East-West Transmission Line)	225	0.08%
		5	228	0.08%
		6A	228	0.08%
		6B	228	0.08%
		6C	23	0.01%
		7	228	0.08%
8	228	0.08%		
9	11	0.00%		

Plan	Plan Area (ac.)	Alternative	Permanent Surface Impacts (ac.)	Surface Impacts Relative to Plan (% of Plan Area)
East Contra Costa County HCP/NCCP	174,115	1A	1,258	0.72%
		1B	1,258	0.72%
		1C	4,755	2.73%
		2A	1,258	0.72%
		2B	1,258	0.72%
		2C	4,755	2.73%
		3	1,258	0.72%
		4 (North-South Line)	1,258	0.72%
		4 (East-West Transmission Line)	1,245	0.72%
		5	1,258	0.72%
		6A	1,258	0.72%
		6B	1,258	0.72%
		6C	4,755	2.73%
San Joaquin County Multi-Species Habitat Conservation and Open Space Plan	912,383	7	1,258	0.72%
		8	1,258	0.72%
		9	166	0.10%
		1A	1,290	0.14%
		1B	14,044	1.54%
		2A	1,296	0.14%
		2B	14,050	1.54%
		2C	6	0.00%
		3	1,290	0.14%
		4 (North-South Line)	1,296	0.14%
		4 (East-West Transmission Line)	1,171	0.13%
		5	1,290	0.14%
		6A	1,290	0.14%
6B	14,044	1.54%		
7	1,290	0.14%		
8	1,290	0.14%		
9	2,623	0.29%		
Solano County Multi-Species HCP	581,872	1C	3,165	0.54%
		2C	3,165	0.54%
		6C	3,165	0.54%

Plan	Plan Area (ac.)	Alternative	Permanent Surface Impacts (ac.)	Surface Impacts Relative to Plan (% of Plan Area)
South Sacramento HCP	374,732	1A	2,105	0.56%
		1B	3,988	1.06%
		2A	2,120	0.57%
		2B	3,988	1.06%
		3	1,933	0.52%
		4 (North-South Line)	2,022	0.54%
		4 (East-West Transmission Line)	2,056	0.55%
		5	1,861	0.50%
		6A	2,105	0.56%
		6B	3,988	1.06%
Yolo Natural Heritage Program Plan	653,818	7	1,972	0.53%
		8	1,972	0.53%
		9	150	0.04%
		1C	5,403	0.83%
Yolo Natural Heritage Program Plan	653,818	2C	5,403	0.83%
		6C	5,403	0.83%

1

2

### Effects of BDCP Acquisition and Restoration on Other Conservation Plans

3 Like the BDCP, each of the six overlapping conservation plans contains a conservation strategy  
4 composed of a variety of actions or measures. Approved conservation plans (ECCCCHCP/NCCP,  
5 SJCMHCP, EACCS) are required to implement those actions in order to meet their permit  
6 conditions. Proposed plans (YNHP, South Sacramento HCP, and Solano County MSHCP) are not yet  
7 permitted but are far enough along in their development process to predict the nature and general  
8 location of likely conservation actions. In all overlapping conservation plans (approved or in  
9 process), the primary conservation actions are a combination of land preservation through  
10 acquisition in fee title or conservation easement and restoration of natural communities. All of the  
11 overlapping plans focus primarily on terrestrial species (see Table 1-4 in Chapter 1 of the BDCP for  
12 the overlap of covered species) and, consequently, on the preservation and restoration of terrestrial  
13 natural communities and adjacent wetland and stream systems.

14 This regional focus on land protection and conservation to benefit endangered species creates  
15 opportunities for coordination, partnerships, and achieving common conservation goals. However,  
16 the need to fulfill acquisition and restoration targets in geographically overlapping areas also  
17 creates the potential for conflicts. For example, in certain areas, sites available for acquisition and  
18 restoration with rare natural communities or physical conditions may be limited. This limitation  
19 may cause plans to compete for conservation lands, particularly to meet HCP obligations that are  
20 driven by mitigation-to-impact ratios.

21 Conservation components under Alternatives 1B, 1C, 2A, 2B, 2C, 3, 4, 6A, 6B, 6C, 8 and 9 would be the  
22 same as those under Alternative 1A. Conservation components under Alternative 5 would be the same  
23 as those under Alternative 1A, except that 25,000 acres, rather than 65,000 acres, of tidal habitat would  
24 be restored. Conservation components under Alternative 7 would be similar to those under Alternative

1 1A, but 40 linear miles, rather than 20 linear miles, of channel margin habitat would be enhanced, and  
2 20,000 acres, rather than 10,000 acres, of seasonally inundated floodplain would be restored to further  
3 improve fish and wildlife habitat, particularly along the San Joaquin River.

4 This analysis addresses the potential for conflict by analyzing the conservation needs of the BDCP  
5 and each of the six plans with substantial (more than 1%) overlap with the BDCP (Table 12-11).

## 6 **Methodology**

7 To understand the conservation issues of all plans relative to the overlap areas, several analyses  
8 were conducted. First, a crosswalk table was developed for all natural community types with  
9 restoration or acquisition targets in the BDCP. Because each plan uses a different land-cover dataset,  
10 a crosswalk was created that broadly assimilates these land-cover types into six categories relevant  
11 for conservation: wetlands, tidal, riparian, grassland, agriculture, and streams (Table 12-12). The  
12 BDCP dataset contains both tidal and nontidal wetlands. Tidal wetlands were assigned to the “tidal”  
13 community, while nontidal wetlands were assigned to the “wetland” community. Note that land  
14 cover types without restoration or acquisition targets in the BDCP (e.g., chaparral, urban, conifer)  
15 were not crosswalked because the analysis is limited to understanding how the implementation of  
16 BDCP restoration and acquisition targets might affect other plans.

1 **Table 12-12. Crosswalk of BDCP Natural Communities with those of Overlapping Conservation Plans**

BDCP Natural Communities		ECCC HCP/NCCP	SJCM SHCP	EACCS	Solano MSHCP	South Sacramento HCP	YNHP
Wetlands	Vernal pool complex	Perennial Wetland	Vernal Pool Grassland	Alkali Wetland	Vernal Pools	Vernal Impoundment	(riparian and wetlands)
	Alkali seasonal wetland complex	Seasonal Wetland	Wetlands	Seasonal Wetland		Vernal Pool	
	Managed wetland	Alkali Wetland		Valley Sink Scrub		Vernal Swale	
	Nontidal freshwater perennial emergent wetland					Seasonal Wetlands	
	Other natural seasonal wetland					Freshwater Marsh	
Tidal	Tidal brackish emergent wetland/ Tidal freshwater emergent wetland		Delta Water's Edge*		Coastal Marsh		
	Tidal mudflat						
	Tidal perennial aquatic						
Riparian	Valley/foothill riparian <sup>1</sup>	Riparian Woodland Scrub	Riparian		Riparian Vegetation	Valley Oak Riparian Woodland	(riparian and wetlands)
						Mine Tailing Riparian Woodland	
						Mixed Riparian Woodland	
						Mixed Riparian Scrub	
Agriculture	Cultivated lands	Cropland	Flooded Field		Agriculture	Cropland	
			Agricultural			Vineyard	
						Orchards	
						Irrigated Pasture-Grassland	
Grassland	Grassland	Alkali Grassland	Grassland	Alkali Meadow and Scalds	Valley Floor Grasslands	Valley Grassland	Grasslands
		Annual Grasslands		California Annual Grassland			
Dune Scrub	Inland dune scrub						
Streams	Nontidal perennial aquatic (lakes, ponds, streams)	Perennial Streams	Submerged Aquatic Vegetation	Streams			

Note: All natural communities are crosswalked to column B NOT to each other.

Crosswalk based on aggregated Preserve Types from 2000 SJC MSCP and Open Space Plan Table 5.4.2. Each preserve includes multiple vegetation types resulting in overlaps between the preserves and the major natural community types created by the crosswalking exercise.

1 The six natural community categories were analyzed for each of the six plans with respect to both  
 2 acquisition and restoration. Tables 12-13 through 12-17 summarize the acquisition targets for each  
 3 plan, if available. In order to roughly approximate potential acquisition needs of each plan in the  
 4 overlap areas, the acquisition targets from each plan for each natural community type were  
 5 multiplied by the proportion of each community type in the overlap area relative to each plan as a  
 6 whole. This method assumes that acquisition will be evenly distributed throughout each plan area  
 7 and roughly approximates potential acquisition in the overlapping zones. In cases where acquisition  
 8 was focused geographically (i.e., did not fit this assumption), a “correction factor” was applied to  
 9 account for underestimates or overestimates based on plan requirements and ICF’s familiarity with  
 10 each overlapping plan. We used the U.S. Forest Service’s California Vegetation (CALVEG) and BDCP  
 11 vegetation datasets to calculate the proportion of each natural community type in the overlap areas.  
 12 Because the draft conservation strategy for the YCHP has not been released, acquisition targets were  
 13 not provided, only the overlap acres (Table 12-17).

14 **Table 12-13. Estimated Overlap in Acquisition Activities by Major Natural Community Type for**  
 15 **ECCCCHCP/NCCP**

East Contra Costa County HCP/NCCP					
	Overlap with BDCP	Plan-Wide Target (acres)	Correction Factor	Estimated Acquisition Needs in BDCP Plan Area (acres)	Notes
Agriculture	96%	400	1.04	400	All agriculture acquisition will occur in BDCP overlap area.
Grassland	11%	17,750	0.5	957	Most grassland will be protected outside of the BDCP overlap area; includes alkali grassland.
Riparian	60%	70	1	42	
Wetlands	94%	336	0.4	127	Most wetlands will be preserved in foothills, not agricultural areas.

16

1 **Table 12-14. Estimated Overlap in Acquisition Activities by Major Natural Community Type for San**  
 2 **Joaquin County MSHCP and Open Space Plan**

San Joaquin County MSHCP and Open Space Plan <sup>a</sup>					
	Overlap with BDCP	Plan-Wide Target (acres)	Correction Factor	Estimated Acquisition Needs in BDCP Plan Area (acres)	Notes:
Agriculture	40%	36,382	1	14,487	
Grassland	9%	12,744	1	1,099	Approximately half of the proposed tidal restoration would occur in the overlap area.
Riparian	81%	1,231	1	992	
Streams	71%	2,269	1	1,609	
Tidal	100%	6,048	0.6	3,629	
Wetlands	89%	701	1	624	

<sup>a</sup> Planwide targets based on SJC MSHCP 2010 Annual Report for remaining acquisition acres. Tidal natural community corrected due to crosswalking of Delta's Water's Edge Preserve type, which contains riparian and other vegetative types

3

4 **Table 12-15. Acres of Estimated Overlap in Acquisition Activities by Major Natural Community**  
 5 **Type for Solano County MSHCP**

Solano County MSHCP					
	Overlap with BDCP	Plan-Wide Target (acres)	Correction Factor	Estimated Acquisition Needs in BDCP Plan Area (acres)	Notes
Agriculture	29%	6,000	0.5	900	Most agricultural land will be acquired outside BDCP Plan Area to meet needs for Swainson's hawk mitigation
Grassland	19%	12,200	1	2,320	
Riparian	44%	1,050	1	462	
Tidal	84%	100	1	84	
Wetlands	94%	1,600	1	1,504	

6

7 **Table 12-16. Acres of Estimated Overlap in Acquisition Activities by Major Natural Community**  
 8 **Type for South Sacramento HCP**

South Sacramento HCP				
	Overlap with BDCP	Plan-Wide Target (acres)	Correction Factor	Estimated Acquisition Needs in BDCP Plan Area (acres)
Agriculture	21%	11,405	1	2,381
Grassland	2%	26,835	1	596
Riparian	68%	1,228	1	837
Wetlands	75%	1,996	1	1,488

9

10

1 **Table 12-17. Overlap by Major Natural Community Type for Yolo Natural Heritage Program**

Yolo Natural Heritage Program			
	Amount in Plan Area (acres)	Overlap with BDCP (acres)	Overlap
Agriculture	365,392	72,666	20%
Grassland	100,662	10,639	11%
Riparian	6,657	3,074	46%
Streams	6,105	1,157	19%
Tidal	4,949	4,926	100%
Wetlands	11,501	10,932	95%

2

3 **Effects of BDCP Acquisition of Cultivated Land on Other Conservation Plans**

4 By far the BDCP's largest land acquisition need is for cultivated land, which the BDCP calls  
5 "cultivated lands." BDCP would acquire cultivated lands for three primary purposes. First, cultivated  
6 land would be acquired to build the water conveyance facilities, as describe above and quantified in  
7 Tables 12-18 through 12-21. Second, cultivated land would be acquired by BDCP for preservation as  
8 foraging habitat for three covered species (Swainson's hawk, sandhill crane, and tricolored  
9 blackbird). Finally, cultivated land would be acquired for restoration to tidal wetland, floodplains,  
10 riparian woodland, or nontidal marsh.

11 This acquisition and preservation has the greatest potential for conflict with overlapping  
12 conservation plans that have substantial needs for acquisition of cultivated lands to satisfy their  
13 own conservation requirements. Acquisition by BDCP of cultivated land reduces the amount of such  
14 land available for overlapping plans. The assessment of this potential conflict compares the amount  
15 of cultivated land not already protected (i.e., that available for acquisition) with the need for  
16 cultivated land by BDCP and each plan in the overlap area. The analysis also takes into account that  
17 BDCP and each plan would remove cultivated lands through their own covered activities, further  
18 reducing the available cultivated land for preservation. This assessment assumes all covered  
19 activities in each plan are implemented and, therefore, all mitigation or conservation needs for  
20 cultivated lands are realized in each plan. In reality, some plans may not have the development  
21 assumed by the plan and, therefore, would not have the full need assumed by the plan for mitigation  
22 or conservation (which is proportional to the development that occurs).

23 The cultivated preservation needs of BDCP and the other conservation plan are deemed to be  
24 without conflict if the available cultivated land with full buildout is at least double the sum of the  
25 needs of the two plans in the overlap area. This assumption is based on the need to have more  
26 cultivated land for preservation than required to ensure that enough willing sellers are available for  
27 each plan.

28 One limitation of this analysis is that it is a snapshot at the end of the permit terms of each plan. In  
29 reality, each plan will be gradually preserving cultivated land in the overlap area at the same time.  
30 BDCP and overlapping plans would also be coordinating and cooperating in their land acquisition  
31 activities. For example, BDCP Chapter 3, Section 3.4.1.3.1, *Land Protection*, describes a process for  
32 coordination among BDCP, South Sacramento HCP, and San Joaquin Multiple Species Conservation  
33 Plan to ensure that sufficient lands are available in the overlap area for each plan to meet its  
34 conservation obligations. Additionally, for NCCPs in development that have planning agreements,

1 discretionary projects within the plan area that are subject to CEQA are subject to review by the  
2 CDFW to ensure that they do not conflict with the preliminary conservation objectives of an NCCP  
3 under development (Fish and Game Code Section 2810(b)(8)). Both the gradual preservation in the  
4 overlap area over time and ongoing coordination would help to minimize any conflicts that might  
5 arise with individual acquisitions or with a gradual shortage that might arise near the end of the last  
6 permit.  
7

1 **Table 12-18. Amount of Cultivated Land Preservation by BDCP in Each Overlap Area (Pipeline/Tunnel Alignment; Alternatives 1A, 2A, 6A)**

Plan with Overlap	Amount of Unprotected Cultivated Land in Overlap Area <sup>a</sup> (acres)	Estimated Amount Lost to Covered Activities (acres)	Percent of Overlap of Each HCP with BDCP	Est. Amount Lost to Covered Activities in Overlap Area (acres)	Est. Amount Lost to BDCP Covered Activities in Overlap Area (acres)	Est. Preservation Need for each Plan in Overlap Area (acres)		Est. Preservation Need for BDCP in Overlap Area (acres)		Est. Cultivated Lands Available for Preservation at End of Permit Terms <sup>e</sup> (acres)	Total Preservation Needs in Overlap Areas (acres)		Est. Cultivated Lands Remaining After Preservation for Covered Activities and Restoration (acres)	
						Low	High	Low	High		Low	High	Low	High
East Alameda County Conservation Strategy	2,687	2,694	2%	54	78	100	1,000	100	176	2,555	100	1,176	2,455	1,380
East Contra Costa County HCP/NCCP	29,039	12,148	85%	10,326	1,140	400	400	1,460	2,562	17,573	1,860	2,562	15,713	14,611
San Joaquin County Multi-species Habitat Conservation and Open Space Plan	218,370	47,915	35%	16,770	32,580	14,487	36,382	7,400	12,987	169,090	21,887	49,369	146,203	119,721
Solano County MSHCP	59,307	60,140	34%	20,448	12,844	870	6,000	4,580	8,038	25,963	5,450	14,038	20,513	11,925
South Sacramento HCP	17,583	17,617	4.8%	846	3,556	2,381	11,405	960	1,685	12,127	3,341	13,090	8,786	(-963)
Yolo Natural Heritage Plan	55,609	47,915	17%	8,146	6,158	2,000	5,000	2,540	4,458	47,451	4,540	9,458	42,911	37,993
<b>Total</b>	<b>382,595</b>	<b>196,420</b>		<b>44,926</b>	<b>56,356</b>	<b>20,328</b>	<b>60,187</b>	<b>17,040</b>	<b>29,905</b>	<b>274,759</b>	<b>37,278</b>	<b>90,092</b>	<b>237,481</b>	<b>184,667</b>

<sup>a</sup> Estimate based on data in each plan.

2

3 **Table 12-19. Amount of Cultivated Land Preservation by BDCP in Each Overlap Area (East Alignment; Alternatives 1B, 2B, and 6B)**

Plan with Overlap	Amount of Unprotected Cultivated Land in Overlap Area (acres)	Estimated Amount Lost to Covered Activities (acres)	Percent of Overlap of Each HCP with BDCP	Est. Amount Lost to Covered Activities in Overlap Area (acres)	Est. Amount Lost to BDCP Covered Activities in Overlap Area (acres)	Est. Preservation Need for each Plan in Overlap Area (acres)		Est. Preservation Need for BDCP in Overlap Area (acres)		Est. Cultivated Lands Available for Preservation at End of Permit Terms (acres)	Total Preservation Needs in Overlap Areas (acres)		EST. Cultivated Lands Remaining After Preservation for Covered Activities and Restoration (Acres)	
						Low	High	Low	High		Low	High	Low	High
East Alameda County Conservation Strategy	2,687	2,694	2%	54	79	100	1,000	100	176	2,554	100	176	2,354	1,378
East Contra Costa County MSHCP	29,039	12,148	85%	10,326	1,140	400	400	1,860	2,962	17,573	1,860	2,562	15,713	14,611
San Joaquin County MSHCP	218,370	47,915	35%	16,770	44,577	14,487	36,382	7,400	12,987	157,023	21,887	49,369	135,136	107,654
Solano County Multispecies HCP	59,307	60,140	34%	20,448	12,844	870	6,000	4,580	8,038	26,015 <sup>1</sup>	5,450	14,038	20,565	11,977
South Sacramento HCP	17,583	17,617	4.8%	846	4,024	2,381	11,405	960	1,685	12,713 <sup>1</sup>	3,341	13,090	9,372	(-376)
Yolo Natural Heritage Program Plan	55,609	47,915	17%	8,146	6,158	2,000	5,000	2,540	4,458	41,305	2,540	4,458	36,765	31,847
<b>Total</b>	<b>382,595</b>	<b>188,429</b>		<b>56,589</b>	<b>68,822</b>	<b>20,238</b>	<b>60,187</b>	<b>20,000</b>	<b>35,100</b>	<b>257,184</b>	<b>37,278</b>	<b>90,093</b>	<b>219,906</b>	<b>167,091</b>

4

<sup>1</sup> This does not meet the “double the sum of the two Plans” criterion for the highest estimated preservation needs.

1 **Table 12-20. Amount of Cultivated Land Preservation by BDCP in Each Overlap Area (West Alignment; Alternatives 1C, 2C and 6C)**

Plan with Overlap	Amount of Unprotected Cultivated Land in Overlap Area (acres)	Estimated Amount Lost to Covered Activities (acres)	Percent of Overlap of Each HCP with BDCP	Est. Amount Lost to Covered Activities in Overlap Area (acres)	Est. Amount Lost to BDCP Covered Activities in Overlap Area (acres)	Est. Preservation Need for each Plan in Overlap Area (acres)		Est. Preservation Need for BDCP in Overlap Area (low) (acres)	Est. Preservation Need for BDCP in Overlap Area (high) (acres)	Est. Cultivated Lands Available for Preservation at End of Permit Terms (acres)	Total Preservation Needs in Overlap Areas (acres)		EST. Cultivated Lands Remaining After Preservation for Covered Activities and Restoration (acres)	
						Low	High				Low	High	Low	High
East Alameda County Conservation Strategy	2,687	2,694	2%	54	0	100	1000	100	176	2,633	200	1,176	2,433	1,457
East Contra Costa County HCP/NCCP	29,039	12,148	85%	10,326	5,320	400	N/A	1,460	2,562	13,393	1,860	2,962	11,533	10,431
San Joaquin County MSHCP and Open Space Plan	218,370	47,915	35%	16,770	30,832	14,487	36,382	7,400	12,987	170,768	21,887	49,369	148,881	121,399
Solano County MSHCP	59,307	60,140	34%	20,448	16,373	870	6,000	4,580	8,038	22,486	5,450	14,038	17,036	8,448
South Sacramento HCP	17,583	17,617	4.8%	846	3	2,381	11,405	960	1,685	16,734	3,341	13,090	13,393	3,644
Yolo Natural Heritage Plan	55,609	47,915	17%	8,146	12,617	2,000	5,000	2,540	4,458	34,846	2,540	4,458	30,306	25,389
<b>Total</b>	<b>382,595</b>	<b>188,429</b>		<b>56,589</b>	<b>65,145</b>	<b>20,000</b>	<b>35,100</b>	<b>17,040</b>	<b>29,905</b>	<b>260,861</b>	<b>37,040</b>	<b>65,005</b>	<b>223,821</b>	<b>195,856</b>

2

3 **Table 12-21. Amount of Cultivated Land Preservation by BDCP in Each Overlap Area (Through Separate Corridors Alignment; Alternative 9)**

Plan with Overlap	Amount of Unprotected Cultivated Land in Overlap Area (acres)	Estimated Amount Lost to Covered Activities (acres)	Percent of overlap of Each Plan with BDCP	Est. Amount Lost to Covered Activities in Overlap Area (acres)	Est. Amount Lost to BDCP Covered Activities in Overlap Area (acres)	Est. Preservation Need for each Plan in Overlap Area (acres)		Est. Preservation Need for BDCP in Overlap Area (acres)		Est. Cultivated Lands Available for Preservation at End of Permit Terms (acres)	Total Preservation Needs in Overlap Areas (acres)		EST. Cultivated Lands Remaining After Preservation for Covered Activities and Restoration (acres)	
						Low	High	Low	High		Low	High	Low	High
East Alameda County Conservation Strategy	2,687	2,694	2%	54	8	100	1000	1,460	2,562	2,625	1,560	3,562	1,065	(-937)
East Contra Costa County HCP/NCCP	29,039	12,148	85%	10,326	257	400	400	7,400	12,987	18,456	7,800	13,387	10,656	5,069
San Joaquin County Multi-species Habitat Conservation and Open Space Plan	218,370	47,915	35%	16,770	32,841	14,487	36,382	100	176	168,759	14,587	36,558	154,172	132,201
Solano County Multispecies HCP	59,307	60,140	34%	20,448	12,844	870	6,000	4,580	8,038	26,015	5,450	14,038	20,565	11,977
South Sacramento HCP	17,583	17,617	4.8%	846	15	2,381	11,405	960	1,685	16,722	3,341	13,090	13,381	3,632
Yolo Natural Heritage Program Plan	55,609	47,915	17%	3,354	6,158	2,000	5,000	2,540	4,458	46,097	4,540	9,458	41,557	36,639
<b>Total</b>	<b>382,595</b>	<b>188,420</b>		<b>51,797</b>	<b>52,123</b>	<b>20,138</b>	<b>60,187</b>	<b>20,000</b>	<b>35,100</b>	<b>278,675</b>	<b>37,278</b>	<b>90,093</b>	<b>241,397</b>	<b>188,582</b>

1 Tables 12-22 through 12-25 summarize the restoration targets for each plan and estimate the  
 2 overlap with BDCP. The restoration targets are multiplied by the percentage of overlap between  
 3 each plan area and the BDCP to approximate the potential for competition over land cover for  
 4 restoration. Like the analysis for Table 12-22, a correction factor was applied to targets and plans  
 5 where additional information regarding the location of restoration was available. Because the draft  
 6 conservation strategy for the YNHP has not been released, a restoration table was not developed.  
 7 The acres of each natural community type relative the YNHP plan area and the overlap area are  
 8 provided in Table 12-17.

9 **Table 12-22. Estimated Overlap in Restoration Activities by Major Natural Community Type for**  
 10 **ECCCCHCP/NCCP**

East Contra Costa County Habitat Conservation Plan				
	Plan-Wide Target (acres)	Overlap	Correction Factor <sup>a</sup>	Estimated Overlap (acres)
Wetlands	315	36%	0.4	45
Riparian	55	36%	1	20

<sup>a</sup> Wetlands are less likely to be restored within the BDCP Plan Area because of the location of existing preserves outside of the BDCP Plan Area (wetland restoration must occur on the preserves).

11  
 12 **Table 12-23. Estimated Overlap in Restoration Activities by Major Natural Community Type for**  
 13 **San Joaquin County MSHCP and Open Space Plan**

San Joaquin County MSHCP and Open Space Plan <sup>a</sup>				
	Plan-Wide Target (acres)	Overlap	Correction Factor	Estimated Overlap (acres)
Wetlands	350	35%	1	123
Riparian	751	45%	1	338

<sup>a</sup> Table based on remaining acres for restoration from 2011 San Joaquin County MSHCP and Open Space Plan Annual Report. Vegetation management and enhancement in other natural community types (e.g., riparian) occurring in SJC MSHCP preserves acquired under the plan. However, specific targets for this restoration is not associated with the acreages provided for plan mitigation. Riparian includes: Great Valley Riparian Forest (R), Great Valley Oak Riparian Forest (R2), Arroyo Willow Thicket (R4), Great Valley Mixed Riparian Forest (R5), Riparian Scrub (RS2), and Great Valley Riparian Scrub(S)

14  
 15 **Table 12-24. Estimated Overlap in Restoration Activities by Major Natural Community Type for**  
 16 **Solano County MSHCP**

Solano County MSHCP				
	Plan-Wide Target (acres)	Overlap	Correction Factor	Estimated Overlap (acres)
Wetlands	270-400	34%	1	62-92
Tidal	75-100	34%	2.94 <sup>a</sup>	75-100
Riparian	50	34%	1	17

<sup>a</sup> All tidal wetland restoration is expected to occur in the overlap area.

1 **Table 12-25. Estimated Overlap in Restoration Activities by Major Natural Community Type for**  
 2 **South Sacramento HCP**

	South Sacramento HCP			
	Plan-Wide Target (acres)	Overlap	Correction Factor	Estimated Overlap (acres)
Wetlands	722	11%	1	79
Riparian	315	11%	1	35

3  
 4 Note that for Tables 12-13 through 12-25, if a plan did not set an acquisition or restoration target for  
 5 a given natural community type, that community type was not included in the table.

### 6 **Plan-Specific Analysis**

#### 7 ***East Contra Costa County***

8 The ECCCHCP/NCCP was adopted in 2006 by Contra Costa County and the cities of Brentwood,  
 9 Clayton, Pittsburg, and Oakley. Permits were issued in 2007 by USFWS and CDFW for a 30-year  
 10 term. A joint powers authority of the agencies receiving the permits and the East Bay Regional Park  
 11 District formed the East Contra Costa County Habitat Conservancy to implement the plan.

12 The HCP/NCCP provides regional conservation while improving and streamlining the permit  
 13 process for endangered species. In 2012, the Corps issued a Regional General Permit to the East  
 14 Contra Costa County Habitat Conservancy to provide additional streamlining for wetland  
 15 regulations. Within the 174,115-acre plan area, the HCP/NCCP covers 8,670–11,853 acres of  
 16 development and 1,126 acres of rural infrastructure projects. The HCP/NCCP requires creation of a  
 17 preserve system of 23,800–30,300 acres that will be managed for the benefit of 28 covered species  
 18 and their associated natural communities. The range of impacts and conservation requirements  
 19 varies depending on whether the current urban limit lines of the participating cities are expanded.

20 The BDCP overlaps with the ECCCHCP/NCCP in the central western portion of the study area (Figure  
 21 12-3). The two plans have 15 covered species in common, including San Joaquin kit fox, western  
 22 burrowing owl, and Swainson's hawk (BDCP Chapter 1, Table 1-4). While approximately 36% of the  
 23 ECCP plan area overlaps with that of the BDCP (Table 12-9), the overlap area is largely cultivated  
 24 land outside of the urban limit lines of the county and participating cities.

25 The proposed preserve system for the ECCCHCP/NCCP occurs almost entirely outside of the BDCP  
 26 boundary. Construction of the water conveyance facilities would have impacts in the  
 27 ECCCHCP/NCCP plan area (e.g., new forebay adjacent to Clifton Court), but not on any existing  
 28 preserves. Some riparian acquisition and restoration may occur in the overlap area, particularly in  
 29 the lower reaches of Marsh Creek or Kellogg Creek. Preservation and acquisition of riparian  
 30 woodland and streams in the overlap area would not be likely to result in conflicts because each  
 31 plan has many options for riparian restoration both inside and outside of the overlap area. These  
 32 needs present an opportunity for coordination of East Contra Costa County Habitat Conservancy  
 33 efforts with proposed tidal marsh restoration for the BDCP (see discussion below).

34 While acquisition and restoration needs of the ECCCHCP/NCCP for wetlands, grasslands, and  
 35 riparian land cover are relatively low within the overlap area, all acquisition of cultivated lands will  
 36 occur there (Table 12-13). Because the ECCCHCP/NCCP acquisition target for agriculture is only 400  
 37 acres, and there are more than 30,000 acres of cultivated lands within the overlap area,

1 implementation of the BDCP is not anticipated to conflict with the ability of ECCCHCP/NCCP to meet  
 2 its conservation obligations. Each plan is expected to be able to meet its conservation requirements  
 3 for cultivated lands easily; together, both plans would need less than 11% of the cultivated land  
 4 available at the end of the permit term of both plans once covered activities “consumption” of  
 5 cultivated land is taken into account.

6 Below is a description of specific BDCP actions and a brief discussion of how they might affect  
 7 implementation of the ECCCHCP/NCCP Conservation Strategy.

- 8 • **Permanent Surface Disturbance.** The water conveyance facilities (CM1) would be located  
 9 within the ECCCHCP/NCCP area (Subzone 6d), resulting in permanent surface impacts that may  
 10 remove lands available for conservation. Under all alternatives, this represents less than 3% of  
 11 the total acreage within the ECCCHCP/NCCP area (Table 12-11), and land in this area is  
 12 designated as having a “lower” level of acquisition effort by the ECCCHCP/NCCP, with the  
 13 exception of “higher” priority acquisition lands near Byron Airport—an area where BDCP actions  
 14 are not projected to occur.
- 15 • **Grasslands and Vernal Pools Restoration.** The northwest portion of CZ 8 of the BDCP  
 16 overlaps with the southeast corner of the ECCCHCP/NCCP Acquisition Analysis Zone 6 (Figure  
 17 12-3). Implementation of CM3 would secure and protect at least 1,000 acres of grassland and  
 18 1,000 acres of wetlands (i.e., vernal pools and alkali seasonal wetland) within CZ 8. Within  
 19 Acquisition Analysis Zone 6, ECCCHCP/NCCP intends to acquire 250–400 acres of agriculture,  
 20 100–300 acres of grassland (i.e., alkali grasslands) and 20–40 acres of wetlands (i.e., alkali  
 21 wetlands). Because more than half of BDCP CZ 8 lies outside of the ECCCHCP/NCCP,  
 22 implementation of the BDCP conservation strategy is not likely to preclude any grassland or  
 23 wetland acquisition and restoration for the ECCCHCP/NCCP. Grassland restoration is also  
 24 targeted in BDCP CM8. Some of this restoration could take place in the southeast portion of the  
 25 ECCCHCP/NCCP around Byron Airport. The ECCCHCP/NCCP does not target a specific acreage of  
 26 grassland restoration, but does target lands surrounding Byron Airport for preservation.  
 27 However, the BDCP area overlaps with a relatively small proportion of the total amount of  
 28 grassland in ECCCHCP/NCCP area (Table 12-13).
- 29 • **Restoration of Dutch Slough.** BDCP CM4 identifies Dutch Slough, located with the  
 30 ECCCHCP/NCCP area, as an area suitable for restoration, as does the ECCCHCP/NCCP. However,  
 31 the BDCP targets tidal areas for restoration or acquisition while the ECCCHCP/NCCP targets  
 32 riparian and stream communities, creating an opportunity for restoration synergies in streams,  
 33 riparian, and tidal areas, including in Dutch Slough.
- 34 • **Riparian Habitat Restoration.** BDCP CM7 proposes 5,000 acres of riparian forest and scrub  
 35 protection, a portion of which may occur in CZs 6 and 8, which overlap with the ECCCHCP/NCCP  
 36 area (Figure 12-4). Table 12-13 indicates a moderate amount of overlap in riparian land cover  
 37 targeted for preservation, but little relative to the amount existing in the ECCCHCP/NCCP area  
 38 (less than 10%). Based on the proportion of overlap between the two plans, Table 12-22  
 39 indicates a relatively small area of potential overlap for riparian restoration priorities.

#### 40 ***San Joaquin County Multi-Species Habitat Conservation and Open Space Plan***

41 The SJCMShCP was permitted in 2000 and is administered by the San Joaquin Council of  
 42 Governments. This 50-year plan addresses 97 special-status plant, fish and wildlife species (47 of  
 43 which are on the federal permit) throughout most of San Joaquin County (more than 900,000 acres),  
 44 including a substantial portion of the eastern Delta. The plan participants include the County of San

1 Joaquin and the cities of Stockton, Lodi, Manteca, Tracy, Ripon, Escalon and Lathrop. Activities  
 2 covered under the plan include urban development, mining, expansion of existing urban boundaries,  
 3 nonagricultural activities occurring outside of urban boundaries, levee maintenance undertaken by  
 4 the San Joaquin Area Flood Control Agency, transportation projects, school expansions, nonfederal  
 5 flood control projects, new parks and trails, maintenance of existing facilities for non-federal  
 6 irrigation district projects, utility installation, maintenance activities, managing preserves, and  
 7 similar public agency projects.

8 The study area overlaps a substantial portion (almost 35%) of the SJCMShCP (Figure 12-3), which  
 9 itself overlaps approximately half of the legal Delta. The plans have 39 covered species in common,  
 10 including San Joaquin kit fox, western burrowing owl, giant garter snake, and Swainson's hawk  
 11 (BDCP Table 1-4). Within the overlapping area, the SJCMShCP targets for acquisition include flooded  
 12 fields, grasslands, riparian woodland, row and field crops, and wetlands. The potential exists for  
 13 competition for restoration sites and land acquisition in these land cover types. BDCP proposes to  
 14 acquire and restore freshwater tidal, seasonal floodplains, riparian forest, grassland, and nontidal  
 15 marsh in portions of the overlapping area. However, because the acquisition and restoration  
 16 requirements of the SJCMShCP are based upon mitigation ratios applicable to the natural  
 17 community types where impacts occur, and the plan operates on a "pay-as-you-go" basis, the  
 18 acquisition targets depend on the amount and location of impacts occurring within the county. In  
 19 the 11 years of plan implementation, the vast majority of impacts and, consequently, preservation  
 20 and creation efforts have occurred on cultivated land. The mitigation needs for other community  
 21 types, including wetlands and riparian areas, have been minimal (Tables 12-26 and 12-27). There  
 22 have been almost no impacts to wetlands in the SJCMShCP since its inception. Most of the impacts  
 23 with San Joaquin County occur on cultivated land; therefore, this land cover type has the greatest  
 24 potential for competition with BDCP. A more detailed assessment is provided below for each natural  
 25 community type.

26 **Table 12-26. SJCMShCP Preserve Acreages by SJCMShCP Zone with Overlap of BDCP**

Habitat Type	Central	Delta	Vernal Pool	Total
Wetlands	--	--	6.00	6.00
Agricultural	2,036.70	1,837.20	--	3,873.90
Agricultural and Grassland	360.00	--	--	360.00
Natural <sup>a</sup>	27.00	--	--	27.00
Total	2,423.70	1,837.20	6.00	4,260.90

<sup>a</sup> This table includes preserves in the entirety of all SJCMShCP Zones, regardless of the proportion of each Zone that overlaps with BDCP. The SJCMShCP 2010 Annual Report does not identify specific habitat types within preserves. Natural Habitat Lands are lands which "retain natural vegetation and are not irrigated or cultivated agricultural lands."

27

1 **Table 12-27. SJCMShCP Mitigation (acres) Owed from Existing Impacts by Habitat Type as of 2010**

Habitat Type	Central	Central/Southwest	Delta	Vernal Pool	Total
Wetlands	--	15.27	--	--	15.27
Tidal	0.07	--	--	--	0.07
Riparian	--	--	--	--	0.00
Agriculture	1,948.28	1,087.33 <sup>a</sup>	9.44	--	1,957.72
Grassland	17.21	--	--	0.85	18.06
Streams	66.13	50.46	--	--	116.59
Total	2,031.69	65.73	9.44	0.85	2,107.71

<sup>a</sup> The SJCMShCP was partially through the easement acquisition process for a large grassland preserve of approximately 1,095 acres to close in 2011 which would negate the row and field crop mitigation acreage required in the Central/Southwest Zone.

2

3 Below is a description of specific BDCP actions and a discussion of their effects on implementation of  
4 the SJCMShCP.

- 5 • **Permanent Surface Disturbance and Connectivity.** Under CM1, construction of water  
6 conveyance facilities located in the SJCMShCP area would result in permanent surface impact  
7 that would remove between 2,660 acres and 14,000 acres of land available for conservation  
8 (Table 12-11). However, under all alternatives, this land represents less than 1.6 % of the total  
9 SJCMShCP area (Table 12-11). Above-ground conveyance would permanently impact habitat  
10 connectivity for less mobile species. Although the eastern alignment (Alternative 1B) would not  
11 affect known occurrences of giant garter snake in San Joaquin County, it would adversely affect  
12 the giant garter snake population in the vicinity of White Slough in San Joaquin County by  
13 impairing habitat connectivity in this area: this could affect the ability for SJCMShCP to achieve  
14 its conservation goals for giant garter snake.
- 15 • **Cultivated Lands Preservation.** The southern portion of the BDCP, including almost all of CZ 7,  
16 the eastern portions of CZs 5, 6, and 8, and the southern portion of CZ 4, overlaps the SJCMShCP  
17 area (Figure 12-4). There is an estimated 218,370 acres of cultivated land in the overlap area  
18 that is not protected (Tables 12-18 through 12-21). Of this total, approximately 16,770 acres  
19 would be lost to covered activities planned by the SJCMShCP and 32,580 acres expected under  
20 BDCP. BDCP effects on cultivated lands would result primarily from construction of the water  
21 facilities and restoration of tidal wetlands and floodplains in the South Delta and Cosumnes-  
22 Mokelumne ROAs. The SJCMShCP needs approximately 14,487–36,382 acres of cultivated land  
23 acquisition to mitigate for the remaining impacts under that plan, or 9%–22 % of the total  
24 remaining. BDCP would need between 7,400–12,987 acres of acquisition in the overlap area  
25 (4%–8% of the total), depending on the habitat values of the cultivated land lost to covered  
26 activities. At the end of the permit terms, there would be an estimated 169,000 acres of  
27 cultivated land available for preservation. The combined preservation needs of the SJCMShCP  
28 and the BDCP in the overlap area is between 21,887 and 49,369 acres, or 13%–30% of the total  
29 cultivated lands available for preservation. The Delta Wetlands Project (Delta Wetlands Project  
30 2010), a water supply and habitat restoration project that is independent of SJMSHCP and BDCP,  
31 will require an additional estimated 20,000 acres of cultivated lands (11,000 acres for water  
32 storage and 9,000 acres of conservation easements to offset the loss of cultivated lands) within  
33 the overlap area: this would reduce the amount of lands available for preservation to 149,000.  
34 With implementation of the Delta Wetlands project, the preservation needs in the overlap area

1 for the SJCM SHCP and the BDCP would still constitute only 15%-33% of the total cultivated  
 2 lands available for preservation. This analysis demonstrates that enough cultivated lands would  
 3 remain to meet the conservation and mitigation needs of both plans, even after full  
 4 implementation of covered activities. In reality, preservation would occur gradually over time,  
 5 prior to full implementation of all covered activities. Nonetheless, this analysis provides a  
 6 conservative assessment of the potential for conflict between BDCP and the SJCM SHCP with  
 7 respect to conservation and mitigation of cultivated lands. The East Alignment (BDCP  
 8 Alternatives 1B, 2B, and 6B) of the proposed water conveyance system poses potential impacts  
 9 to the 783-acre East and West Nuss cultivated land preserves in the SJCM SHCP. However, these  
 10 impacts would be temporal in nature because the impacted area would be restored to pre-  
 11 existing baseline conditions following the construction of the water conveyance facilities. Loss of  
 12 cultivated lands habitat from the construction of the water conveyance facilities would have a  
 13 less-than-significant impact on agriculturally-dependent species, such as Swainson's hawk,  
 14 because the enhancement and management of 8,000 acres of cultivated lands as foraging habitat  
 15 for Swainson's hawk distributed throughout Conservation Zones 1, 2, 3, 4, and 7 of the BDCP  
 16 would provide ample foraging habitat for these species in the long term. Additionally, if the East  
 17 Alignment alternative is chosen as the preferred alternative, the BDCP Implementation Office  
 18 would pursue a temporary conservation easement over the affected preserve that would extend  
 19 for the duration of the construction and restoration activities.

20 Each plan is expected to be able to meet its conservation requirements for cultivated lands  
 21 easily; together, both plans would need less than 30% of the cultivated land available at the end  
 22 of the permit term of both plans once covered activities "consumption" of cultivated land is  
 23 taken into account.

- 24 • **Tidal Wetland Restoration.** There is a large amount of overlap between the SJCM SHCP and  
 25 BDCP in tidal areas (Table 12-14). The SJCM SHCP does not include any requirements for tidal  
 26 wetland preservation or restoration, so there would be no direct conflicts with BDCP on these  
 27 targets. However, BDCP proposes to convert an estimated 2,200 acres of cultivated land to tidal  
 28 wetlands. Under Alternative 5, tidal habitat restoration would be reduced from 65,000 acres to  
 29 25,000 acres, which would not meet the BDCP restoration target for this natural community  
 30 type. As a result, the extent to which the BDCP would support the recovery and long-term  
 31 survival of the covered species that depend on these habitats would be substantially reduced  
 32 compared with other alternatives.

33 The tidal restoration proposed in the South Delta ROA (CZ 7) has the potential to conflict with  
 34 the with the existing 300-acre Ishizuka Preserve in the SJCM SHCP. In addition, tidal restoration  
 35 proposed in the Cosumnes/Mokelumne ROA (CZ 4) has potential to conflict with the existing  
 36 350-acre Wing Levee Road preserve in the SJCM SHCP. These preserves provides protection for  
 37 cultivated lands which the BDCP may convert to tidal natural communities. If tidal restoration  
 38 occurs on one of these sites (or any other owned by the SJCM SHCP), the BDCP Implementation  
 39 Office would provide compensation to property owners for the conversion of existing land use  
 40 and the associated economic losses. Additionally, the BDCP Implementation Office would  
 41 coordinate with SJCM SHCP to identify and acquire lands of equal or greater biological value to  
 42 replace the conservation needs for SJCM SHCP, as described in BDCP Chapter 3, Section 3.4.3  
 43 *Conservation Measure 3*. Mitigation Measure AG-1 requires the BDCP Implementation Office to  
 44 develop an Agricultural Lands Stewardship Plan (ALSP) to preserve agricultural productivity of  
 45 Important Farmland and land subject to Williamson Act contracts and to compensate off-site. In  
 46 addition to Mitigation Measure AG-1, as discussed above in the cultivated land preservation

1 section, the enhancement and management of 8,000 acres of cultivated lands as foraging habitat  
 2 for Swainson's hawk distributed throughout Conservation Zones 1, 2, 3, 4, and 7 of the BDCP  
 3 would provide ample foraging habitat for these species in the long term. Additional tidal  
 4 restoration is targeted in the South Delta ROA (at least 5,000 acres) and the Cosumnes-  
 5 Mokelumne ROA (up to 1,500 acres). All of the South Delta ROA and approximately half of the  
 6 Cosumnes-Mokelumne ROA are within the SJCMShCP plan area.

- 7 ● **Riparian Preservation and Restoration.** BDCP proposes to acquire 750 acres of riparian  
 8 natural community in CZ 7 under CM7. In addition, BDCP would restore at least 5,000 acres of  
 9 riparian woodland and forest in the Plan Area. Approximately 40–50% of the acquisition and  
 10 restoration of riparian woodland and forest is expected to occur in the overlap area of San  
 11 Joaquin County (i.e., up to 375 acres of preservation and 2,500 acres of restoration). The  
 12 majority of the restoration would occur on cultivated lands.

13 The SJCMShCP has an estimated need of 992 acres of riparian woodland preservation in the  
 14 overlap area (Table 12-14) and 25 acres of riparian restoration if all impacts to this community  
 15 occur. The SJCMShCP permits allow removal of up to 750 acres of riparian woodland in San  
 16 Joaquin County, most of which would occur in the study area (Table 12-23). There are an  
 17 estimated 17,930 acres of riparian woodland and forest in the study area and approximately  
 18 8,070 acres in the overlap area. This amount is enough to meet the riparian preservation and  
 19 impact needs of both plans.

- 20 ● **Floodplain Restoration.** The SJCMShCP does not require restoration of floodplains so would  
 21 not conflict with BDCP in this restoration action. In BDCP, CM5 calls for restoration of 10,000  
 22 acres of seasonally inundated floodplains. Under Alternative 7, seasonally inundated floodplain  
 23 restoration would be increased from 10,000 acres to 20,000 acres, which would increase costs  
 24 and reduce the practicability of the conservation strategy, but would increase benefits to some  
 25 covered species. Floodplains would be created by breaching and/or setting back existing levees  
 26 and seasonally flooding cultivated lands, similar to what is done now in the Yolo Bypass. In this  
 27 situation, cultivated lands continue to produce food but the periodic flooding limits the suitable  
 28 crop types and the duration of the growing season. CM5 identifies the most promising  
 29 opportunities for large-scale floodplain restoration as being in the south Delta along the San  
 30 Joaquin, Old, and Middle Rivers all of which are located within the SJCMShCP area. Therefore,  
 31 this action would cause the loss or degradation of cultivated lands within the restored  
 32 floodplains. The amount of cultivated land affected is estimated at 7,750–9,100 acres. This  
 33 represents less than 2% of the total cultivated lands available for preservation within the  
 34 SJCMShCP area.

- 35 ● **Channel Margin Enhancement.** Channel margin enhancement (CM6) would be performed  
 36 along the Sacramento River between Freeport and Walnut Grove, and along the San Joaquin  
 37 River between Vernalis and Mossdale, which lies within the SJCMShCP area. Under Alternative  
 38 7, channel margin enhancement would be increased from 20 linear miles to 40 linear miles. This  
 39 alternative would increase costs and reduce the practicability of the conservation strategy, but  
 40 would increase benefits to some covered species. However, channel margin enhancements are  
 41 not likely to conflict with SJCMShCP conservation requirements. These actions are not likely to  
 42 convert a substantial amount of agricultural land, and the SJCMShCP is unlikely to need large  
 43 amounts of riparian or channel margin habitat to meet its mitigation requirements because of  
 44 the limited impacts to this land cover type in the county.

- 1 • **Grassland Preservation and Restoration.** The BDCP target of 8,000 acres of grassland  
2 preservation would occur in CZ 1 and 8, outside of the SJCMShCP area. The SJCMShCP plan also  
3 has substantial grassland preservation needs but these would be met largely in the inner Coast  
4 Range in southwestern San Joaquin County, outside of the study area (San Joaquin Council of  
5 Governments 2010).

6 The BDCP may restore a portion of its target of 2,000 acres of grassland (CM8) in the western  
7 portion of the SJCMShCP area, primarily from existing degraded grasslands. The SJCMShCP does  
8 not specifically target grassland for restoration. However, based on the limited proportion of  
9 grassland overlap between the plans (Table 12-14), potential conflicts in acquisition or  
10 restoration targets are minimal.

- 11 • **Nontidal Marsh Restoration.** CM10 of the BDCP targets 400 acres of nontidal marsh for  
12 restoration, a portion of which could occur adjacent to habitat occupied by the Coldani  
13 Marsh/White Slough giant garter snake population in CZ 4 within the SJCMShCP area. However,  
14 the proposed restoration would be designed to meet the conservation goals of each plan for  
15 giant garter snake and Swainson's hawk. This conservation measure is likely to provide a mutual  
16 benefit to both plans, as the SJCMShCP specifies avoidance for known giant garter snake habitat.

#### 17 ***East Alameda County Conservation Strategy***

18 EACCS provides a mechanism for endangered species permitting under CESA and ESA within  
19 271,485 acres of eastern Alameda County. The Conservation Strategy does not directly result in  
20 permits for any participating local agency but provides a framework for endangered species  
21 permitting of projects in the study area. The strategy was completed in early 2011 and is currently  
22 being utilized by local jurisdictions. The plan was prepared by Alameda County; the cities of Dublin,  
23 Livermore, and Pleasanton; Alameda County Waste Management Authority; the Alameda County  
24 Congestion Management Agency; East Bay Regional Parks District; the Alameda County Resource  
25 Conservation Service; the Natural Resource Conservation Service and in consultation with the  
26 USFWS, CDFW, and the San Francisco Regional Water Quality Control Board. The conservation  
27 strategy addresses the conservation needs of 19 species, including eight species that overlap with  
28 the BDCP (BDCP Table 1-4). In June 2012, USFWS issued a programmatic Section 7 Biological  
29 Opinion with the USACE that can be used for Clean Water Act Section 404 compliance using the  
30 framework of the conservation strategy for federally-listed species.

31 Only a small portion of the northeastern corner of the EACCS study area overlaps with the study  
32 area (less than 2%) and the overlap occurs in one conservation zone only (zone 7 of the EACCS).  
33 There is little anticipated urban development in that area that would be permitted using the strategy  
34 guidelines, due in part to Alameda County Measure D, which does not allow for growth outside of  
35 the existing urban limit line for the county. However, several large commercial solar energy facilities  
36 have been proposed in the overlap area. Despite this, it is unlikely that BDCP implementation would  
37 negatively affect any of the provisions associated with EACCS or vice-versa.

38 Below is a description of specific BDCP activities and a brief discussion of the overlap with EACCS:

- 39 • **Permanent Surface Impacts.** A small portion of the water conveyance facilities may be located  
40 in the EACCS area, resulting in permanent surface impacts of up to 1,245 acres that would  
41 remove lands available for conservation (Table 12-11). However, under all alternatives, this  
42 land only represents 0.1 % or less of the total EACCS area.

- 1       ● **Restoration and Acquisition Overall.** CZ 8 of the BDCP intersects with Conservation Zone 7 of  
 2       the EACCS. Within BDCP CZ 8 (Figure 12-3), BDCP would acquire or protect riparian forest and  
 3       scrub, grassland, and vernal pool communities (CM7, CM8, and CM9, respectively). However,  
 4       based on the relatively small amount of overlap between the two plans (Table 12-9), the  
 5       potential for conflict is minimal.

6       ***Solano County Multi-Species Habitat Conservation Plan***

7       The Solano County Water Agency is developing the Solano County MSHCP to support the issuance of  
 8       an incidental take permit under the ESA for a period of 30 years. The plan covers activities within  
 9       the Solano County Water Agency's contract service area, including the cities of Fairfield, Vacaville,  
 10      Vallejo, Suisun City, the Solano Irrigation District, and the Maine Prairie Water District. The plan  
 11      area also covers all of unincorporated Solano County and a small portion of Yolo County.

12      Primary conservation actions include preservation (primarily through avoidance), restoration,  
 13      invasive species control, and improvement of water quality. The plan area covers 580,000 acres,  
 14      which includes 12,000 acres of proposed development and the creation of reserve system to protect  
 15      natural communities and habitat for covered species<sup>2</sup>.

- 16      ● 10,500 to 11,500 acres of valley floor grassland and vernal pools.  
 17      ● 5,700 acres of cultivated lands, 1,000 of nesting and associated foraging habitat, and 1,000 of  
 18      grassland/oak savanna for Swainson's hawk and burrowing owls.  
 19      ● 3,300 acres of upland habitat for the California red-legged frog and callippe silverspot butterfly.  
 20      ● 50 acres of riparian woodland.  
 21      ● 36 acres of freshwater marsh, pond, and seasonal wetlands.

22      The two plans share 29 covered species (BDCP Table 1-4), including Swainson's hawk, California  
 23      clapper rail, and salt marsh harvest mouse.

24      The Solano County MSHCP overlaps substantially with the study area in Suisun Marsh and Cache  
 25      Slough (Figure 12-2) including the entirety of BDCP CZs 1 and 11, the southern portions of CZs 2 and  
 26      3, and a small, western portion of CZ 5. Most of the overlap area occurs within the Suisun Marsh and  
 27      Cache Slough, which the BDCP identifies as restoration opportunity areas. The Solano County  
 28      MSHCP identifies providing additional funding for management and restoration of Suisun Marsh and  
 29      the Delta as one of its main objectives. The areas of overlap, therefore, are likely to represent  
 30      opportunities for collaboration, based upon like objectives between BDCP and Solano County  
 31      MSHCP. Below is a description of specific BDCP action and a discussion of how they might affect the  
 32      Solano County MSHCP.

- 33      ● **Floodplain Restoration.** The BDCP proposes to increase the frequency, duration, and  
 34      magnitude of floodplain inundation in the Yolo Bypass (CM2). This would restore habitat in the  
 35      Suisun Marsh and Cache Slough and bays downstream of the bypass that overlap with the  
 36      Solano County MSHCP area. Restoration targets for wetlands and tidal communities would be  
 37      designed to benefit covered species in common with both plans such as the giant garter snake.

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<sup>2</sup> Conservation targets for the Solano HCP are based on a June 2011 working draft plan and are therefore preliminary.

- 1       ● **Wetlands and Vernal Pools Restoration.** Within CZs 1 and 11, the BDCP intends to protect a  
 2       portion of the 600 acres of existing vernal pool complex in the Jepson-Prairie core vernal pool  
 3       recovery area (U.S. Fish and Wildlife Service 2005), a portion of the 400 acres of existing alkali  
 4       seasonal wetland complex, and at least 1,000 acres of existing grassland, which may include  
 5       vernal pool complex and several occurrences of covered plant species (see Table 12-15 for  
 6       summary of wetland acquisition). The BDCP proposes no net loss of vernal pool acreage, and a  
 7       portion of proposed restoration and acquisition which would occur in CZ 1 and/or CZ 11, both  
 8       of which overlap with the Solano County MSHCP plan area. The Solano County MSHCP does  
 9       identify acreage targets for wetlands restoration (Table 12-15), including vernal pools.  
 10      However, all of the vernal pool acquisition and restoration needs of the Solano County MSHCP  
 11      will be acquired from existing commercial mitigation banks that have adequate capacity to meet  
 12      the requirements of the Plan. Therefore, BDCP wetland preservation and restoration is not  
 13      expected to conflict with the Solano County MSHCP.
- 14      ● **Cultivated Lands Preservation.** The cultivated land acquisition target for the Solano County  
 15      MSHCP is 5,700 acres of agricultural foraging habitat for Swainson’s hawk and burrowing owl.  
 16      Most of the cultivated land preservation will take place in the northern or northeastern portion  
 17      of the county (near Dixon Ridge), which is outside of the study area. These areas have been  
 18      selected for preservation because they are cultivated with crops such as alfalfa, which is  
 19      preferred by Swainson’s hawk as foraging habitat for. The BDCP may also maintain a portion of  
 20      non-rice agriculture as foraging habitat for Swainson’s Hawk in CZs 1, 2, and 3, all three of which  
 21      overlap with the Solano County MSHCP (Figure 12-3). However, based on emphasis of the  
 22      Solano County MSHCP to preserve cultivated lands in the northern portion of the county, outside  
 23      of the areas where the Plans overlap, there is limited potential for conflicting acquisition and  
 24      restoration priorities.
- 25      ● **Tidal Habitat Restoration.** The BDCP identifies the Cache Slough ROA as a substantial area of  
 26      land with elevations suitable for freshwater tidal natural community restoration (CM4). Almost  
 27      all of the Cache Slough ROA occurs in Solano County. This would result in the conversion of  
 28      approximately 5,000 to 7,000 cultivated lands to tidal natural communities. As described above,  
 29      neither the loss of cultivated land or the creation of tidal natural communities is expected to  
 30      conflict with the Solano County MSHCP conservation strategy, because the Cache Slough area is  
 31      only targeted for conservation by BDCP. The Solano County MSHCP targets 75–100 acres of tidal  
 32      habitat (coastal marsh habitat) for restoration (Table 12-15), with more than 50,000 acres  
 33      available in the overlap area. Consequently, there is minimal potential for conflicting acquisition  
 34      and restoration priorities.

### 35      ***South Sacramento Habitat Conservation Plan***

36      The proposed South Sacramento HCP would address issues related to species conservation,  
 37      agricultural protection, and urban development in 341,000 acres of south Sacramento County. The  
 38      plan is being prepared by Sacramento County; the cities of Sacramento, Elk Grove, Galt, and Rancho  
 39      Cordova; Sacramento Regional County Sanitation District; and the Capital Southeast Connector Joint  
 40      Powers Authority. The HCP would cover 30 species of plants and wildlife, including 10 that are  
 41      state- or federally listed as threatened or endangered. The western extent of the South Sacramento  
 42      HCP plan area, approximately 11%, overlaps the study area Conservation Zone 4 (Figure 12-3).  
 43      Included in the overlap is a portion of the South Sacramento HCP’s Urban Development Area. Sixteen  
 44      species are covered by both plans, including greater sandhill crane, Swainson’s hawk, and giant  
 45      garter snake (BDCP Table 1-4).

1 The South Sacramento HCP, over its permit term, intends to conserve at least 41,923 acres, most of  
 2 which would be agricultural and grassland land cover types with limited overlap with the BDCP  
 3 (Table 12-9). The South Sacramento HCP also intends to restore 1,786 acres, most of which would  
 4 be wetland and riparian land cover types. Most of the preservation and restoration would be  
 5 directed towards Primary Conservation Zones identified by the plan. Small portions of the Primary  
 6 Conservations Zones for valley elderberry longhorn beetle, California tiger salamander, giant garter  
 7 snake, and western burrowing owl, and most of the Primary Conservation Zone for Swainson's hawk  
 8 overlap with BDCP. In these areas, the potential for conflict in acquisition efforts between the plans  
 9 would be greatest, but so would the potential for restoration collaboration, especially in regards to  
 10 freshwater marsh and giant garter snake habitat.

11 The South Sacramento HCP aims to preserve mostly grassland, by a ratio of more than 2:1 relative to  
 12 other land cover types, and the BDCP does not target grassland preservation in CZ 4, thereby  
 13 limiting the amount of potential conflict between the two plans overall. Approximately 41% (20,041  
 14 of 48,832 acres) of CZ 4 consists of existing protected lands, so there are ample opportunities in this  
 15 zone to link the reserve system with existing open space. Stone Lakes National Refuge Wildlife  
 16 Refuge and Cosumnes Preserve occupy a majority of the land in the northern half of CZ 4, which  
 17 signifies less private land ownership and potential conflicts in meeting the preservation targets of  
 18 both plans. The BDCP Implementing Office would protect a corridor that would be composed of  
 19 contiguous patches of agricultural, restored tidal, and nontidal wetlands, grassland, vernal pool  
 20 complex, and other seasonal wetlands. This corridor would extend from the Caldoni Marsh/White  
 21 Slough giant garter snake subpopulation area north to Stone Lakes National Wildlife Refuge, and to  
 22 the extent possible would also connect to the Cosumnes River Preserve. The corridor would be  
 23 configured to provide a giant garter snake movement habitat along this north-south corridor.  
 24 Tables 12-16, 12-18 through 12-21 and 12-25 summarize potential overlap in acquisition and  
 25 restoration targets, respectively.

26 • **Permanent Surface Disturbance.** The construction of the water conveyance facilities poses the  
 27 greatest permanent surface impacts to the South Sacramento HCP area; an estimated 2,050  
 28 acres would be lost under alternative 4. However, because of the limited geographic overlap  
 29 between the two plans, and the Sacramento HCP's emphasis on acquisition of grassland, which  
 30 is ample in the South Sacramento HCP overall area (more than 175,000 acres available), there is  
 31 limited potential for conflicting acquisition priorities. Under CM1, construction of the water  
 32 conveyance facilities located in the South Sacramento HCP would result in permanent surface  
 33 impacts that would remove between 150 acres and 3,998 acres of land available for  
 34 conservation (Table 12-11). However, under all alternatives this represents less than 1.1 % of  
 35 the total South Sacramento HCP area (Table 12-11).

36 • **Cultivated Lands Preservation.** The northeastern portion of the BDCP, including over half of  
 37 CZ 4 and the northern portion of CZ 5 (Figure 12-3). There is an estimated 17,583 acres of  
 38 cultivated land in the overlap area that is not protected (Tables 12-18 through 12-21). Of this  
 39 total, approximately 1,900 acres would be lost to covered activities planned by the South  
 40 Sacramento HCP and 3,556 acres expected under the BDCP. The water conveyance facilities  
 41 footprint impacts are the among the largest in the South Sacramento HCP area. BDCP impacts to  
 42 cultivated lands would occur primarily from construction of the water facilities and restoration  
 43 of tidal wetlands and floodplains in the Cosumnes-Mokelumne ROA. After subtracting all the  
 44 remaining impacts assumed from both plans, there would be an estimated 13,181 acres  
 45 available for preservation. The combined preservation needs of the South Sacramento HCP and  
 46 the BDCP in the overlap area is between 3,341 and 13,090 acres, or 25–99% of the total

1 cultivated lands available for preservation. If all the preservation needs of both plans were to be  
 2 acquired in the overlap area, there is potential for conflict in meeting the acquisition targets of  
 3 both plans. Alternative 1B poses the greatest impacts to the South Sacramento HCP overlap area  
 4 (4,024 acres), and could present conflicts in achieving cultivated land preservation targets for  
 5 both plans in the overlap area (Table 12-19). However, as discussed above, there is an estimated  
 6 60,000 acres of cultivated land remaining for preservation in the South Sacramento HCP area  
 7 that does not overlap with the BDCP study area, so both plans would easily be able to achieve  
 8 their cultivated land preservation targets. As described in the BDCP, Section 3.4.3 *Conservation*  
 9 *Measure 3*, if during the permit terms of the overlapping plans, the South Sacramento HCP is  
 10 unable to meet its mitigation requirements due to a lack of willing sellers and due in part to  
 11 acquisition by BDCP in the overlap area, a credit swap of easement(s) would be initiated.  
 12 Determination that this criterion has been met would be made jointly by CDFW, USFWS, the  
 13 BDCP Implementation Office, and the South Sacramento HCP implementing entity. Land owned  
 14 by the BDCP Authorized Entities or Supporting Partners in the overlap area in fee title or  
 15 conservation easements would be identified for their applicability to the South Sacramento HCP  
 16 conservation strategy. The South Sacramento HCP would acquire conservation easements or fee  
 17 title on land outside of the overlap area with equivalent or greater conservation value to BDCP  
 18 as the land identified in the criteria above. This land acquired would be within the BDCP Plan  
 19 Area but could be outside Sacramento County. As an alternative, the BDCP Authorized Entities  
 20 or Supporting Partners could acquire the additional lands with funds from the South  
 21 Sacramento HCP. Once the additional land is acquired outside of the overlap area, the BDCP land  
 22 within the overlap area would be transferred in fee title or conservation easement holder to the  
 23 South Sacramento HCP. The land acquired by the South Sacramento HCP outside of the plan area  
 24 with equivalent or greater conservation value to BDCP would be transferred to a BDCP  
 25 Authorized Entity or Supporting Partner. Once the transfers are complete, the credit assigned to  
 26 each plan for the conserved land would also be transferred. BDCP would ultimately acquire no  
 27 more than 3,000 acres in the overlap area with South Sacramento HCP.

- 28 ● **Tidal Habitat Restoration.** Approximately half of the proposed 3,072 acre Cosumnes  
 29 Mokelumne ROA overlaps with the South Sacramento HCP, resulting in an estimated 1,535 acres  
 30 of cultivated land converted into tidal natural communities. However, as discussed above, both  
 31 plans would easily achieve their cultivated lands preservation targets through the  
 32 implementation of MM AG-1 and the preservation of cultivated lands in the South Sacramento  
 33 HCP area that does not overlap with the BDCP study area.
- 34 ● **Nontidal Marsh Restoration.** The South Sacramento HCP proposes to restore 600 acres of  
 35 nontidal wetland habitat in Caldoni Marsh/ White Slough, which overlaps with the CZ 4 of the  
 36 BDCP. The BDCP proposes 200 acres of nontidal restoration in CZ 4. In total, the two plans  
 37 propose to convert 800 acres of the approximately 1,700 available acres of cultivated land in the  
 38 overlap area to nontidal wetland natural communities. This represents less than half of the total  
 39 cultivated land available in the overlap area and as such both plans would be able to meet their  
 40 restoration targets in this area. CZ 4 of the BDCP contains the Caldoni Marsh/White Slough  
 41 subpopulation of giant garter snake, providing opportunities for joint preservation of  
 42 agricultural land and restoration of nontidal and riparian habitats to protect and expand this  
 43 subpopulation and create habitat connectivity with the giant garter snakes in the Stone Lakes  
 44 area.
- 45 ● **Wetlands and Vernal Pools Restoration.** The BDCP proposes to protect 600 acres of existing  
 46 vernal pool habitat and 400 acres of existing alkalai seasonal wetland complex, with the

1 majority of the preservation occurring in CZ 1, 8, and 11. The South Sacramento HCP proposes  
 2 to preserve a total of 1,048 acres of vernal pool, or vernal impoundment and 170 acres of vernal  
 3 swale in a matrix of valley grassland, and restore a total of 363 acres of vernal pool or vernal  
 4 impoundment in a matrix of valley grassland. The total preservation and restoration of vernal  
 5 pools and alkalai seasonal wetlands proposed by the South Sacramento HCP is approximately  
 6 1,800 acres, or 24%, of an estimated 7,500 acres available in the South Sacramento HCP area.  
 7 The BDCP does not have specific requirements for vernal pools or alkalai seasonal wetland  
 8 preservation in CZ 4, so there is minimal potential for conflict in achieving the preservation  
 9 targets of the South Sacramento HCP in the overlap area.

#### 10 ***Yolo Natural Heritage Program***

11 The Yolo County NCCP/HCP Joint Powers Authority (JPA), consisting of five local public agencies,  
 12 launched the YNHP in March 2007. Member agencies are Yolo County and the cities of Davis,  
 13 Woodland, West Sacramento, and Winters. In addition, a representative of University of California,  
 14 Davis, serves as an ex-officio member of the JPA board. The YNHP covers a 653,818-acre planning  
 15 area, 17% of which overlaps with the BDCP. The YNHP documents are in development. The  
 16 proposed list of covered species contains 32 sensitive species in five principal natural communities.  
 17 The YNHP overlaps with the BDCP in the Yolo Bypass area (CZs 2 and 3) (Figure 12-3) and has 20  
 18 species in common with the BDCP (BDCP Table 1-4). Within the overlapping area, the YNHP targets  
 19 for acquisition include annual grasslands, riparian, and cultivated lands. BDCP proposes to acquire  
 20 cultivated lands, acquire or restore grasslands, and restore nontidal marsh in portions of the  
 21 overlapping area, primarily to benefit giant garter snake. Additionally, BDCP proposes tidal  
 22 restoration in the Cache Slough ROA, which partly overlaps with the YNHP plan area. The potential  
 23 exists for competition for restoration sites and land acquisition, but the overlap also creates  
 24 opportunities for coordination, partnerships, and achieving common conservation goals.

25 Based on a simple analysis of the major natural community types for the intersecting area of the two  
 26 plans (Table 12-17), there is significant overlap between tidal and wetland land cover types. In other  
 27 words, most conservation targets for these land cover types in the YNHP would need to be  
 28 addressed within the overlap area. However, the overlap area has more than 10,000 acres of  
 29 mapped wetland available for acquisition or restoration and almost 5,000 acres of tidal land cover  
 30 type. BDCP CM4 would restore or create at least 24,000 acres of tidal freshwater emergent wetland,  
 31 a portion of which would be located in CZ 2 (within the overlap area). The BDCP targets 600 acres of  
 32 nontidal marsh restoration (crosswalked to “wetlands” in this analysis), 200 acres of grassland  
 33 protection or restoration, and 700 acres of cultivated lands protection within or adjacent to habitat  
 34 occupied by the giant garter snake Yolo/Willow Slough subpopulation in CZ 2, entirely within Yolo  
 35 County. The YNHP also has conservation targets for giant garter snakes in this subpopulation, but it  
 36 is focused in the YNHP Willow Slough Basin Planning Unit, only a small portion of which overlaps  
 37 with the BDCP Plan Area. The two plans could work together to jointly achieve conservation for  
 38 giant garter snake in the Yolo/Willow Slough subpopulation.

39 Below is a description of specific BDCP actions and a brief discussion of the overlap with YNHP.

- 40 ● **Permanent Surface Disturbance.** Under CM1, water conveyance facilities located in the YNHP  
 41 area would result in permanent surface impacts of up to 5,834 acres under Alternative 1C that  
 42 may remove lands available for conservation (Table 12-11). There would be no permanent  
 43 surface impacts of the water conveyance facilities from the other alternatives.

- 1       • **Cultivated Lands Preservation.** Within CZs 2 and 3, BDCP may protect a portion of the total  
2 conservation goal of 1,000 acres of cultivated lands as foraging habitat for Swainson’s hawk  
3 (CM3), thus removing it from conservation under the YNHP. There is an approximately 17,500  
4 acres of cultivated land in the area where the BDCP overlaps with the YNHP. An estimated 6,158  
5 acres of cultivated would be lost under CM1 in the overlap area, approximately 35% of the  
6 cultivated land available for preservation. BDCP CM4 would restore or create at least 24,000  
7 acres of tidal freshwater emergent wetland, a portion of which would occur in CZ 2, within the  
8 overlap area.
- 9       • **Riparian Restoration.** CM7 would restore 5,000 acres of riparian forest and scrub in the BDCP  
10 Plan Area in association with restoration of tidal wetlands and floodplains. A portion of this  
11 restoration would occur in CZ 2, although most is expected to occur in CZ 7, outside the overlap  
12 area. The YNHP also has conservation targets for riparian but most of it is targeted for YNHP  
13 planning units outside the overlap area.
- 14       • **Floodplain Restoration.** Implementation of BDCP CM2 would increase the annual average  
15 inundation of the Yolo floodplain within the overlap area of the two plans. This measure would  
16 help to restore habitat in Cache Slough (a portion of which is within the YNHP area) for delta  
17 smelt, longfin smelt, and other BDCP covered fish species. The YNHP conservation strategy does  
18 not include any conservation measures within the Yolo Bypass, so an increase in inundation  
19 frequency and duration as a result of BDCP is not expected to affect the YNHP. BDCP will  
20 mitigate for any significant impacts on terrestrial species that would result from inundation.
- 21       • **Wetlands Restoration.** CM10 would restore 600 acres of nontidal marsh within or adjacent to  
22 habitat occupied by the giant garter snake Yolo/Willow Slough subpopulation in CZ 2.  
23 Approximately 58% of CZ 2 consists of protected land, and there remain ample opportunities to  
24 protect cultivated lands and associated natural communities in large blocks connected to open  
25 space. Yolo Bypass Wildlife Area and other open space lands owned by CDFW are present in the  
26 central and northern portions of CZ 2, while Liberty Island, owned by the Trust for Public Lands,  
27 and other land owners by the U.S. Army Corps of Engineers and the Bureau of Reclamation are  
28 present in the southern portion. Based on the amount of overlap between YNHP and BDCP areas  
29 (Table 12-9), there may be limited potential for conflict and possibilities for joint collaboration  
30 in restoration efforts.

### 31 **Effects of Other BDCP Conservation Measures on Overlapping Conservation Plans**

32 The BDCP contains management-based conservation measures designed to meet or contribute to  
33 the biological goals and objectives identified in BDCP Chapter 3, Section 3.3, *Biological Goals and*  
34 *Objectives*. Many of these conservation measures are designed to address “other stressors” of the  
35 BDCP covered fish. While many of these conservation measure are expected to occur within the  
36 overlapping conservation plans (Table 12-28), most would occur within the aquatic environment of  
37 the Delta, resulting in minimal overlap with the other conservation plans (which focus primarily on  
38 upland and terrestrial areas). Potential areas for overlap are identified in this section and are  
39 considered to be manageable and/or avoidable.

- 40       • *CM11 Natural Communities Enhancement and Management* outlines a suite of management  
41 techniques to be applied across the BDCP reserve system and for each natural community. CM11  
42 would overlap all other conservation plans and be applied wherever BDCP acquires land for the  
43 reserve system. The management techniques described in CM11 are similar or the same as those

- 1 of the other conservation plans, so management is expected to be highly compatible where  
2 conservation lands of overlapping plans occur adjacent or near to each other.
- 3 ● *CM13 Invasive Aquatic Vegetation Control* would be applied in aquatic systems throughout the  
4 BDCP Plan Area, with concentrated activities expected within the five ROAs. Therefore, this  
5 conservation measure is likely to overlap with most of the other conservation plans (Table 12-  
6 28). Invasive aquatic vegetation is a serious problem identified in several other conservation  
7 plans, so this BDCP conservation measure is expected to be consistent with the other  
8 overlapping plans.
  - 9 ● *CM14 Stockton Deep Water Ship Channel Dissolved Oxygen Levels* would only be applied in the  
10 Stockton Deep Water Ship Channel in San Joaquin County. This measure is compatible with the  
11 goals of the SJCMShCP, which also covers green sturgeon. This species is expected to be benefit  
12 from this conservation measure.
  - 13 ● *CM15 Localized Reduction of Predatory Fishes* would be applied in select locations throughout  
14 the Plan Area. The conservation measure is likely to be applied in the overlap areas of the  
15 SJCMShCP, Yolo HCP, and South Sacramento HCP, and may be applied in the Solano HCP and  
16 ECCC HCP/NCCP. Predator control measures would not conflict with existing or planned  
17 conservation plans because they would be applied in aquatic systems only, which does not  
18 overlap with most plans. Of these plans, only the SJCMShCP and Solano HCP cover fish also  
19 covered by BDCP.
  - 20 ● *CM18 Conservation Hatcheries* requires the establishment of new hatcheries, and the expansion  
21 of existing conservation propagation programs for delta and longfin smelt. CM18 would be  
22 implemented near Rio Vista in Solano County. A small amount of land would need to be acquired  
23 to build the longfin smelt hatchery. Because the planned site is already disturbed, this  
24 acquisition would not conflict with the Solano HCP.
  - 25 ● *CM19 Urban Stormwater Treatment, CM20 Recreational Users Invasive Species Program, and*  
26 *CM21 Nonproject Diversions*, would be implemented throughout the BDCP Plan Area and are  
27 likely to overlap with almost all of the other conservation plans. The exact locations of their  
28 implementation are not known because CM19 and CM21 rely on willing participants that have  
29 not been identified yet. Despite this uncertainty, these conservation measures are likely to be  
30 compatible with or at least not conflict with the other conservation plans because they are  
31 restricted to aquatic areas that are largely not addressed by the other conservation plans.

1 **Table 12-28. Potential Occurrence of Other BDCP Conservation Measures in Overlapping Conservation**  
 2 **Plans**

BDCP Conservation Measure	ECCC HCP/NCCP	San Joaquin	EACCS	Solano MSHCP	South Sacramento HCP	YNHP
<i>CM11 Natural Communities Enhancement and Management</i>	Yes	Yes	Potentially	Yes	Yes	Yes
<i>CM12 Methylmercury Management</i>	W Delta ROA (Dutch Slough)	South Delta ROA	None	Suisun Marsh and Cache Slough ROAs	Cosumnes-Mokulemne ROA	Cache Slough ROA
<i>CM13 Invasive Aquatic Vegetation Control</i>	Yes	Yes	None	Yes	Yes	Yes
<i>CM14 Stockton Deep Water Ship Channel Dissolved Oxygen Levels</i>	None	Yes	None	None	None	None
<i>CM15 Localized Reduction of Predatory Fishes</i>	Potentially	Yes	None	Potentially	Yes	Yes
<i>CM16 Nonphysical Fish Barriers</i>	Unlikely	Yes	None	Potentially	Yes	Yes
<i>CM17 Illegal Harvest Reduction</i>	Potentially	Yes	None	Yes	Yes	Yes
<i>CM18 Conservation Hatcheries</i>	None	None	None	Yes	None	None
<i>CM19 Urban Stormwater Treatment</i>	Potentially	Potentially	None	Potentially	Potentially	Potentially
<i>CM20 Recreational Users Invasive Species Program</i>	Yes	Yes	None	Yes	Yes	Yes
<i>CM21 Nonproject Diversions</i>	Potentially	Potentially	None	Potentially	Potentially	Potentially

3

#### 4 **CEQA Conclusion**

5 The BDCP overlaps geographically with six conservation plans. Impacts from construction and  
 6 implementation of BDCP alternatives are not anticipated to affect implementation of the overlapping  
 7 plans. Understanding whether BDCP acquisition and restoration goals would preclude the  
 8 implementation of other conservation plans is more challenging. The analysis above indicates that  
 9 the degree to which this competition would impact the conservation goals of other plans is limited.  
 10 In most cases, because of the flexibility for acquisition targets incorporated into the BDCP and other  
 11 plans, the potential conflict would be manageable, and significant conflicts with the implementation  
 12 of overlapping plans could be avoided. Because the conservation strategy for the YNHP and South  
 13 Sacramento HCP are not available, further analysis may be required at a later date. In certain cases,  
 14 especially pertaining to similar restoration objectives, perceived conflicts may also represent  
 15 opportunities for collaboration to jointly achieve similar conservation goals. Because implementing  
 16 the BDCP would not result in a conflict with the provisions of an adopted HCP, NCCP or other  
 17 approved local, regional or state habitat conservation plan, there would be a less-than-significant  
 18 impact.

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